State of Pensions 2020

Equable Institute's First Annual Report

Pension Trends to Know in the Age of COVID

ABOUT THIS REPORT

State of Pensions an annual report on the status of statewide public pension systems, put into a historic context. State and local governments face a wide range of challenges in general – and some of the largest are growing and unpredictable pension costs. The scale and effects of these challenges is best understood by considering the context of multi-decade financial trends that have brought public sector retirement systems to this moment.

Our analyses begin with the topline, aggregated trends over the past two decades, and proceed by digging into some of those data points to show how the trends vary across the states and over time.

Learning from history and looking beyond the headline figures is important for finding paths into the future that can bring states closer to sustainable and accountable retirement systems that ensure retirement security for all public workers.

We focus in this report on the largest statewide retirement systems (measured as those with at least $1 billion in promised benefits). We use publicly available data reported by the retirement systems themselves. In future reports, we intend to expand the scope to cover large municipal retirement systems too.

Looking closely at these trends in public pension plans underscores two essential points:

> There is a wide range of financial performance for pension plans; a few states are well managed, some states are on the brink of pension insolvency, and most are somewhere in-between.

> The problems facing states are not an inherent result of offering pensions in the first place; the problems stem from a political apathy toward the steadily growing rate of unfunded liabilities and the costs they produce.

While the concrete effects of the COVID-19 pandemic are not fully known, we can't ignore the reality that the pandemic will have a negative influence on pension plans. There will be economic effects on state governments that lead to underfunding of employer contributions. There will be (and have been) financial effects on pension fund investment returns. To anticipate how the novel coronavirus will exacerbate financial threats to public pensions, this report also looks at patterns of behavior following the Great Recession as a guide to what might happen in the coming decade.

Technical Note: As of this publication, some states had not yet released all of their FYE 2019 numbers. For these few plans we've rolled forward 2018 figures to 2019. As new data is released, we will update our figures. See methodological notes at the end for more details.

THIS IS THE STATE OF PENSIONS IN 2020

Technical Note: As of this publication, some states had not yet released all of their FYE 2019 numbers. For these few plans we've rolled forward 2018 figures to 2019. As new data is released, we will update our figures. See methodological notes at the end for more details.

ABOUT
EQUABLE INSTITUTE

Equable is a bipartisan non-profit that works with public retirement system stakeholders to solve complex pension funding challenges with data-driven solutions.

For an interactive version of the report, visit Equable.org/stateofpensions.

Some states have not released their final data points for 2019. We will be updating our graphics and figures throughout the year as more states release information.

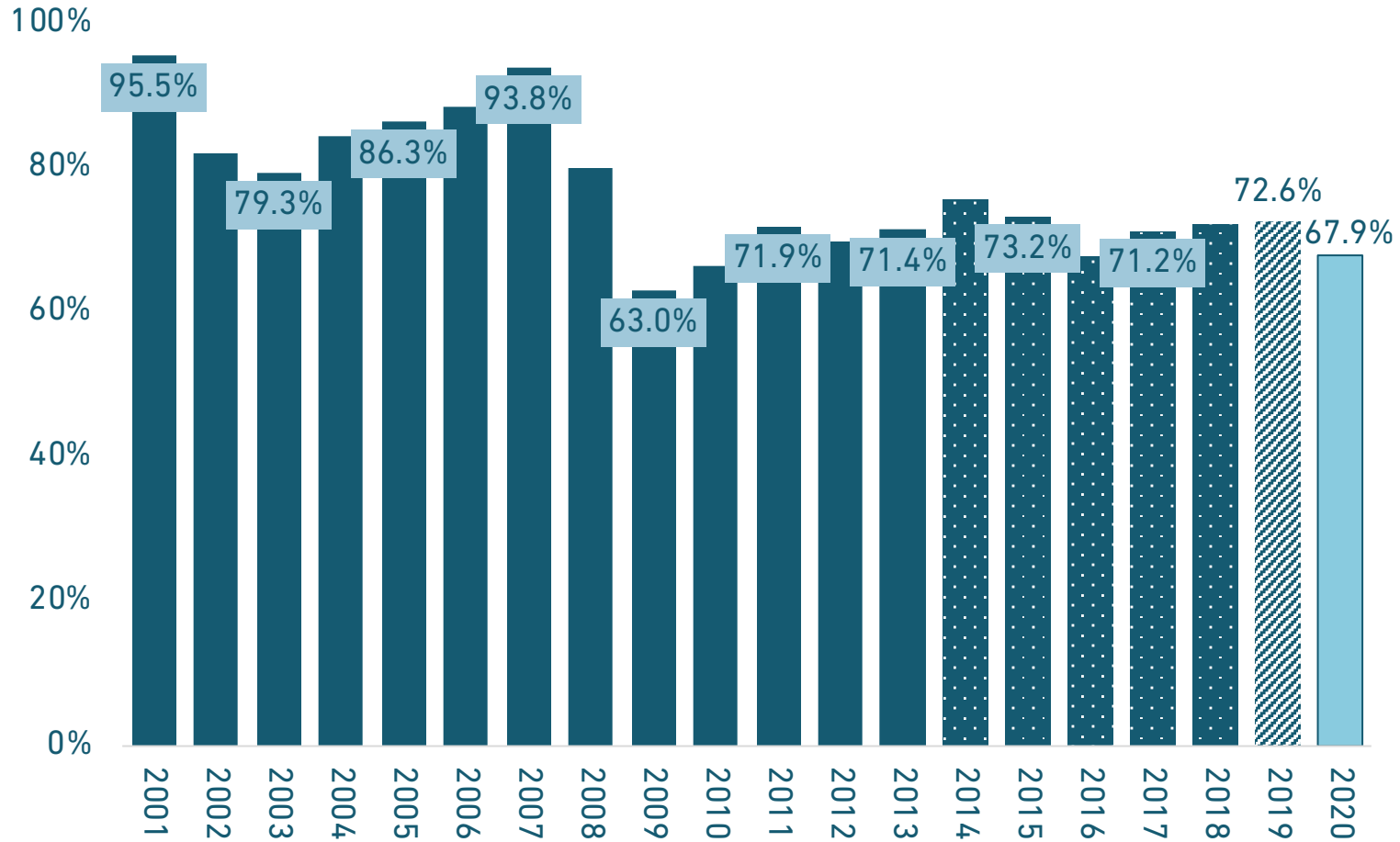
About the Authors:

Anthony Randazzo (Executive Director) is a national expert on public sector pension policy and has provided technical assistance to more than a dozen states and cities on ways to improve retirement plan sustainability.

Jonathan Moody, PhD (Research VP) has developed a wide range of academic and policy research on municipal finance subjects, including state budgeting and reserve funds, state credit ratings, state fiscal management, and public retirement benefits.

National Trends for State Pension Plans

FUNDED RATIO AVERAGE FOR STATEWIDE PENSION PLANS | 2001-2019 + 2020 Estimate

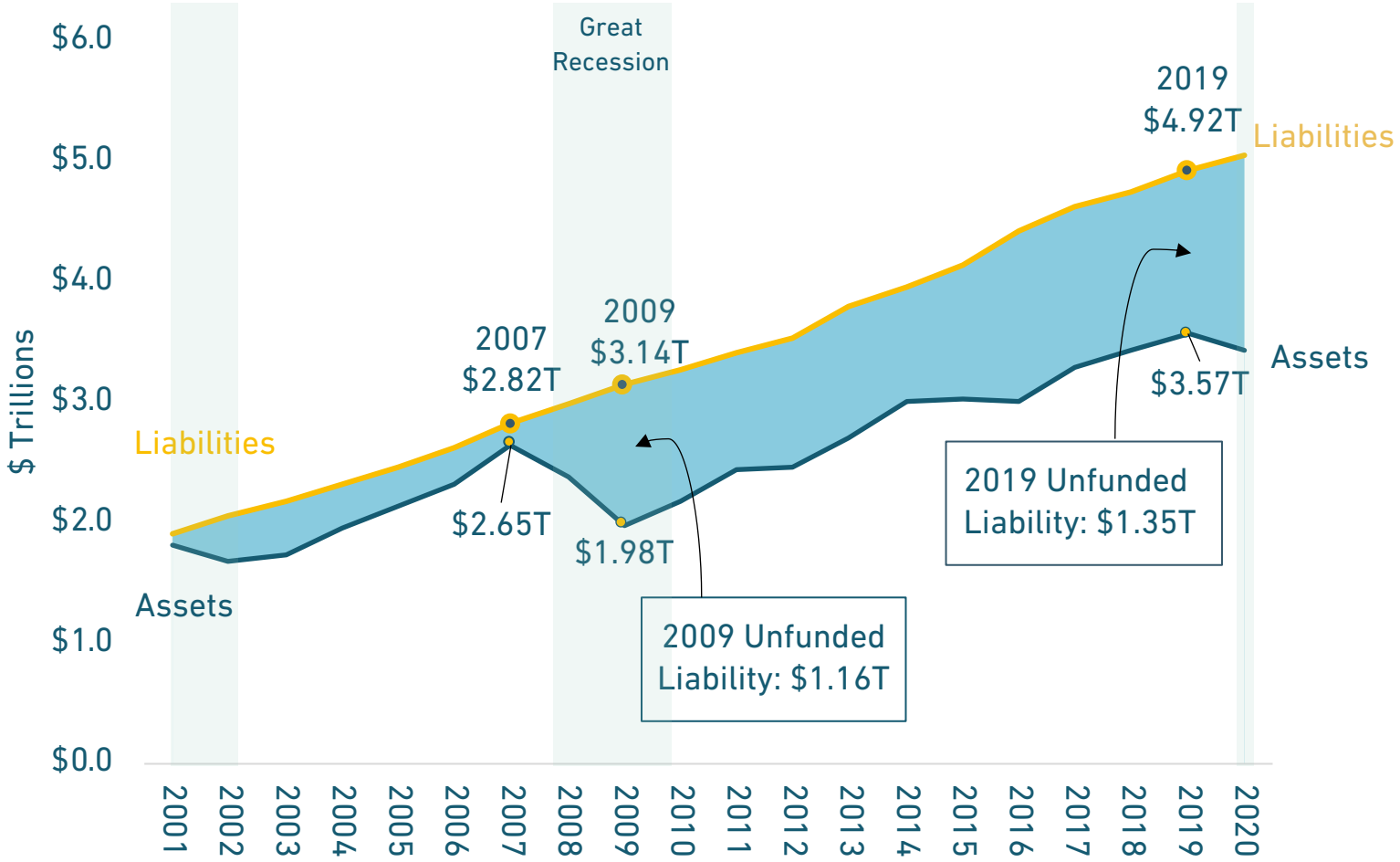


The aggregate funded ratio for statewide plans collectively is near its lowest point in modern history.

- Based on Accrued Liabilities
- Based on Total Pension Liabilities
- Based on 2019 Data Availability
- 2020 Estimate Based on June 30 Returns

Source: Equable Institute analysis of public plan valuation reports and CAFRs. Data for 2001 to 2013 reflects the "actuarially accrued liabilities" reported by public plans. Data from 2014 onward uses the new GASB 67 "total pension liability" measurement. See methodology section for details on 2020 estimate.

TOTAL UNFUNDED LIABILITIES FOR STATEWIDE PENSION PLANS | 2001-2019 + 2020 Estimate



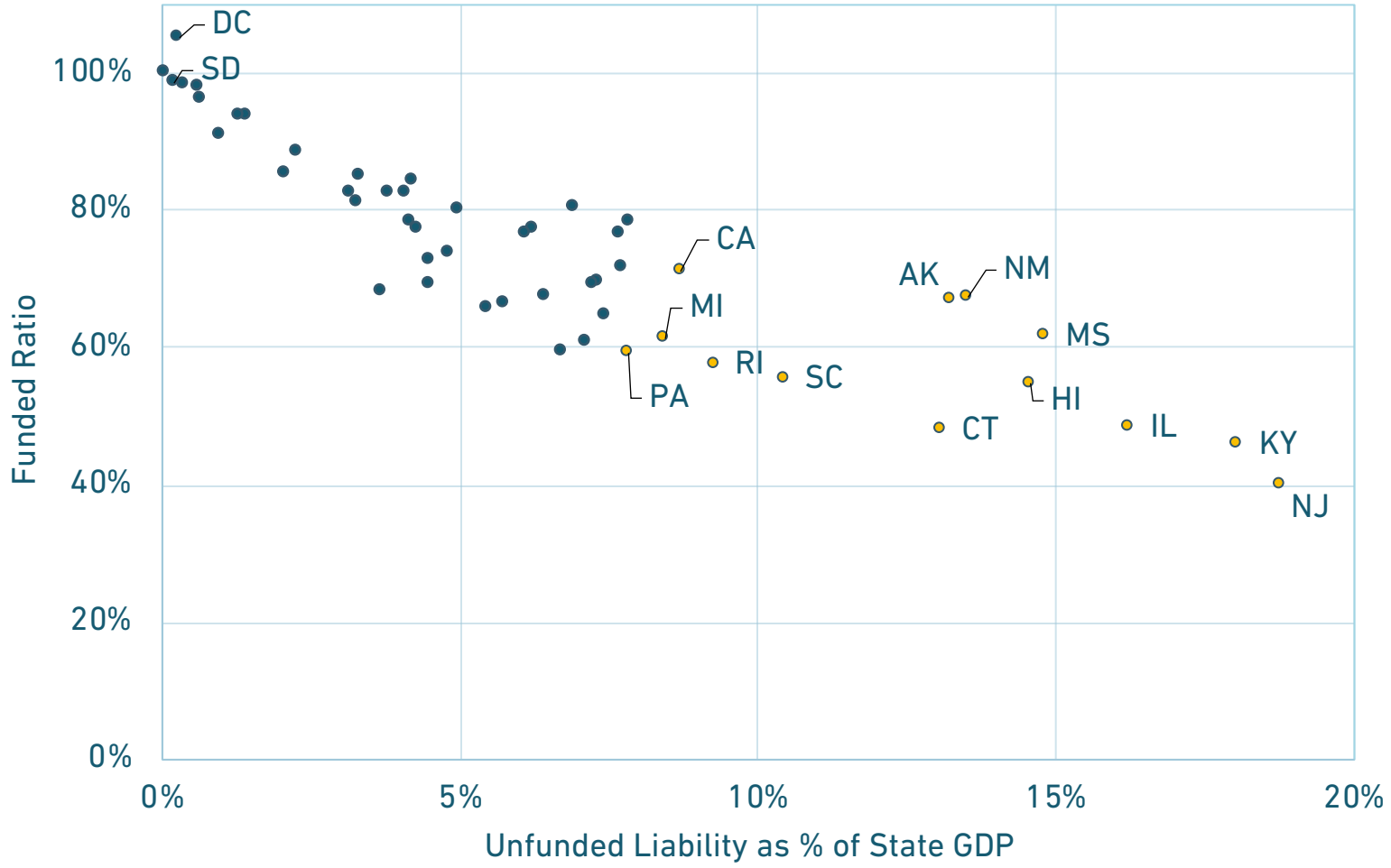
The pension asset shortfall for statewide plans keeps growing. At the end of 2019, there was no net recovery from losses during the Great Recession and Financial Crisis.

Total unfunded liabilities for statewide plans in 2001 were roughly $100 billion. The shortfall was **$1.16 trillion** at the end of 2009, and **$1.35 trillion** in 2019.

We estimate that unfunded liabilities will grow to **$1.62 trillion** in 2020 due to market underperformance and negative cash flows.

Source: Equable Institute analysis of public plan valuation reports and CAFRs. Trendline shown is based on market value of assets; using the "actuarial" value of assets shows a similar trend. See methodology section for details on 2020 estimate.

2019 FUNDED STATUS AS A SHARE OF STATE ECONOMIC OUTPUT



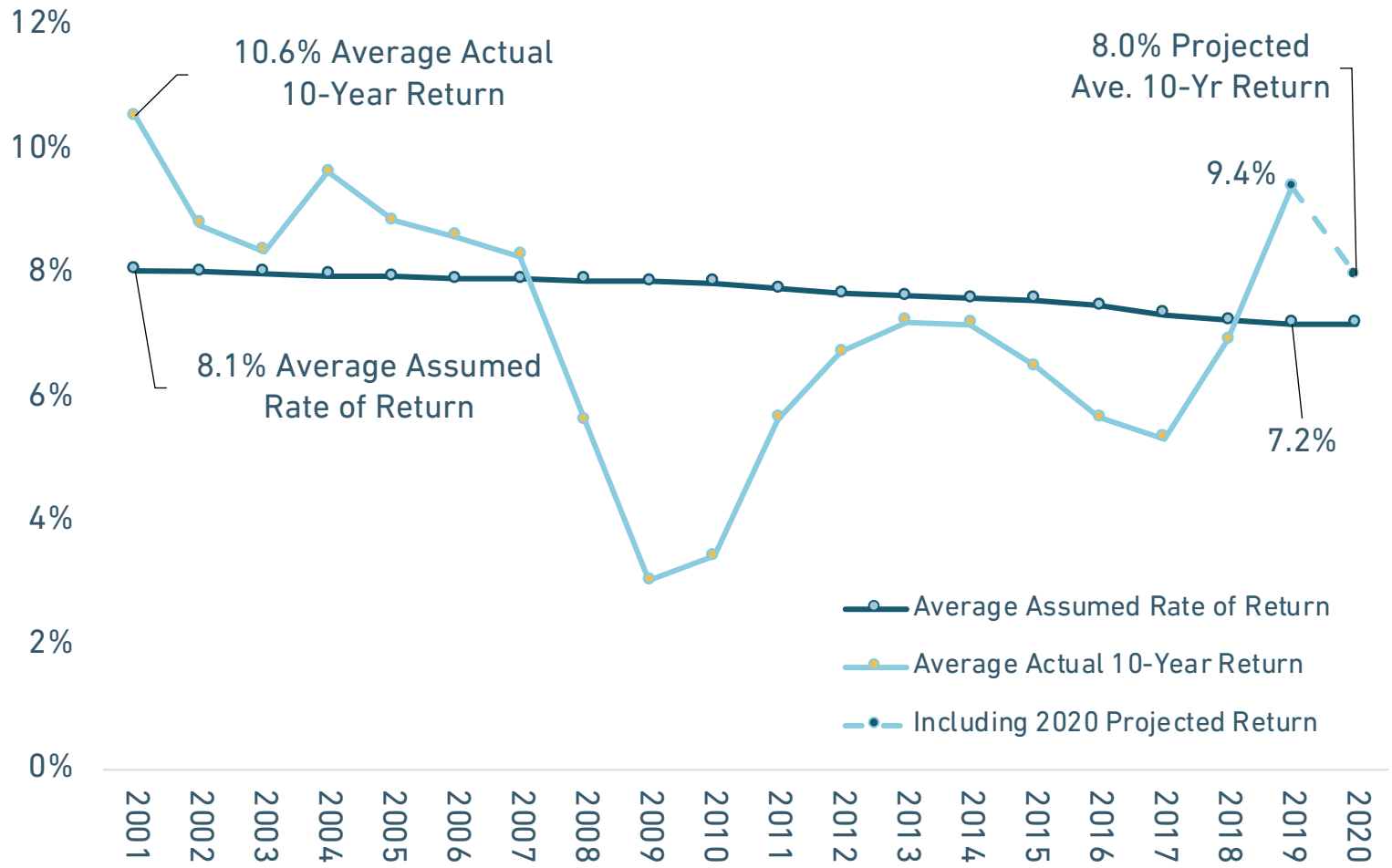
Funded ratio and unfunded liability levels on their own are not perfect indicators of plan health.

Understanding the size of unfunded liabilities relative to the size of a state's economy gives a sense of what scale of resources will be needed from a local tax base to improve funded status.

Find your state with our interactive version

Source: Equable Institute analysis of public plan valuation reports and CAFRs; Bureau of Economic Analysis data for state GDP estimate in 2019.

INVESTMENT RETURN AVERAGES COMPARED TO ASSUMED RATES OF RETURN | 2001-2019

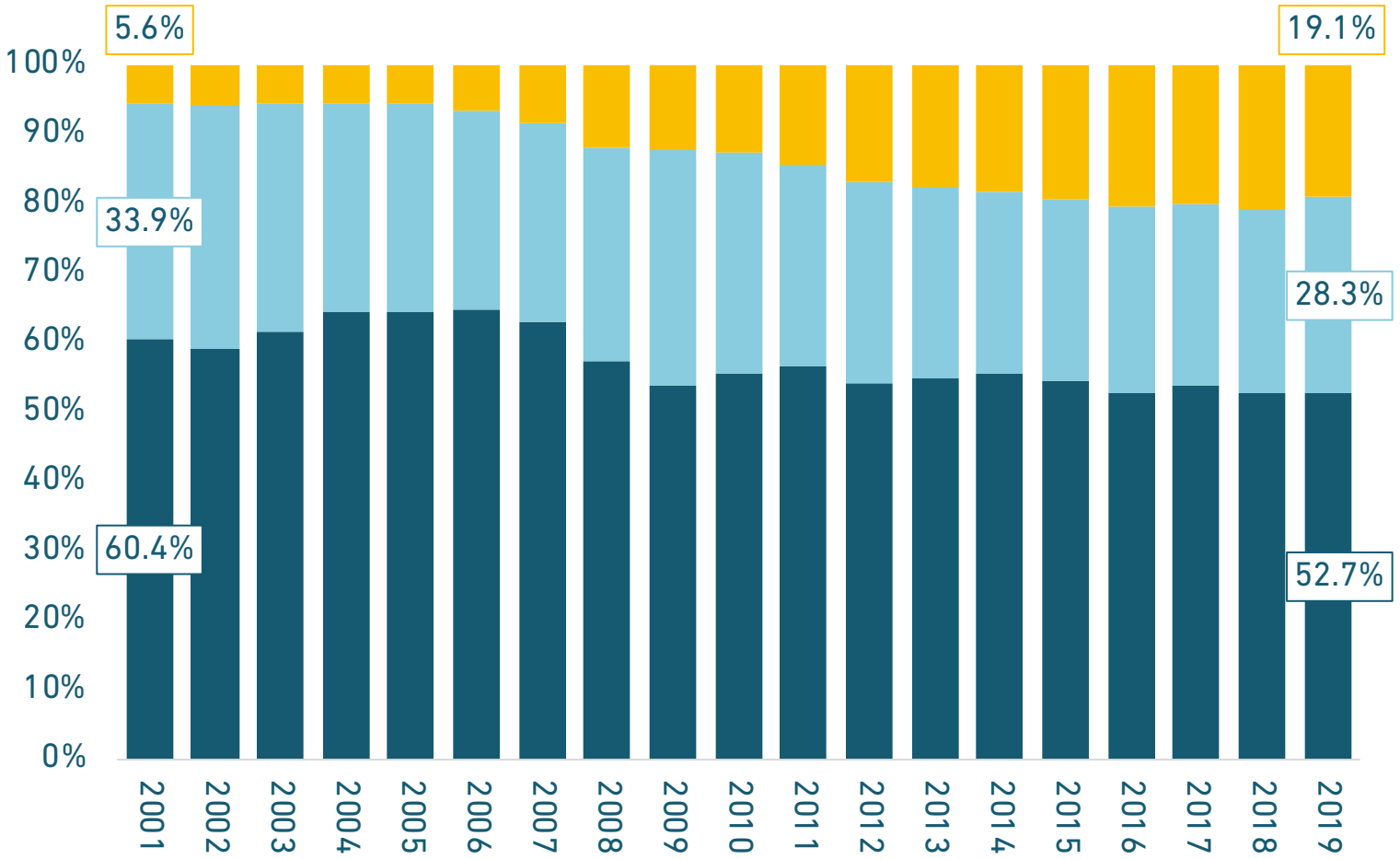


Average investment returns were consistently below assumed rates of return over the past decade. This contributed to the growth in unfunded liabilities for public plans.

Strong returns during the past few years increased the 10-year rolling average above the assumed return line in 2019.

Source: Equable Institute analysis of public plan valuation reports and CAFRs. Average 10-year return for 2020 is based on Equable's projected investment returns as of June 30, 2020.

ASSET ALLOCATION TREND
OF STATEWIDE PENSION FUNDS | 2001-2019



Asset allocations have shifted away from relatively safe fixed income investments into riskier categories in a search for stronger investment returns.

"Alternative" investments include private equity, hedge funds, real estate, commodities, and tactical asset allocations.

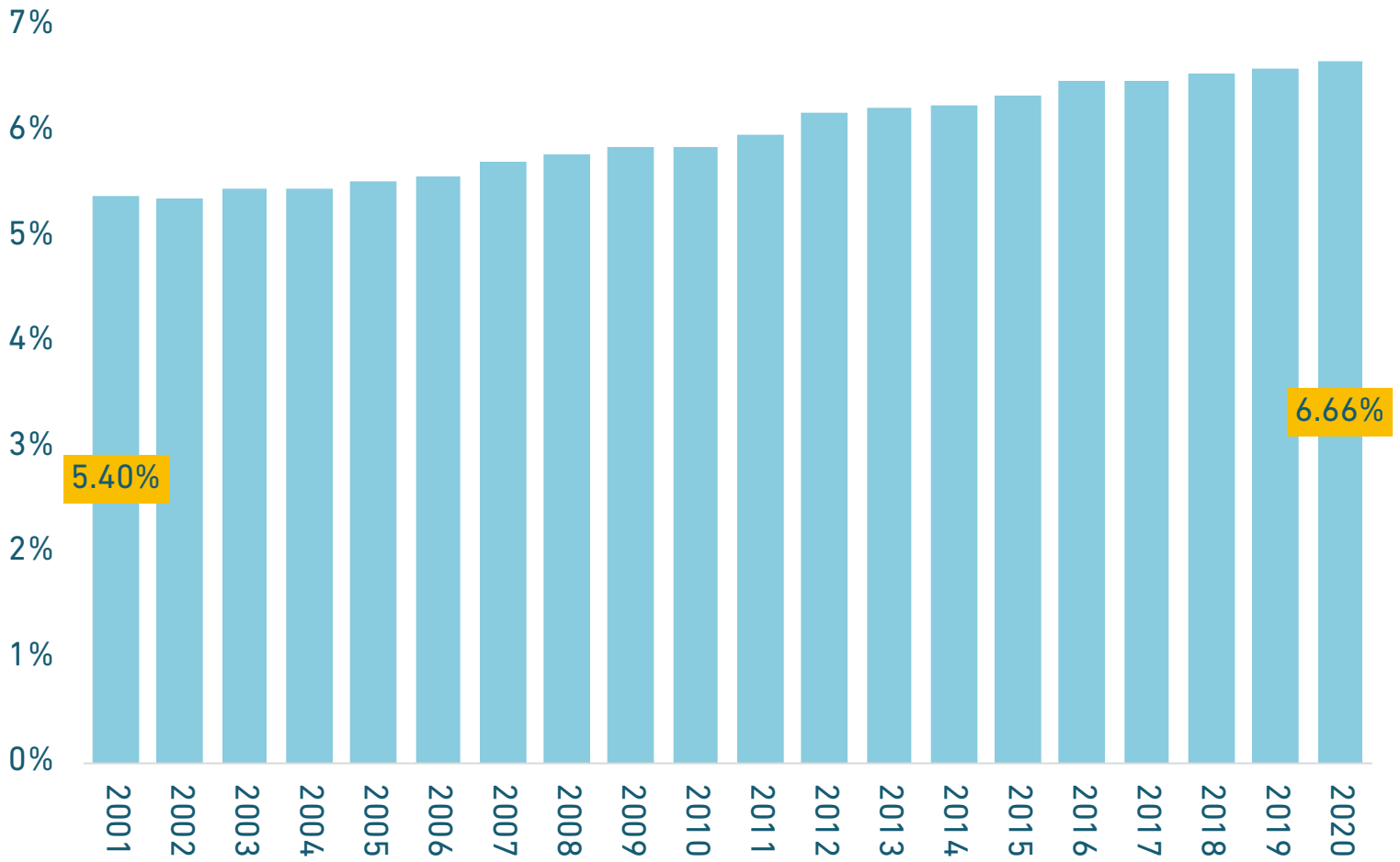
Alternatives

Fixed Income & Cash Holdings

Equities

Source: Equable Institute analysis of public plan valuation reports and CAFRs.

AVERAGE MEMBER CONTRIBUTIONS
AS A PERCENTAGE OF PAYROLL | 2001-2020



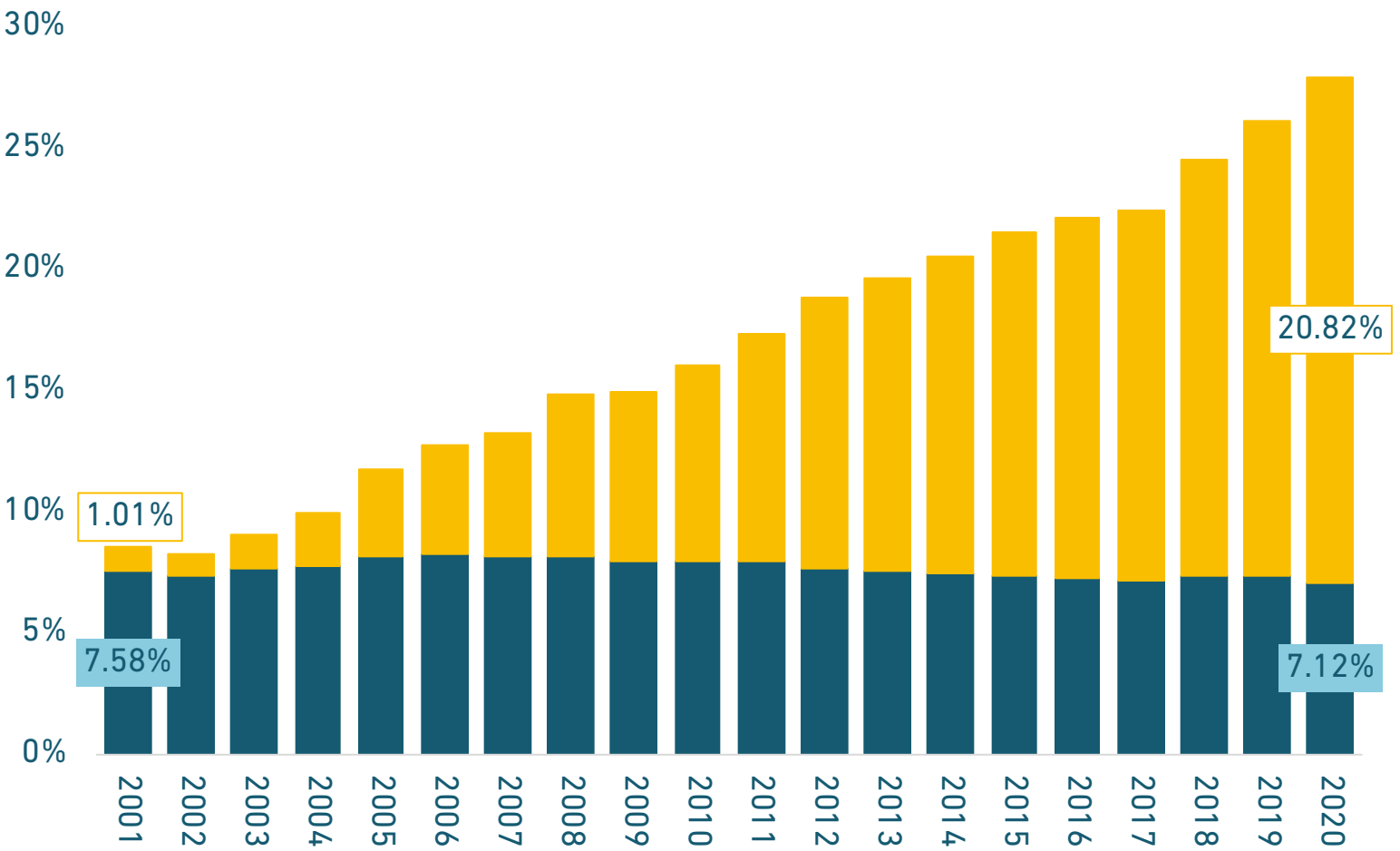
Employee contributions to their own retirement plans have been steadily increasing.

Cumulatively, public sector workers are paying **126 basis points more** (**a 19% increase**) during the 2020 fiscal year than they were during the 2001 fiscal year.

Note: Public employees are not uniformly covered by Social Security. Some states never opted into Social Security, and therefore typically have higher valued benefits and relatively higher contribution rates than for statewide systems where members also have access to Social Security benefits. For a look at this trendline broken out by Social Security participation see the Appendix 1 of this report.

Source: Equable Institute analysis of public plan valuation reports and CAFRs. Contribution rates show for the year actually paid. Notes: (1) Increased contributions do not increase the value of a pension, which is based on years of service and final average salary. (2) Contribution rates are required and set by the sponsoring government.

AVERAGE EMPLOYER CONTRIBUTIONS
AS A PERCENTAGE OF PAYROLL | 2001-2020



Government employer contributions have steadily increased over the past two decades, mostly because of increased unfunded liability amortization payments.

Employer contributions in 2001 were **8.59%** of payroll. During the fiscal year ending 2020, employer contributions are **27.94%**.

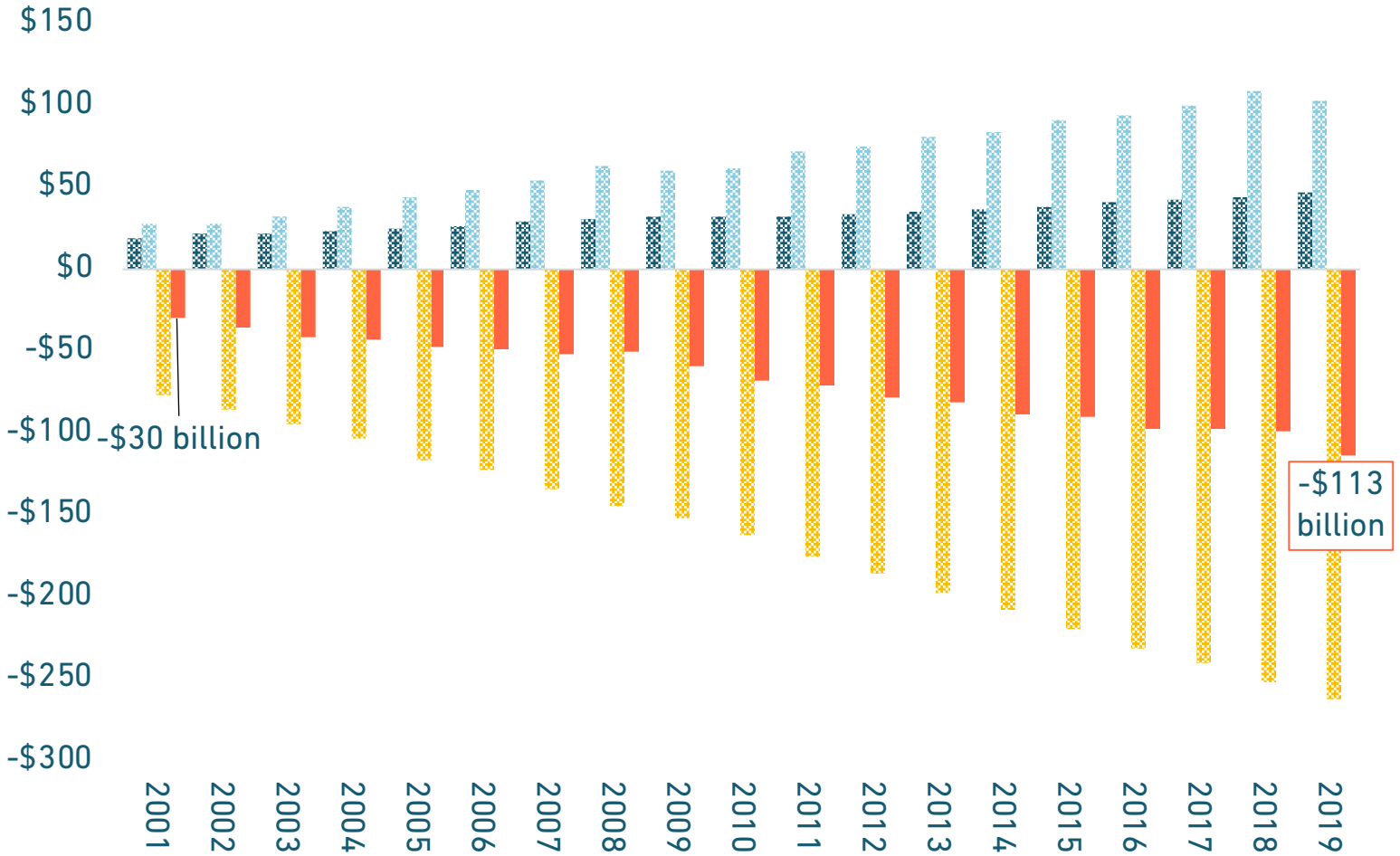
Unfunded Liability Amortization Payments

Normal Cost

Note: Normal cost is the contribution necessary to fund pension benefits earned each year, assuming some future investment income. The normal cost payments pay in advance for pension benefits promised. Unfunded liability amortization payments are contributions made to close a pension plan's funding shortfall over time.

Source: Equable Institute analysis of public plan valuation reports and CAFRs. Contribution rates show for the year actually paid.
Note: For a look at this trendline broken out by Social Security participation see Appendix 1.

AGGREGATE CASH FLOW
FOR STATEWIDE PENSION PLANS | 2001-2019



See our interactive version for all values

Negative net cash flows from contributions and benefit payments have steadily increased over the past two decades, reflecting more "mature" pension plans.

- Net Cash Flow
- Benefit Payments
- Employer Contributions
- Member Contributions

Source: Equable Institute analysis of public plan valuation reports and CAFRs.

Analysis: What We See in the National Trends

The total funded ratio for statewide pensions is near its lowest point in modern history (Page 5). And this is despite a bull market from 2009 to 2019 driving up pension assets plus record levels of contributions into those pension funds.

- **The value of promised benefits is growing faster than assets can keep up** (Page 6). The resulting shortfalls in pension funding (unfunded liabilities) have grown to be more than 10% of GDP in 9 states, and more than 6% of GDP 24 states (Page 7).

- Average pension fund investment returns slowed down over the past two decades, relative to the average rates from the 1990s and early 2000s. However, the rates of returns assumed by statewide pension funds declined only gradually (Page 8). The net result is that **pension fund assets grew less than expected**, which was a key reason for the growth in unfunded liabilities.

- States have more than tripled their contributions into pension funds since 2010 (Page 11), both because of the persistence of pension funding shortfalls and because of improved efforts to pay required contributions based on those unfunded liabilities. But **even the increased contributions from government employers and employees has been less than the steady increase in benefit payments** (outflows) over the past two decades. As a result, statewide pension plans collectively face consistent "negative cash flow" (Page 12). This puts pressure on investment returns to make up the difference between inflows and outflows.

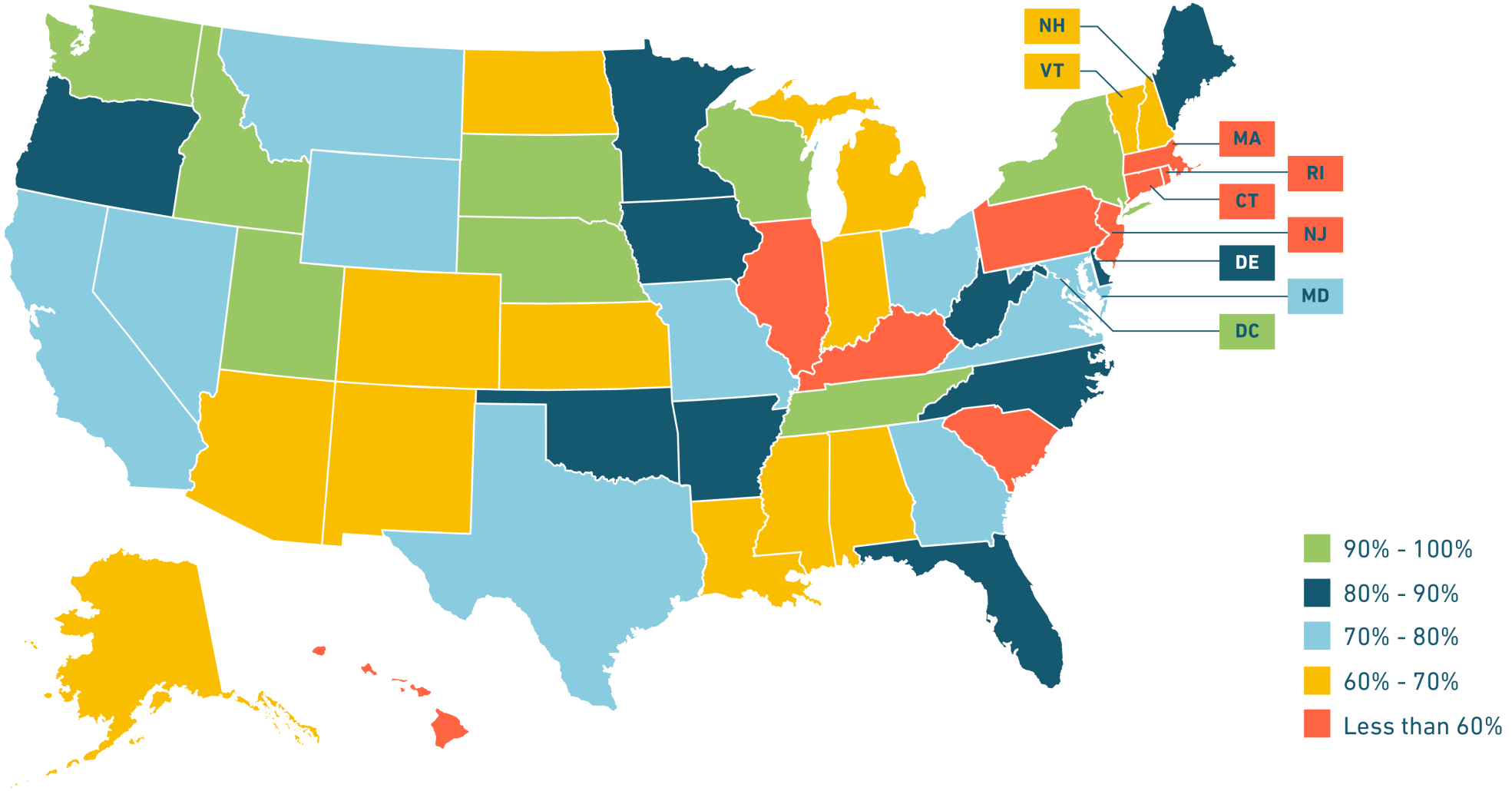
- **In a search to improve investment returns and manage negative cash flow pressure, pension fund managers have allocated an increasing share of public employee money to alternative asset classes**, such as hedge funds, private equity, and real estate (Page 9). These kinds of investments often carry more risk than traditional fixed income or public equities and have less transparency. This shift also happened during a bull market for equities and may have not provided adequate returns to justify the strategy.

Looking to the future: There is a theoretical limit to the contribution rates that state leaders will want to have drawing from their general funds, school district funding, or city budgets. The larger a state's unfunded liability relative to GDP, the harder it will be for that state's tax base to pay down the pension funding shortfall.

Within the Trends:
Funded Status

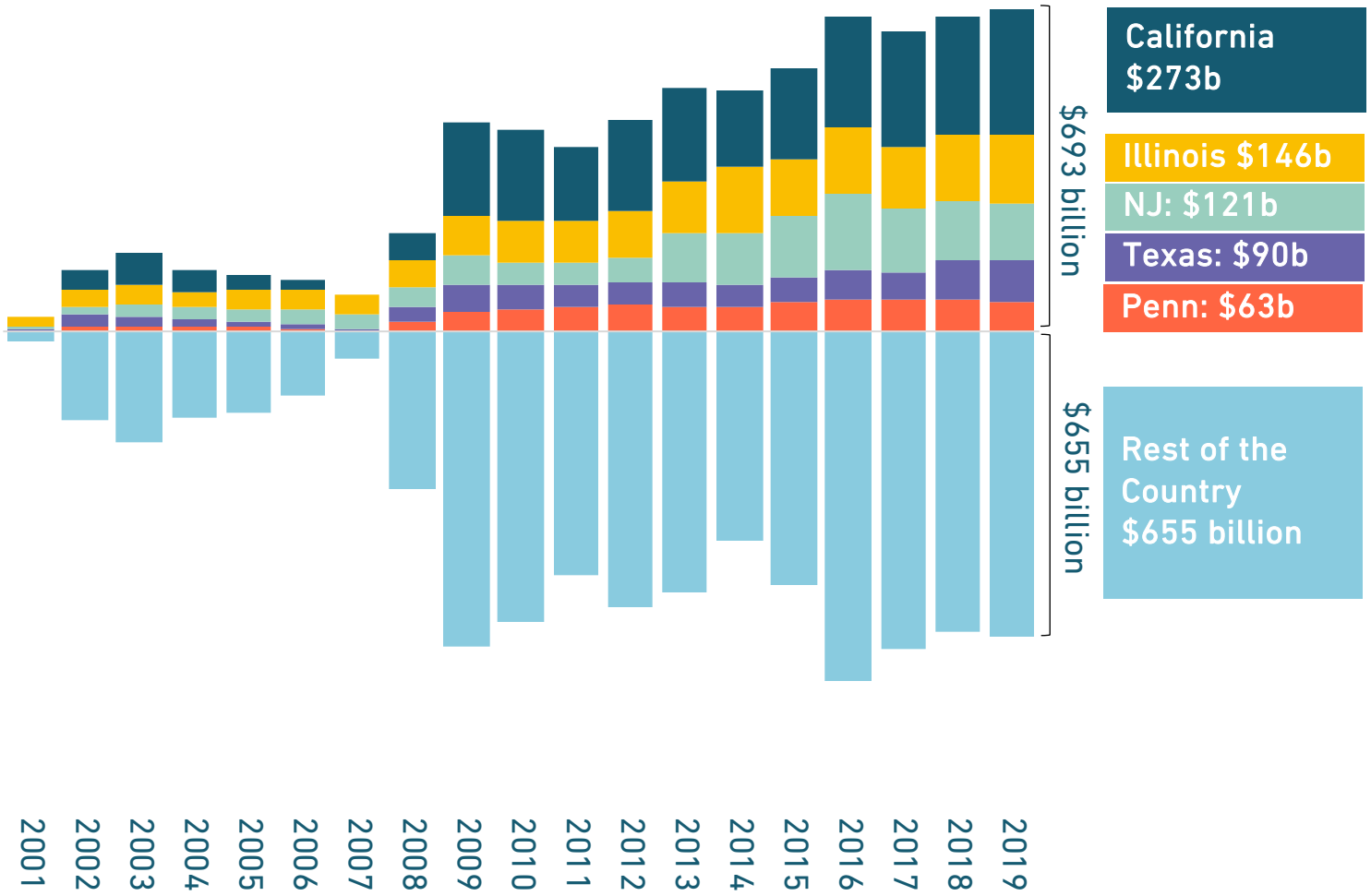
- Funded Ratio
- Unfunded Liabilities

2019 AGGREGATE STATE FUNDED RATIOS, BY STATE



Source: Equable Institute analysis of public plan valuation reports and CAFRs.

UNFUNDED LIABILITY HISTORY
GROUPED BY STATE | 2001-2019

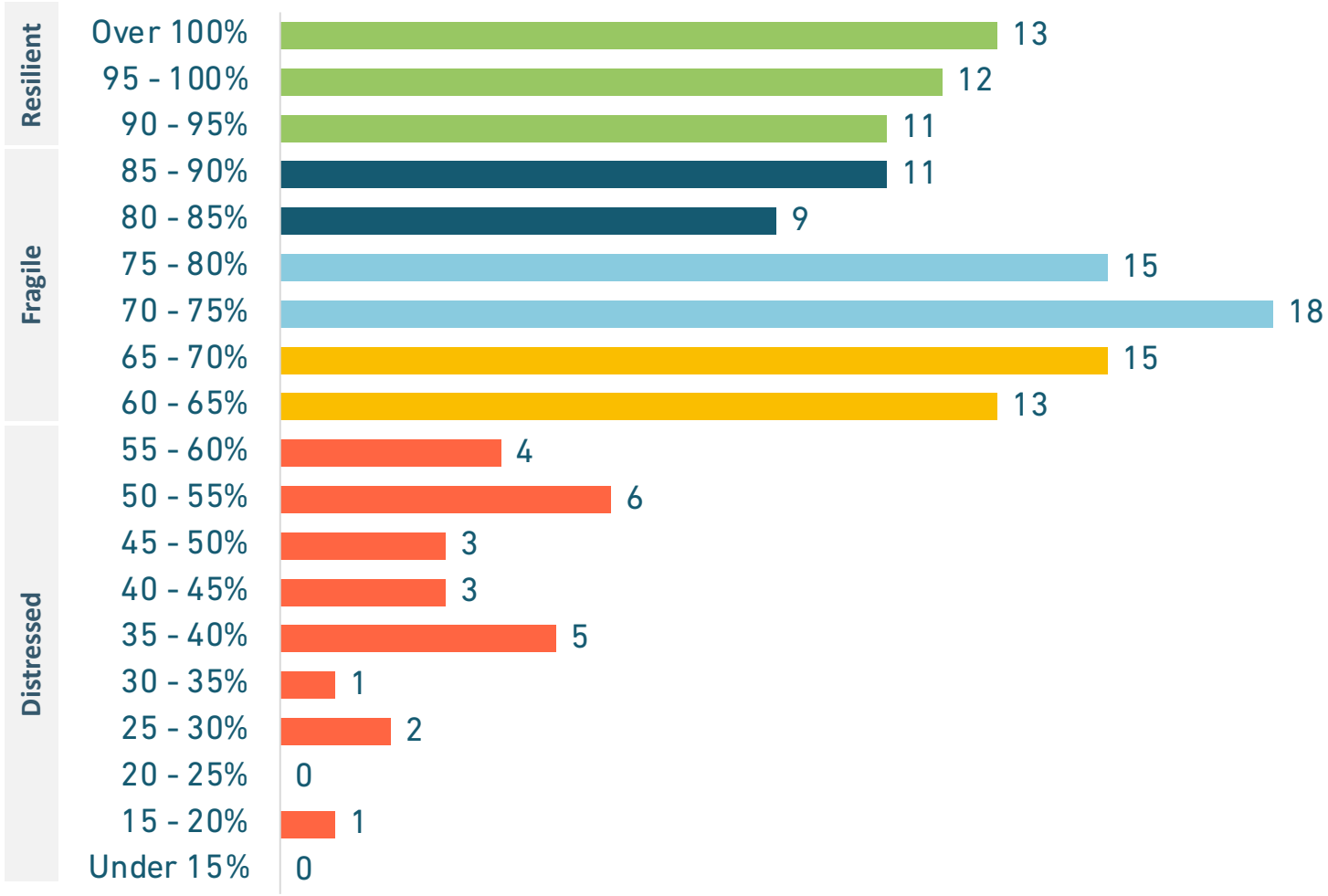


The five largest states by unfunded liabilities have a shortfall (**$693 billion**) that is roughly the same as the rest of the country combined (**$655 billion**).

CalPERS unfunded liabilities (**$161 billion**) are **12%** of the nation's total statewide pension plan funding shortfall. Illinois TRS unfunded liabilities (**$81 billion**) alone are larger than nearly any other single state's funding shortfall.

Source: Equable Institute analysis of public plan valuation reports and CAFRs.

STATE PENSION PLANS BY MOST RECENT FUNDED RATIO



We think about the solvency of state-managed pension funds in three groups —

Resilient: A resilient pension system has a funded ratio of 90% or more for at least two to three years in a row. These plans are generally in a strong position to recover from financial downturns, as funding policy improvements are easier to make when the plan's finances are stable.

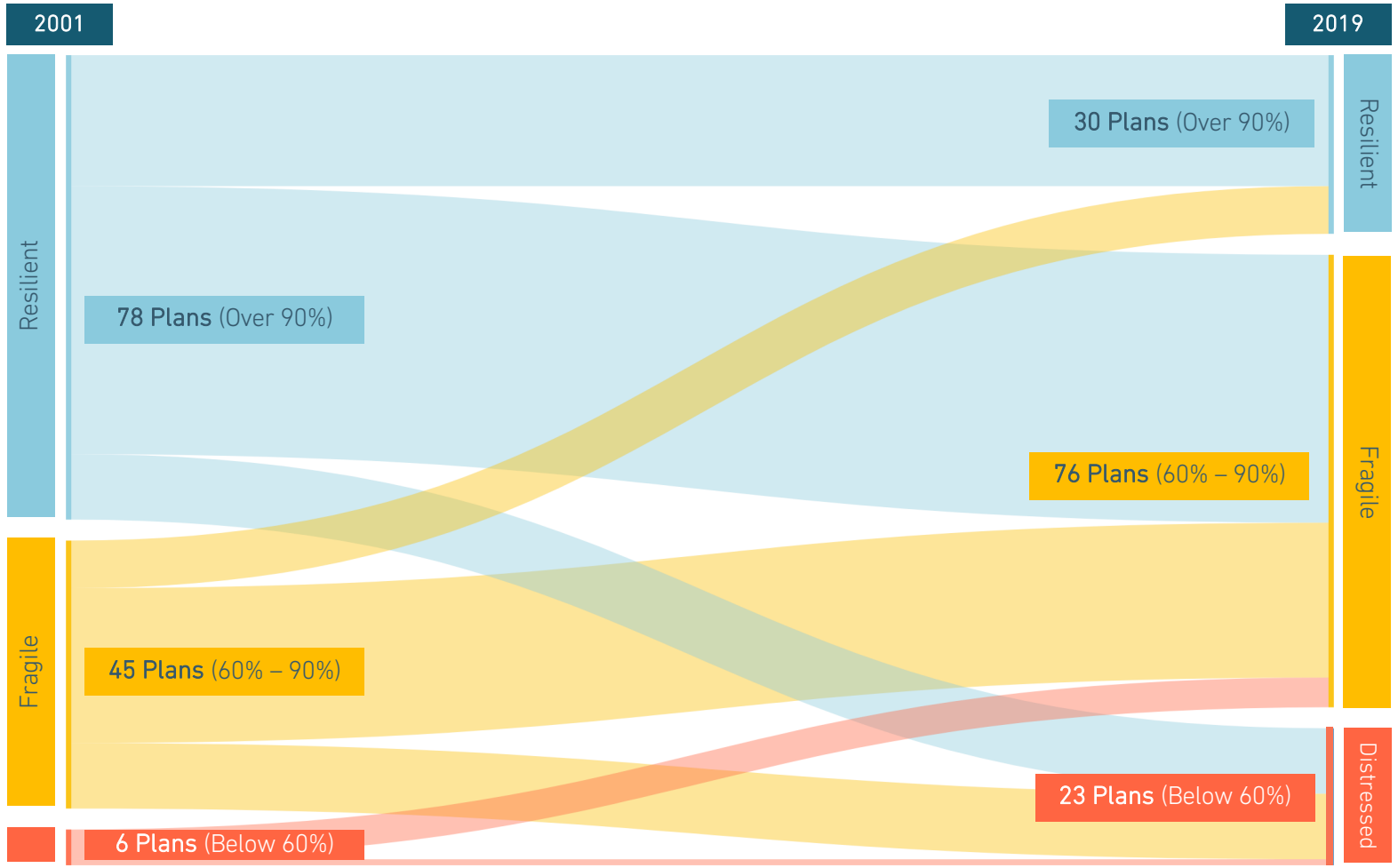
Fragile: A fragile pension fund is consistently between 60% and 90% funded. While these plans aren't going insolvent any time soon, they will be building up unfunded liabilities that will gradually become a strain on budgets and government revenues. A plan that is 85% funded for several years in row is healthier than one 65% funded but is still exposed to risk One or two asset shocks could send the plan into a downward spiral.

Distressed: Pension systems with funding levels below 60% should be looking to make immediate steps toward fixing their problems. While the specific threshold may vary across plans, at a certain point it is much harder for a plan to return to fiscal health.

Note: The funded ratio is a quick first look at the health of a pension plan but isn't the only factor to measure. Actuarial assumptions, funding policies, and governance should also be considered. A pension plan's funded ratio might have dipped because the pension board adopted more realistic actuarial assumptions.

Source: Equable Institute analysis of public plan valuation reports and CAFRs.

CHANGE IN FUNDED RATIO
FOR STATEWIDE PENSION PLANS | 2001-2019

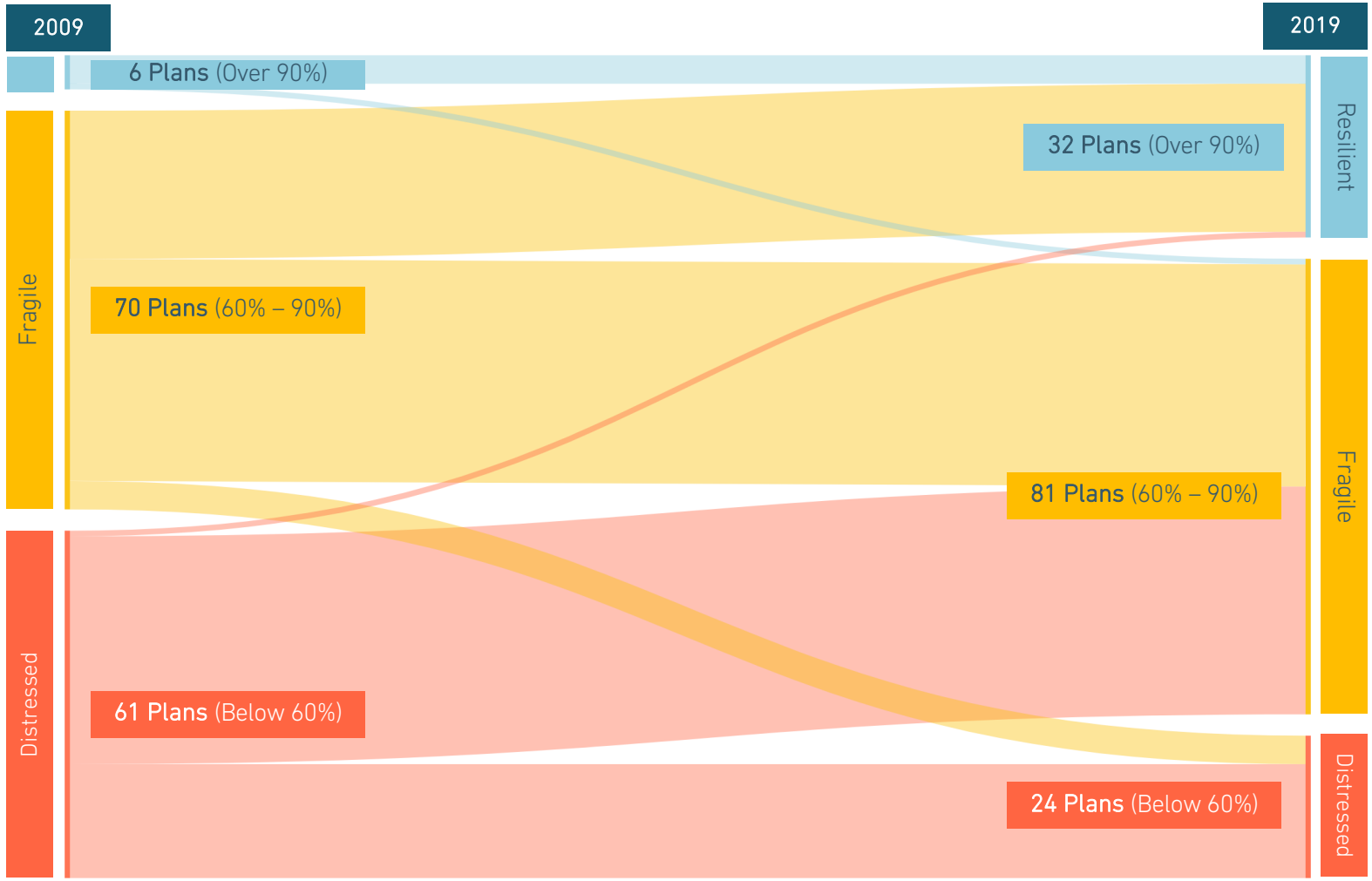


Since the peak of public sector funded status in 2001, there has been a major shift away from funding resilience. Nearly 3 out of 4 statewide plans were 90% funded or better in 2001. Today **only 1 in 5** statewide plans have that Resilient funded status.

During these two points in time, a number of public plans stumbled after the Dot-Com recession, while some which were slowly recovering before the Great Recession hit have stagnated over the past decade.

Source: Equable Institute analysis of public plan valuation reports and CAFRs. Plans shown are those that were in existence as of 2001 with available data for that year.

CHANGE IN FUNDED RATIO
FOR STATEWIDE PENSION PLANS | 2009-2019



Since the Great Recession, most statewide pension plans have either remained Fragile or Distressed. However, a third of the plans that were Fragile as of 2009 have improved their funded status. And Oklahoma State & Local has made the jump from Distressed to Resilient.

Source: Equable Institute analysis of public plan valuation reports and CAFRs.
Plans shown are those that were already in existence in 2009 and do not include plans or systems created since then.

WHICH PLANS CHANGED FUNDED STATUS CATEGORY BETWEEN 2009 AND 2019

Fragile up to Resilient Funded Status

California Judges 2
DC Police & Fire
Idaho Public Employees
Illinois Local
Indiana Police & Fire
Louisiana Parochial
Maine Local
Minnesota State
Nebraska State & Local
New York State & Local
New York State Police & Fire
New York Teachers
North Carolina Local
Oklahoma Police & Fire
Pennsylvania Local
South Dakota Public Employees
Tennessee Legacy
Texas County & District
Utah Contributory
Utah Noncontributory
Utah Public Safety
Noncontributory
Utah Fire
Washington State Plan 2/3
West Virginia State & Local
Wisconsin Public Employees

Distressed up to Fragile Funded Status

Alabama State
Alabama Teachers
Alaska State
Alaska Teachers
Arizona State
Colorado State
Kansas Local
Kansas Teachers
Louisiana Local
Louisiana School Employees
Louisiana State
Louisiana Teachers
Maine State
Maryland State
Maryland Teachers
Minnesota Local
Minnesota Teachers
Mississippi Public Employees
Missouri State Police
Missouri Teachers
Montana Teachers
Nevada Police & Fire
Nevada Regular
New Hampshire Public Employees
New Jersey Police & Fire-Local
New Jersey Police & Fire-State
New Mexico State & Local
New Mexico Teachers
North Dakota Teachers
Ohio State
Ohio Teachers
Oklahoma Teachers
South Carolina Police & Fire
Virginia Judges
Virginia Local
Virginia State Police
Virginia Teachers
Washington State-Plan 1
Washington Teachers-Plan 1
West Virginia Teachers

Other Plans on the Move

Distressed up to Resilient Funded Status

Oklahoma State & Local

Fragile down to Distressed Funded Status

Arizona Police & Fire
Missouri State
Pennsylvania State
Texas State
Texas State Police

Resilient down to Fragile Funded Status

Oregon Public Employees

UNFUNDED LIABILITY BREAKDOWN BY TYPE OF PENSION FUND | 2019

	Plan Count	Unfunded Liabilities	Funded Ratio
Statewide Systems for Teachers and Public School Employees Only*	42 Plans	$592.5 billion	69.0%
Statewide Systems for State Employees Only	17 Plans	$202.5 billion	55.6%
Statewide Systems for All Public Employees Doing Any Public Service Job in the State	10 Plans	$99.7 billion	82.2%
Statewide Systems for Municipal Civilian Employees	17 Plans	$68.4 billion	78.8%
Statewide Systems for Public Safety Only**	25 Plans	$48.0 billion	77.2%
Statewide Systems for Higher Education Only	California URS + Illinois SURS	$46.8 billion	65.8%

Note: There are 30 other statewide plans in our dataset not represented on this list, including 25 that cover different combinations of state, local, public school, and public safety employees but not all of them; 4 four judges; and 1 for elected officials.

Funded ratio and unfunded liability figures vary depending on the kind of employees that the retirement system covers.

Retirement systems for educators are often the largest pension plans in a state, based on the value of promised benefits. The funded status of systems managed solely for public safety or municipalities are also generally better funded than plans for educators.

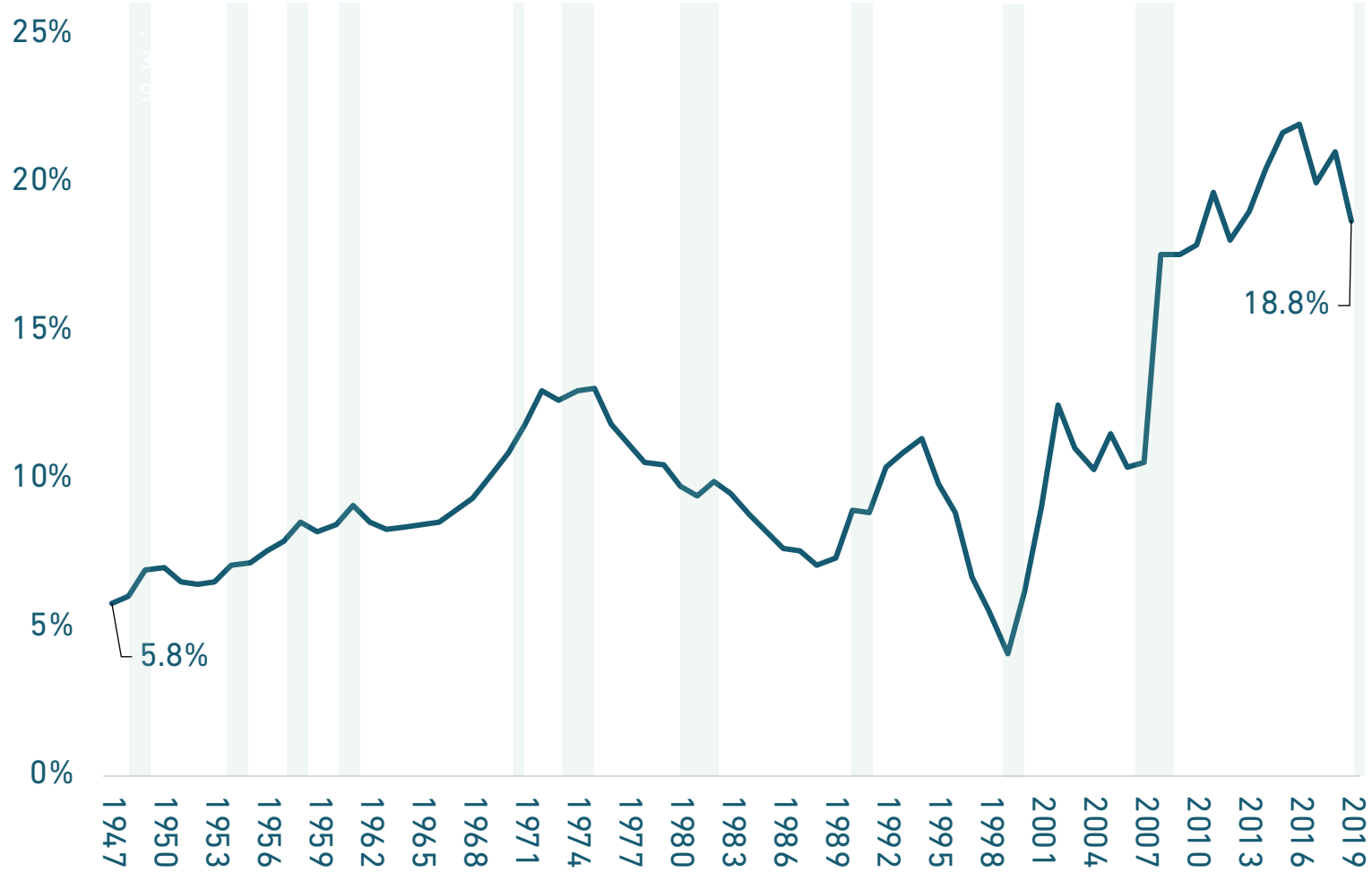
Notes:

* Includes standalone systems for teachers, standalone systems for public school employees, and plans for teachers or public school employees that are part of broader systems but are valued and reported on separately; does not include teacher benefits that are provided by statewide systems including other kinds of employees and blended together (ex. Florida).

** Includes police only systems, firefighter only systems, general public safety systems, and public safety portion of statewide plans that is independently valued and reported.

Source: Equable Institute analysis of public plan valuation reports and CAFRs.

UNFUNDED LIABILITY OF PUBLIC PENSIONS
AS A SHARE OF NATIONAL GDP | 1947-2019



The scale of unfunded liabilities growth is expanding too. The value of the dollar changes over time, so looking at public sector unfunded liabilities as a percentage of the nation's economy is a helpful way to understand just how big the funding shortfall has become.

It is unlikely that state pension funding shortfalls will be solved at a national level. But measuring unfunded liabilities as a share of the national GDP gives a sense of the nation's collective ability – all states combined – to pay down the funding shortfall.

Comparisons:

- 2020 Municipal Debt: 14% GDP
- 2020 Total Student Debt: 8% GDP
- 2020 Consumer Credit Debt: 5% GDP

Source: Federal Reserve's measurement of U.S. public pension liabilities, assets, and GDP. See technical notes for more.

Analysis: What We See in the Funded Status Trends

Funded ratio and unfunded liability levels vary considerably from state to state.

- A small group of states has historically Resilient statewide pension systems — including NY, SD, WI. There are also a few recently created pension plans with strong funded status (ex. AZ Public Safety "Tier 3" and MI Teachers "Pension Plus 2") that are a part of otherwise fragile or distressed retirement systems. But **a quarter of major statewide plans as of 2019 are above 90% funded.**

- **Most statewide plans (58%) as of 2019 are Fragile** (Page 17), with a funded ratio between 60% and 90%. Most of these plans took a hit during the 2008-09 financial crisis and while their assets recovered, they didn't recover fast enough to catch up with still growing liabilities (Page 18). The fact that **only a third of plans below 90% as of 2009 were able to rebound from their asset shock** suggests a structural vulnerability to additional asset shocks, like the COVID-19 market crash in March 2020.

- **A handful (18%) of statewide plans are Distressed and face a considerable uphill climb to recovery** (Page 17). The costs of paying down unfunded liabilities for these plans (e.g. IL Teachers, KY State) are challenging for state budgets, but the costs of insolvency and shifting to "pay-as-you-go" could be even more expensive.

Looking to the future: States that have fragile, but not distressed pension plans should be looking to make funding policy improvements while the costs of doing so are not prohibitively expensive, as is likely the case for states with some of the worst-funded plans.

FACTORS DRIVING OUR ANALYSIS

Funded status matters because it reflects both the solvency of a pension fund and the underlying costs of providing the benefit.

There is no inherent reason that a pension fund needs to be exactly 100% funded every year. The funded level of a plan will fluctuate over time. However, if a pension fund remains at 70% or 80% funded perpetually, the costs of funding benefits will grow.

A plan that is consistently below 100% funded for more than 2 to 3 years will have consistent unfunded liabilities. The costs of carrying unfunded liabilities for a long period of time can grow exponentially.

While a pension fund that is 80% funded for 10 years in a row is at no risk of near-term insolvency, their unfunded liability amortization payments could very well double in that time frame, making the costs of providing the same benefit higher than necessary over the long-term.

Reported funded ratio and unfunded liability numbers are only as good as the underlying assumptions.

Funded ratios and unfunded liability numbers depend on accurately measuring the value of promised liabilities and assets. This means the reported funded status is dependent on accurate assumptions like mortality rates used to measure promised benefits, and valuation methods used to measure assets.

There is an academic debate about whether pension plans should use the assumed rate of return on assets as the discount rate for liabilities. There is a separate debate about whether the assumed rates of return used by plans (current median is 7.25%) is too high.

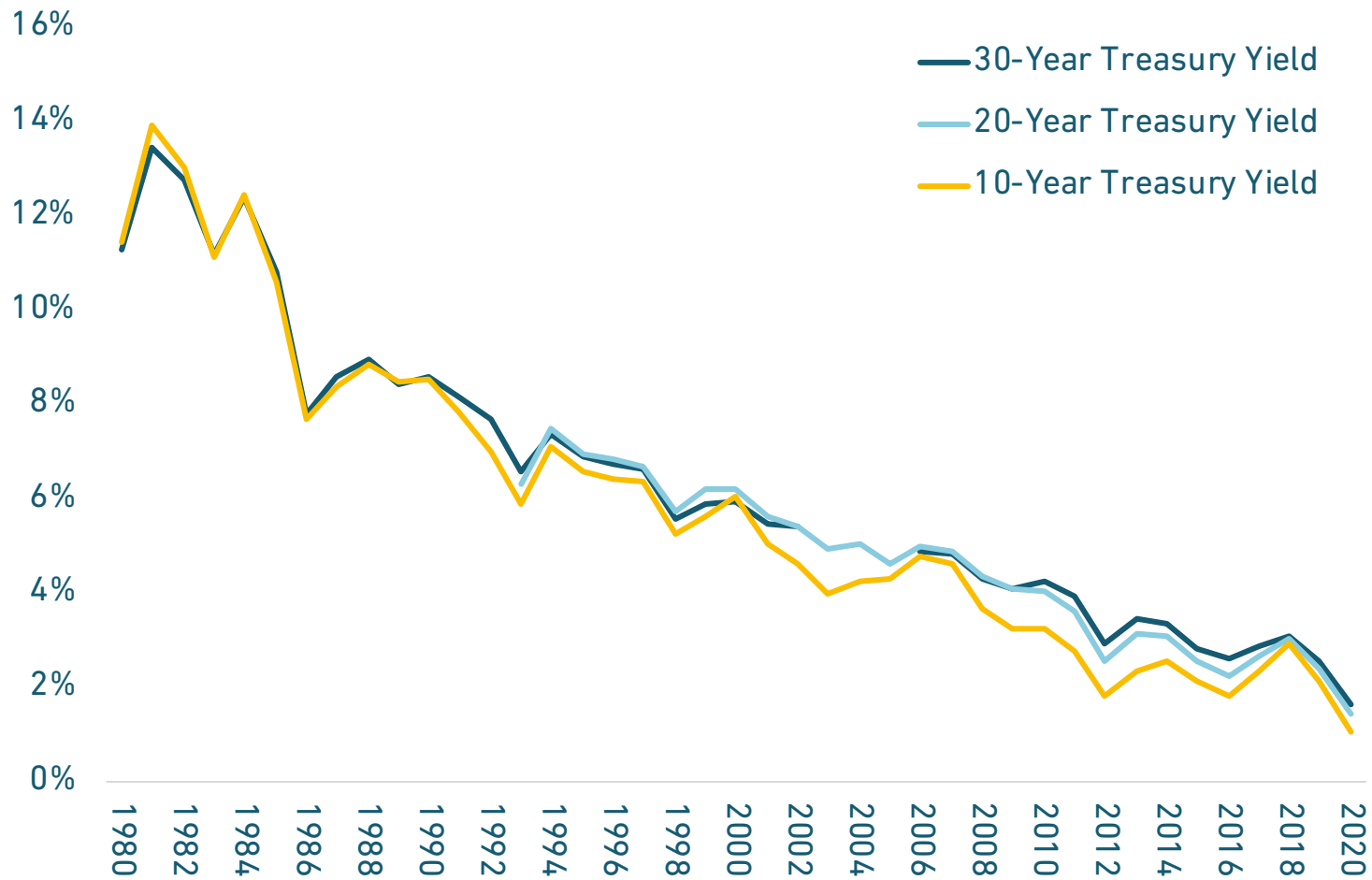
Moody's Analytics uses an alternative process for measuring liabilities from most actuaries and winds up with a discount rate usually 5% or less. Actuarial firm Milliman measures liabilities using an assumed rate of return (6.6%) which is much lower than the national average.

Within the Trends:
Investment Assumptions

- Interest Rates
- Assumed Rate of Return

INTEREST RATES

TREASURY YIELDS IN DECLINE | 1980-2020



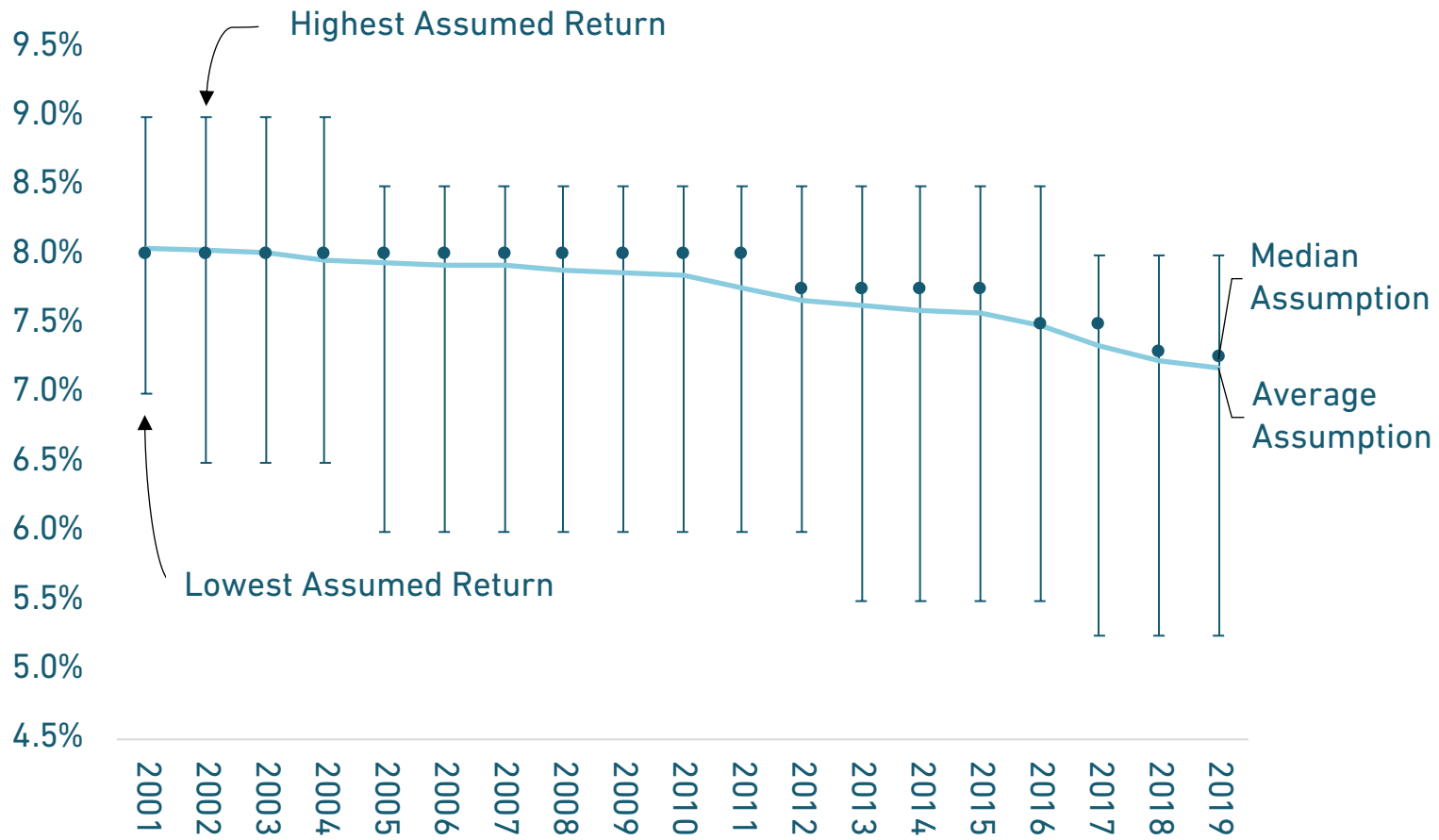
One of the most significant events to influence public pensions over the past 50 years was the steady decline in interest rates.

Lower interest rates have raised the costs of financial guarantees, like pensions and life insurance.

Lower interest rates have also meant pension funds have earned steadily lower yields on fixed-income investments like bonds.

Source: Federal Reserve, annual average yields. See technical notes for more. Notes: (1) 2020 yields are the average as of June 2020. (2) 20-year treasury bonds were not issued until 1993; no 30-year treasury bonds were issued between February 18, 2002 and February 8, 2006.

AVERAGE ASSUMED RATE OF RETURN FOR STATEWIDE PLANS | 2001-2019

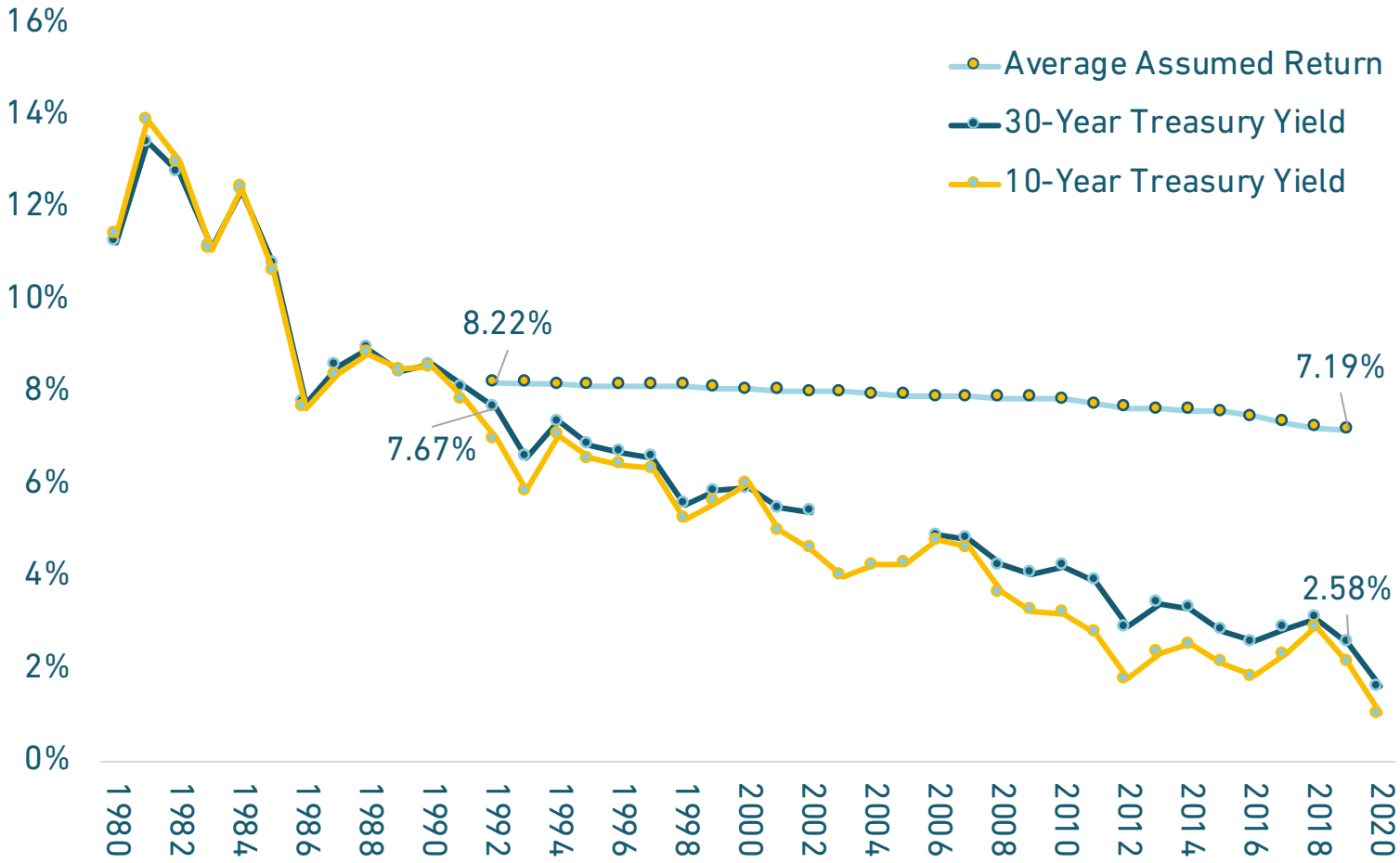


The average assumed rate of return has gradually declined from 8.05% in 2001 to 7.19% in 2019.

Over the past two decades there has been a wider range in assumptions adopted by plans. The lowest rate adopted by any plan has fallen from **7%** to **5.25%**, while the highest rate has only dropped from **9%** to **8%**.

Source: Equable Institute analysis of public plan valuation reports and CAFRs.

ASSUMED RATE OF RETURN
v. INTEREST RATES | 1980-2019

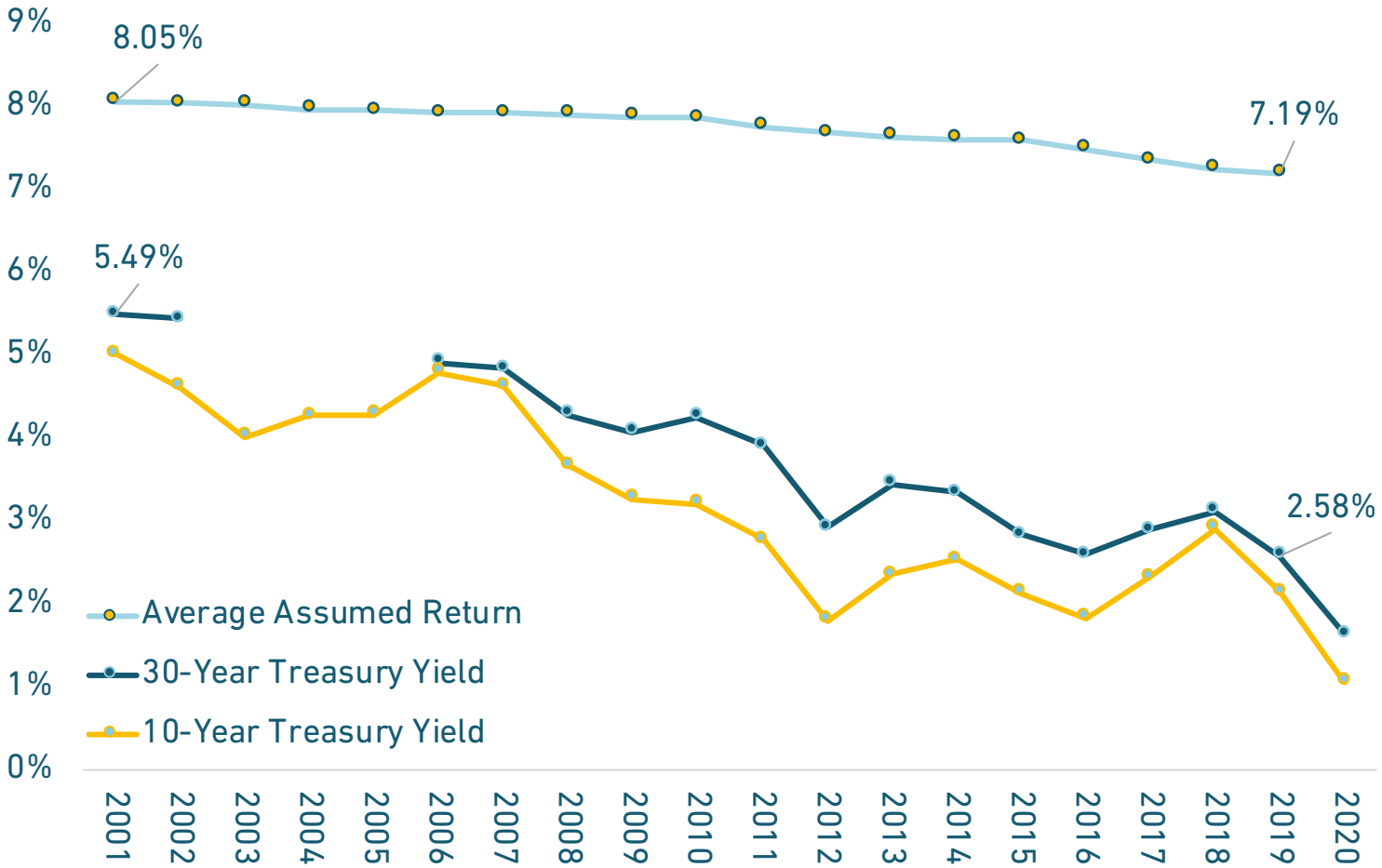


States and pension boards have been slow to reduce their assumed rates of return, relative to declining interest rates.

The growing gap between interest rates and assumed rates of return reflects as an increased amount of risk that pension funds are accepting.

Source: Equable Institute analysis of public plan valuation reports and CAFRs. Notes: (1) 2020 yields are the average as of June 2020. (2) No 30-year treasury bonds were issued between February 18, 2002 and February 8, 2006.

ASSUMED RATE OF RETURN
v. INTEREST RATES | 2001-2019



Looking at the same comparison of assumed returns and interest rates over the past two decades provides a clearer picture of the divergence between these trend lines.

If assumed returns had kept pace with declining interest rates since 2001, the average assumption in 2019 would have been around **5.1%**.

Source: Equable Institute analysis of public plan valuation reports and CAFRs.
Notes: (1) 2020 yields are the average as of June 2020. (2) No 30-year treasury bonds were issued between February 18, 2002 and February 8, 2006.

STATEWIDE PLANS ON THE MOVE:
MEANINGFUL REDUCTIONS OVER THE PAST DECADE

- The average assumed return used by statewide plans has declined 71 basis points since the Great Recession, from 7.9% in 2008 to 7.19% in 2019.
- CalPERS, the largest plan in the country, has lowered its assumed return gradually over the past eight years from 7.75% to 7%. They project there is a 39% probability of earning this return over the next decade.*
- Illinois statewide plans for teachers, state employees, and higher education did not start meaningfully reducing their investment assumptions until 2013:
  - IL TRS (Teachers) was 8% in 2013 stepped down to 7% by 2016.
  - IL SERS (State) lowered its rate from 7.75% to 7.5% in 2014 and eventually 7% by 2016.
  - IL SURS (University) kept its 7.75% rate until 2014 when they adopted a 7.25% rate, and then a 6.75% assumption in 2018.
- Michigan assumed an 8% return for its two large statewide plans covering state employees (MSERS) and teachers (MPSERS) until 2016. They adopted a policy to "buy down" the assumption, which reached 6.8% as of 2019.
  - A new tier of pension benefits created for teachers hired as of February 2018 uses a maximum 6% assumption.
- Connecticut dropped its state employees (SERS) assumption from 8% to 6.9% in 2016 and then did the same for its teacher plan (TRS) in 2019.
- The Kentucky Retirement Systems moved in 2018 to lower its 7.5% assumed return, but has adopted a mix of different rates for different plans: 5.25% for the "non-hazardous" KERS state employees plan, 6.25% for the "hazardous" KERS state employees plan and county employees plans (CERS).
- Missouri had an 8.5% assumed return until 2012, when they began stepping down the assumption in stages, first to 8%, then 7.5% in 2017, 7.25% in 2018, and eventually 7.1% as of 2019.
- Virginia coming out of the Great Recession was assuming 7.5%, stepped down to 7% in 2012, and then again to 6.75% in 2019.
- The South Dakota Retirement System, one of the best-funded plans in the country, moved from 7.75% to 7.25% in 2012, and then adopted 6.5% in 2017.

Source: Equable Institute analysis of public plan valuation reports and CAFRs.
* According to internal CalPERS assessments, reported widely in Bloomberg, The Wall Street Journal, the Barron's, and elsewhere.

STATEWIDE PLANS BEING LEFT BEHIND:
ASSUMED RETURNS HIGHER THAN 7.5%

	Current Assumed Return	Reported Funded Ratio
Ohio Police and Fire Pension Fund	8%	69.4%
Arkansas State Highway Employees' Retirement System	8%	79.8%
Texas County & District Retirement System*	8%	89.4%
Mississippi Public Employees Retirement System	7.75%	61.3%
North Dakota Teachers Fund for Retirement	7.75%	65.5%
Kansas Public Employees Retirement System	7.75%	69.9%
Michigan Municipal Employees' Retirement System**	7.75%	73.0%
Alabama Employees Retirement System	7.7%	68.5%
Alabama Teachers Retirement System	7.7%	69.9%
Montana Public Employees Retirement Board	7.65%	73.9%
Louisiana State Employees Retirement System	7.6%	62.9%
Louisiana Teachers Retirement System	7.55%	68.6%

The states and pension boards for these plans are embracing the highest risks that asset growth will underperform expectations of any statewide pension funds in the country.

Notes:

* Texas C&D is formally a cash balance defined benefit plan, sometimes known as a guaranteed return plan.

** Technically the cities, counties, and other local employers that participate in MERS can select their own assumed return between 7.5% and 7.75%.

Source: Equable Institute analysis of public plan valuation reports and CAFRs.

Analysis: What We See in the Investment Trends

The decline in interest rates (Page 26) has had significant, negative effects on pension plans.

- The cost of making financial guarantees has grown over time as interest rates have declined. The cost of guaranteeing payments just 10 years in the future is nearly 10 times more expensive today than in the 1980s.

Only a few states have made meaningful steps away from relatively high assumed returns (Page 30).

- The slow pattern of assumed return reduction relative to interest rates (Page 28) has tacitly meant pension funds are taking on risk. Both the risk associated with alternative investments (Page 9) and the risk that pension funds won't earn their targeted return, which in turn will produce unfunded liabilities.

- Overly optimistic assumed rates of return also likely mean that the reported value of promised benefits today is too low. Depending on whose capital market assumptions are used, the 50th percentile return for the asset allocation of statewide plans is between 5.5% and 7%. For example, Milliman estimates the expected return for the nation's largest public plans is 6.6%, which is more than 50 basis points below the average rate being used.

Looking to the future: Public plans are likely to continue the trend of lowering their assumed returns in the coming years due to lower probable actual returns. The speed at which this change is made will likely influence how much risk persists within public plans.

FACTORS DRIVING OUR ANALYSIS

The most significant problem for pension fund investments is low interest rates.

Interest rates are an important trend line for retirement systems because they reflect the kind of financial market that pension funds are investing in. If interest rates are low, it makes it harder to earn higher returns from relatively safe, fixed income investments like bonds.

Since the Great Recession, low interest rates have caused pension funds to shift their assets into higher risk categories to try and earn high returns.

The most important actuarial assumption for public pension resilience is the assumed rate of return.

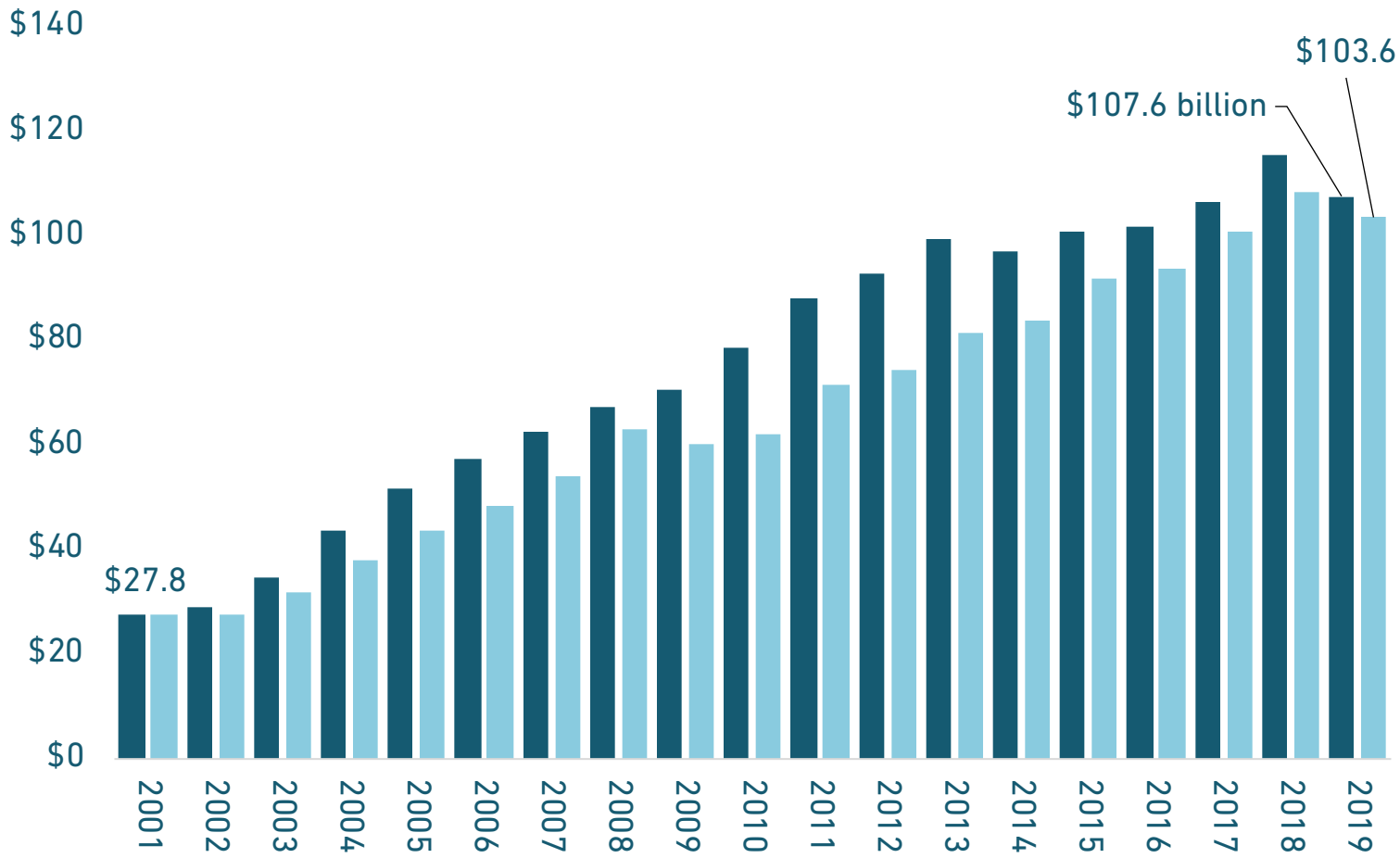
The assumed rate of return is used to help determine what the level of contributions is each year.

The assumed rate of return is the annual target for a pension fund. Just earning a return greater than 0% is not good enough. If a state plan is assuming 7.25%, then anything less than that will add unfunded liabilities.

Within the Trends: Contribution Policy

- Actuarially Determined Employer Contributions
- Funding Policy Trends for Select States
- Risk-Sharing Trends for Select States
- Employee Contributions

ACTUAL v. REQUIRED
EMPLOYER CONTRIBUTIONS | 2001-2019



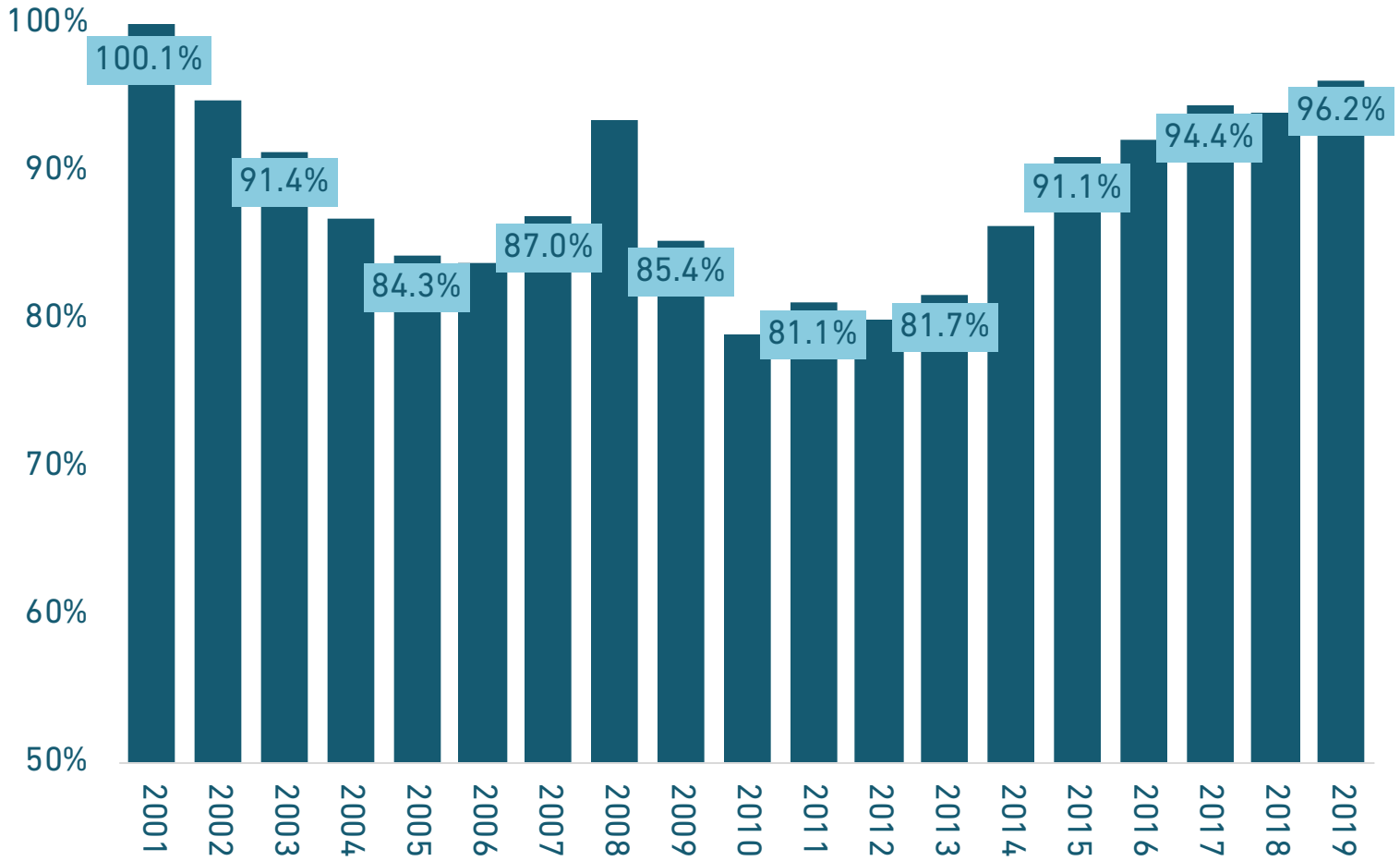
Actuarially required contributions have grown steadily over the past two decades, and in many years, states have struggled to keep up.

Actual Contributions (in billions)

Required Contributions (in billions)

Source: Equable Institute analysis of public plan valuation reports and CAFRs. "Required" based on GASB definitions for ARC and ADC.

SHARE OF REQUIRED CONTRIBUTIONS PAID BY STATEWIDE PLANS | 2001-2019



States have steadily improved their commitment to paying actuarially required contributions over the past several years after reaching a modern low point in 2012, following the Great Recession.

Source: Equable Institute analysis of public plan valuation reports and CAFRs. "Required" based on GASB definitions for ARC and ADC.

FUNDING POLICY TRENDS, EXAMPLES SINCE THE GREAT RECESSION:
ADOPTING A PLAN TO RAMP UP CONTRIBUTION RATES OVER TIME

- California Teachers' Retirement System, FY2014-15 to 2023-24

  Phased-in rate increase for district employers (8.25% to 20.25%), members (8% to 9.2% or 10.25% depending on hire date), and the state's supplemental payment; rates changes were modified in 2020.

- South Carolina Retirement System, FY2017-18 to 2022-23

  A five-year, 100 basis point ramp up of employer contributions following a first year 200 basis point increase from the previous 11.56% rate.

- Wyoming Retirement System, September 2018 to July 2021

  Member and employer contributions increased in 25 basis point steps up to 9.25% and 9.37%, respectively.

- Texas Teachers Retirement System, FY2019-20 to 2024-25

  Phased-in rate increase for the state (6.8% to 8.25% in two steps over five-years), members on a two-year delay (7.7% to 8.25% between FY22-24), and district employers (10 basis points steps between FY21-25).

- Arkansas Teachers' Retirement System, FY2019-20 to 2023-24

  District employers and members will each have a 25 basis points a year increase in contributions for four years.

- New Mexico PERA (State & Local), FY2020-21 to 2025-26

  Member and employer contributions increased 50 basis points a year for four years (two-year delay before municipal employee increase starts).

Source: Equable Institute analysis of public plan valuation reports, CAFRs, and legislation. Descriptions here are highly summarized for space, contact the authors for more complete details.

FUNDING POLICY TRENDS, EXAMPLES SINCE THE GREAT RECESSION: ADOPTED AUTOMATIC CONTRIBUTION INCREASE POLICY LINKED TO EXPERIENCE

- Iowa Public Employees' Retirement System, adopted in 2011

> The board has authority (from the legislature) to set the contribution rate based on actuarial analysis, but the increase can not be more than 100 basis points a year.

- Houston MEPS (Municipal), POPS (Police), FRRF (Fire), adopted in 2016

> Contribution rates are set by the board based on actuarial experience within an established "risk-corridor" that is 500 basis points plus or minus the city's contribution rate in FY2018.

- Colorado PERA (State, Teacher, Local), adopted in 2018

> In any year where statutory contributions are less than the ADC, then both employer and member contributions should be increased by up to 50 basis points a year and the retiree COLA should be reduced by an equivalent amount (no more than 50 basis points in a year); total contribution rates are capped at FY 2018 rates plus 200 basis points.

Source: Equable Institute analysis of public plan valuation reports, CAFRs, and legislation. Descriptions here are highly summarized for space, contact the authors for more complete details.

RISK-SHARING POLICIES
ADOPTED SINCE THE GREAT RECESSION

Employer-Employee Cost-Sharing Arrangements

- CalPERS, 50/50 normal cost share (adopted 2012)
- CalSTRS, 50/50 normal cost share (2012)
- AZ Police & Fire Tier 3, 50/50 share (2016)
- AZ Probation Tier 3, 40/60 share (2018)
- MI Teachers Pension Plus 2, 50/50 share (2017)
- ME Local Districts, 55/45 share (2018)

These are preset arrangements that divide up actuarially determined contribution rates between employers and employees based on a fixed percentage. In some cases, the normal cost is divided; in other cases the entire actuarially determined contribution is divided, including unfunded liability payments.

Variable Employee Contribution Rates

- Utah RS, max employer rate (adopted 2010)
- CT State, linked to ARR change (2017)
- PA State, linked to ROA performance (2017)
- PA Teachers, linked to ROA performance (2017)
- CO PERA, linked to ADC change (2018)
- NM State & Local, linked to funded ratio (2020)

These are funding policies that will automatically increase the contribution rate paid by members based on experience, such as a change to the assumed return, actual return, or funded status.

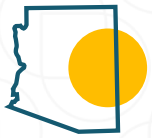
Retiree Risk-Sharing

- MD State & Teachers (adopted 2011)
- RI State & Teachers/Local (2011)
- AZ Police & Fire (2016)
- CO PERA (2018)
- NM State & Local (2020)

These are tools for a pension board to use when funded status declines and usually include reducing cost-of-living adjustments for current retirees. This reduces the unfunded liability level for the pension plan, which in turn reduces required contribution rates from members and employers.

Note: A "Risk-Sharing Policy" is any provision that automatically adjusts employer contributions, employee contributions and/or retiree benefits based on a predetermined set of criteria (such as an increase in unfunded liabilities or to accomplish a funded status goal). The "risk" being shared is the risk that actual experience will differ from actuarial assumptions.

STATES THAT REQUIRE EMPLOYEES TO PAY FOR A PORTION OF UNFUNDED LIABILITY COSTS

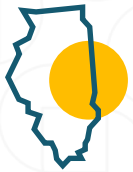


Arizona SRS (State & Local)

Members explicitly pay 50% of unfunded liability payments.

Arizona PSPRS Tier 3 (Police & Fire)

Members explicitly pay 50% of unfunded liability payments.



Illinois TRS (Teachers)

Member contribution rate for Tier 2 (9% of payroll) is larger than the normal cost for the plan (7.57% of payroll), meaning they tacitly cover a portion of unfunded liability costs, too.

Ohio TRS (Teachers)

Member contribution rate (14% of payroll) is larger than the normal cost for the plan (10.8% of payroll), meaning they tacitly cover a portion of unfunded liability costs, too.

Nevada PERA (State & Local)

Members of the "Employer-Employee Pay" plan share the costs of paying the required contribution rate 50/50.

Analysis: What We See in the Contribution Trends

After decades of states failing to ensure they were paying at least the actuarially determined contribution rates, in 2019 states collectively were paying nearly all their bills (Figure 35).

- **States have a historically inconsistent record with paying required contributions.** Even though pension funds are supposed to be pre-funded, many states did not get serious about trying to make such contributions until as late as the 1990s.
- **Contributions relative to requirements were particularly low in the years after the Great Recession** (Figure 36). Though the economy recovered, tax revenues took years to bounce back from their decline in 2008.
- While **2019 was the best year on record for paying actuarially determined contributions since 2001**, there were still a number of states — including large plans in CA, IL, NJ, and TX — that were not paying their full ADC.

Looking to the future: States on the cutting edge of pension plan management (ex. MI, CO, NM) are focused on adopting risk-sharing policies that give pension boards tools to balancing the goals of protecting benefits and ensuring a well-funded plan. The best-funded plans historically — South Dakota and Wisconsin — have benefited from risk-sharing tools built into their plans decades ago.

FACTORS DRIVING OUR ANALYSIS

Ensuring the actuarially determined contribution rate is fully paid each year is the minimum states can do if their goal is to ensure resilient, sustainable retirement systems.

There are reasonable debates to be had over public policy priorities for any given state or municipality, including over-allocation of resources to various policy goals and what tax rates are appropriate. Whether or not states should use resources to pre-fund retirement benefits is often a part of these debates.

While state and local leaders might have acceptable arguments for a choice that trades-off fully funding a pension plan, if a state has the goal of maintaining a sustainable retirement system then the bare minimum requirement each year is paying at least 100% of the ADC.

Actuarially determined contributions rates are only as sound as the underlying assumptions used to calculate them.

Actuarially determined contribution rates are based on numerous actuarial assumptions (investment returns, mortality, payroll growth, etc.) that factor into measuring liabilities. In addition, pension boards can set amortization policies that target 100% funding over an excessive period of time (more than 25 years), or in some cases target less than full funding in the first place.

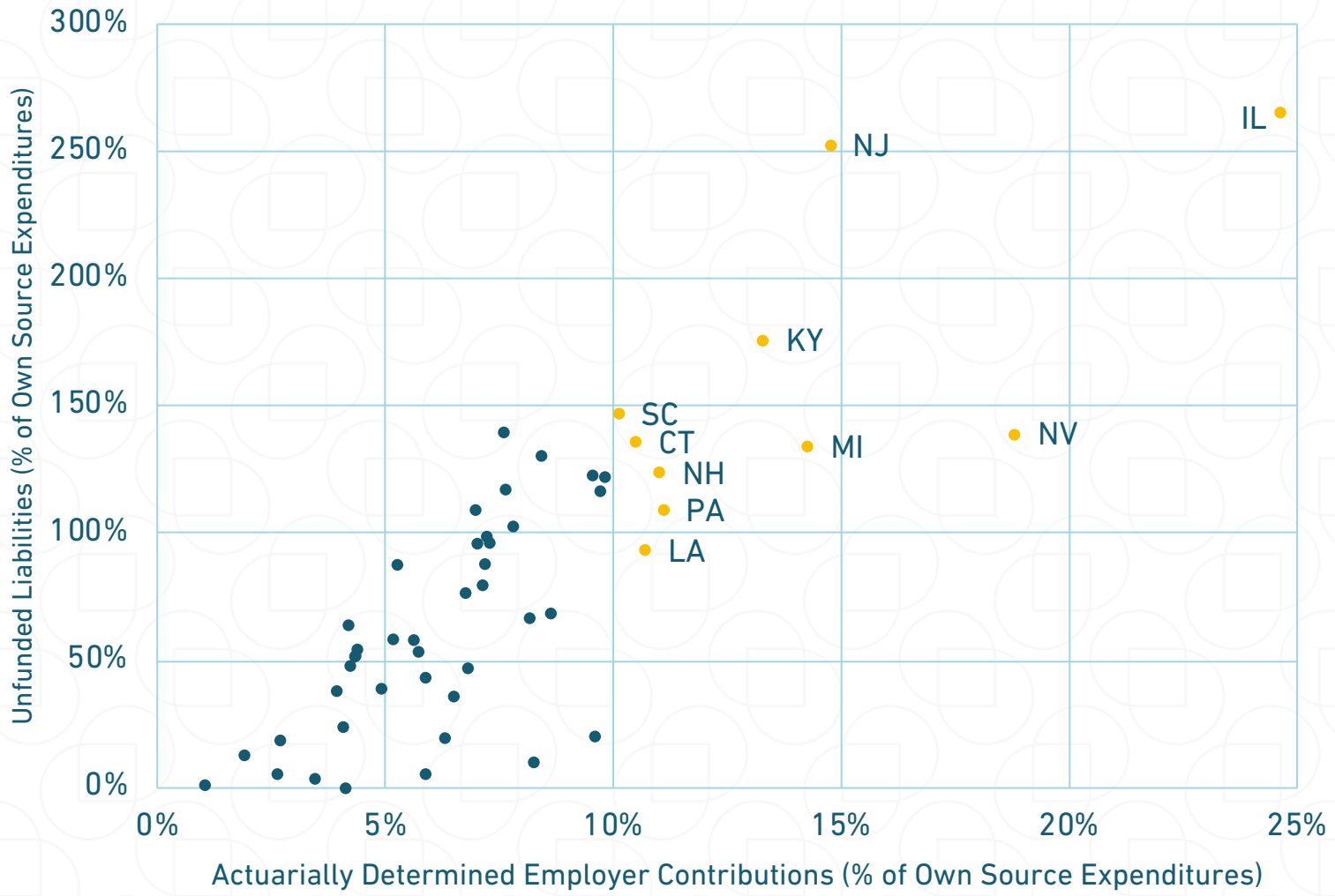
As a result, there are a number of states that pay their full ADC every year but still have mounting unfunded liabilities. Just paying the actuarially required rate each year is not enough on its own to ensure full funding in the long-term.

If the assumptions and funding policies are flawed, then the ADC alone cannot put a pension plan on the path to full funding.

Within the Trends: Ability to Pay Contributions

- Required Contributions as a Share of State Budgets
- Actual Contributions as a Share of State Budgets

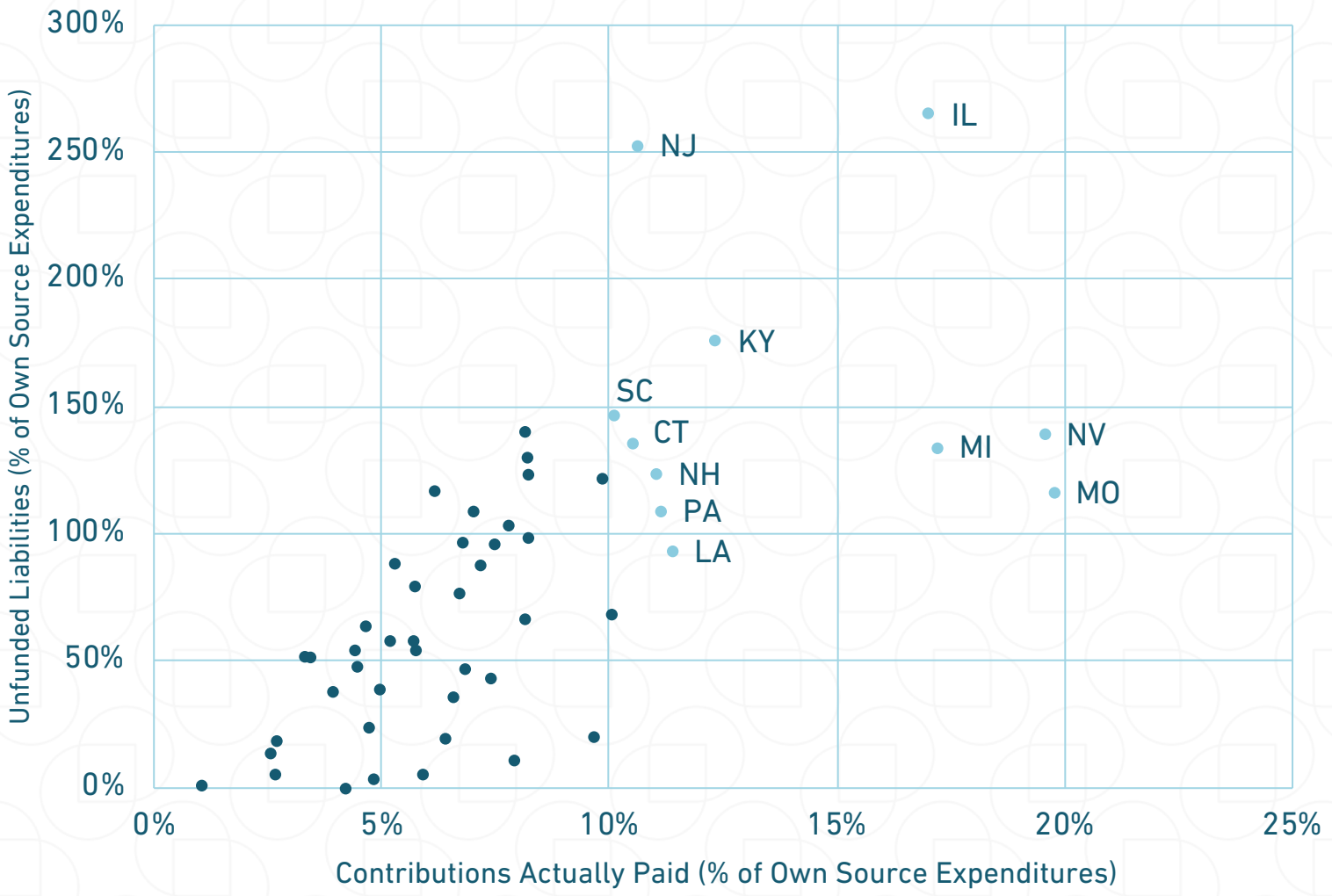
SHARE OF 2019 STATE BUDGETS REQUIRED BY ACTUARIALLY DETERMINED CONTRIBUTIONS



Actuarially Determined Employer Contribution as % of the State's General Fund Budget			
	2001	2009	2019
IL	6.8%	10.7%	24.7%
NV	18.0%	19.2%	18.9%
NJ	2.0%	9.9%	14.8%
MI	2.4%	8.4%	14.3%
KY	3.0%	7.2%	13.4%
PA	0.8%	5.8%	11.2%
NH	3.1%	7.9%	11.1%
LA	5.9%	7.9%	10.8%
CT	4.9%	7.6%	10.6%
SC	5.8%	6.9%	10.2%

Source: Equable Institute analysis of public plan valuation reports and CAFRs; NASBO for state expenditure data. Note that some statewide plans are funded with contributions from local employers that draw on local revenues. This matrix reflects the size of required contributions relative to state expenditures as a common cross-state measurement, not as a reflect of the actual amount of state expenditures on pension contributions.

SHARE OF 2019 STATE BUDGETS REQUIRED BY ACTUAL DETERMINED CONTRIBUTIONS



Actual Contributions as % of the State's General Fund Budget			
	2001	2009	2019
MO	6.8%	6.8%	19.8%
NV	18.0%	18.0%	19.6%
MI	3.0%	3.0%	17.2%
IL	5.7%	5.7%	17.1%
KY	3.2%	3.2%	12.4%
LA	6.4%	6.4%	11.4%
PA	0.9%	0.9%	11.2%
NH	3.1%	3.1%	11.1%
NJ	0.4%	0.4%	10.7%
CT	4.7%	4.7%	10.6%

Source: Equable Institute analysis of public plan valuation reports and CAFRs; NASBO for state expenditure data. Note that some statewide plans are funded with contributions from local employers that draw on local revenues. This matrix reflects the size of all employer contributions relative to state expenditures as a common cross-state measurement, not as a reflect of the actual amount of state spending on pension contributions.

Analysis: Economic Context Matters

Measuring pension plan sustainability means looking at both solvency levels over time (funded ratios and unfunded liability levels), as well as the costs of providing the retirement plan relative to existing tax revenues.

- The larger required pension payments are relative to the size of state budgets, the harder it is for the state to ensure responsible funding policies because of the higher cost burden.
- Unfunded liabilities as a share of a state's economy gives a sense of what scale of resources will be needed from a local tax base to improve funded status (Page 7). For example, $10 billion in unfunded liabilities is a much harder shortfall for Kentucky's tax base to pay down than California.
- Contribution rates as a share of a state's general fund (Page 11) provide a sense of how much the cost of a plan is given existing tax policy and spending priorities.
- The ability to pay required contributions is a function of political will and whatever the limits are on collecting tax revenue.

Looking to the future: There are clear outlier states that have allowed unfunded liabilities to grow beyond acceptable levels of their underlying tax base and are weighed down by required contributions rates that are beyond their ability to pay from current revenues. While these states should be taking immediate action, other states should consider whether they should act before reaching these levels of fiscal distress.

FACTORS DRIVING OUR ANALYSIS

Equable Institute's definition of a "sustainable" retirement plan includes three parts —

- Resilience: maintaining a consistent level of full funding and having the ability to absorb negative actuarial and asset experience such that within a short period of time after such an event plan funded status is improving back to its long-term positive status quo; plans that are fragile or distressed will face the threat of long-term insolvency.

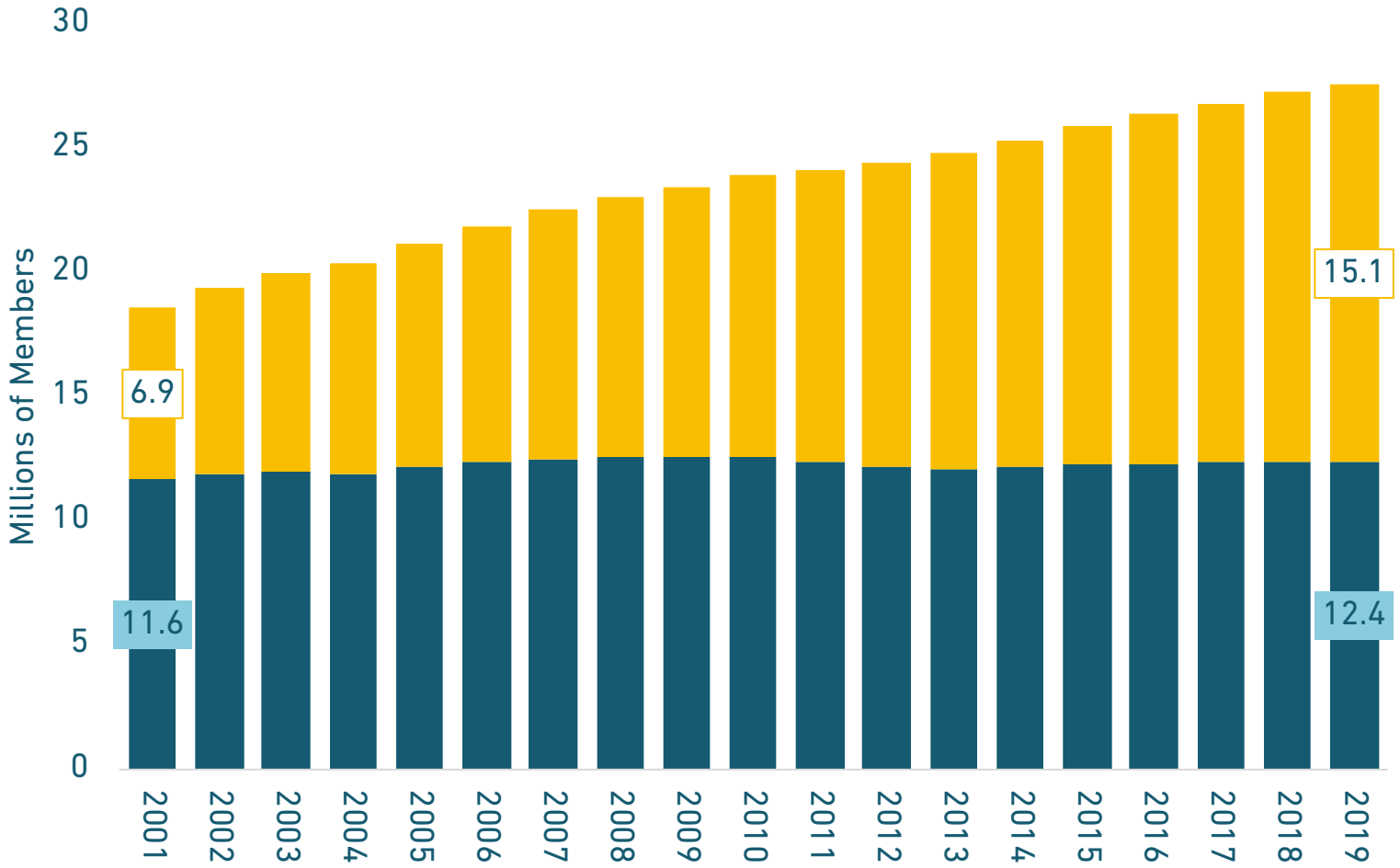
- Affordability: having predictable, well-structured costs that are balanced with other competing interests for government budgets; plans that have uncontrolled costs will create budgetary and political challenges for governments, potentially drive up costs for members, and lead to reduced retirement benefits (such as COLAs) for retirees.

- Goal Accomplishment: successfully accomplishing whatever goals have been set out for the purpose of offering retirement benefits in the first place, such as ensuring the retirement income security of individuals or maintaining an effective workforce; plans that do not accomplish these goals will be under constant political pressure.

Within the Trends: Cash Flows & Maturing Plans

- Active Members to Retirees Ratio
- Benefit to Asset Ratio

RATIO OF
ACTIVE MEMBERS TO RETIREES | 2001-2019



The ratio of active workers to retirees provides a signal about cash flows into and out of pension funds.

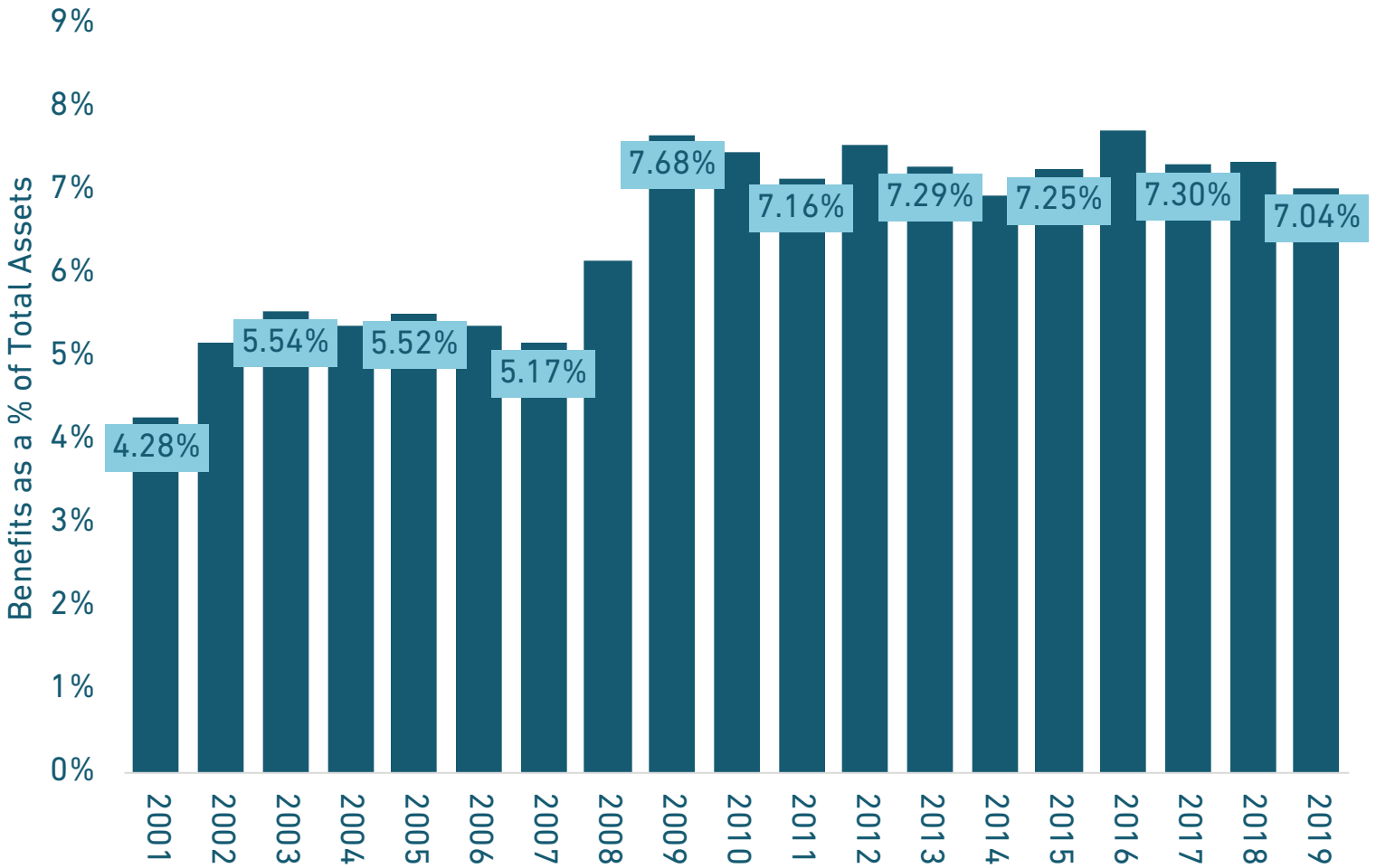
People are living longer and retiring faster (as the Baby Boomer generation phases out of the labor force). Public sector hiring rates slowed down after the Great Recession. The net result is active member counts have been relatively stable for the past few years, while the total number of retirees collecting benefits has grown.

Retired/Inactive

Active

Source: Equable Institute analysis of public plan valuation reports and CAFRs.

BENEFIT PAYMENTS
AS A SHARE OF ASSETS | 2001-2019



The benefit-to-asset ratio is a helpful metric for states and pension boards to monitor whether they are at risk of running into a liquidity crunch. The closer a pension plan is to a 1:1 ratio, the closer they are to running out of cash.

But beyond solvency, there is also an investment concern here: As more of the asset base is being used to pay benefits, there is less money that can be invested in long-term assets to earn returns.

Benefit : Asset Ratio	
1 : 23	1 : 13
2001	2019

Source: Equable Institute analysis of public plan valuation reports and CAFRs.

Analysis: What We See in the Cash Flow Trends

It is going to be harder and harder to earn investment returns. Plans are cash flow negative from contributions and benefit payments (Page 12). And the available asset base to earn investments from is stagnating (Pages 6, 50).

- Total retirees passed active members for the first time in 2015 (Page 49). This is driving ever-increasing benefit payments.
- Collectively, there are more benefit payment outflows than contribution inflows (Page 12).
- Because investment returns have been less than expected (Page 8) and asset values haven't kept up (Page 6), the ratio of benefits-to-assets has been trending down since 2001 (Page 50). This is a vicious cycle because negative cash flow from contributions puts additional pressure on plan investment returns to meet or exceed expectations.
- As that measure of liquidity shifts toward 1:1 pension fund managers will find it increasingly harder to make investment decisions. There will simply be fewer assets that can be invested flexibly.

Looking to the future: It will be very difficult (in some cases impossible) for public plans to invest their way back to fiscal health. Contributions are being fully consumed by benefit payments, and pension funds are relying on investment returns to make up the balance (meaning less exponential investment growth) and pre-fund benefits for active members (which are not being fully funded, meaning continued unfunded liabilities). Each year investment returns underperform expectations, it perpetuates a vicious cycle.

FACTORS DRIVING OUR ANALYSIS

If public plans were fully funded, the active-to-retiree and benefit-to-asset ratios would not be a concern.

Pensions are supposed to be "pre-funded" with contributions plus investment earnings. The benefits earned each year are supposed to be matched by contributions that will be sufficient to pay those benefits, assuming (a) the value of the benefits was calculated correctly, and (b) the contributions earn assumed investment earnings.

This means that new members and their contributions should not be necessary to pay retiree benefits.

In practice, there isn't a problem with a pension fund paying out all its assets if there is enough to meet all promises.

If a fully funded pension plan were to stop adding new members, it could be gradually wound down over time without fear of running out of money, because it was appropriately pre-funded. Each passing year the ratio of retirees to active members would grow and the benefit-to-asset ratio would shift toward 1:1 or worse, but that would be expected and not a problem.

Simply hiring more people would improve near-term cash flows, but it would also mean faster growth of promised benefits which is already outpacing assets.

A frequently proposed solution to cash flow problems is hiring more people, because this will mean more contributions. However, this also means more promised benefits. And the existing challenge for statewide pension plans is that promised benefits are outpacing the growth of assets (Page 6). So hiring more people could exacerbate the long-term problem.

The additional "contributions" that come from hiring more workers are all coming from government resources in the first place — member contributions are from their paychecks, employer contributions are from taxpayer resources. If there is money available to hire more workers, then those funds, including the amounts for paychecks, in theory could be used to pay down existing funding shortfalls without taking on the additional liabilities that come from hiring more members.

This is not to say governments should not hire more people — there are plenty of public policy reasons why that might or might not be appropriate for any given state at any given time. This is to say that hiring more people is not a solution to the cash flow problem.

Public Pension Trends in the Age of COVID-19

THE COVID-19 PANDEMIC WILL HAVE TWO EFFECTS ON PUBLIC RETIREMENT SYSTEMS

1. Financial losses and general volatility will prevent pension funds from earning their assumed rates of return. This will add unfunded liabilities.

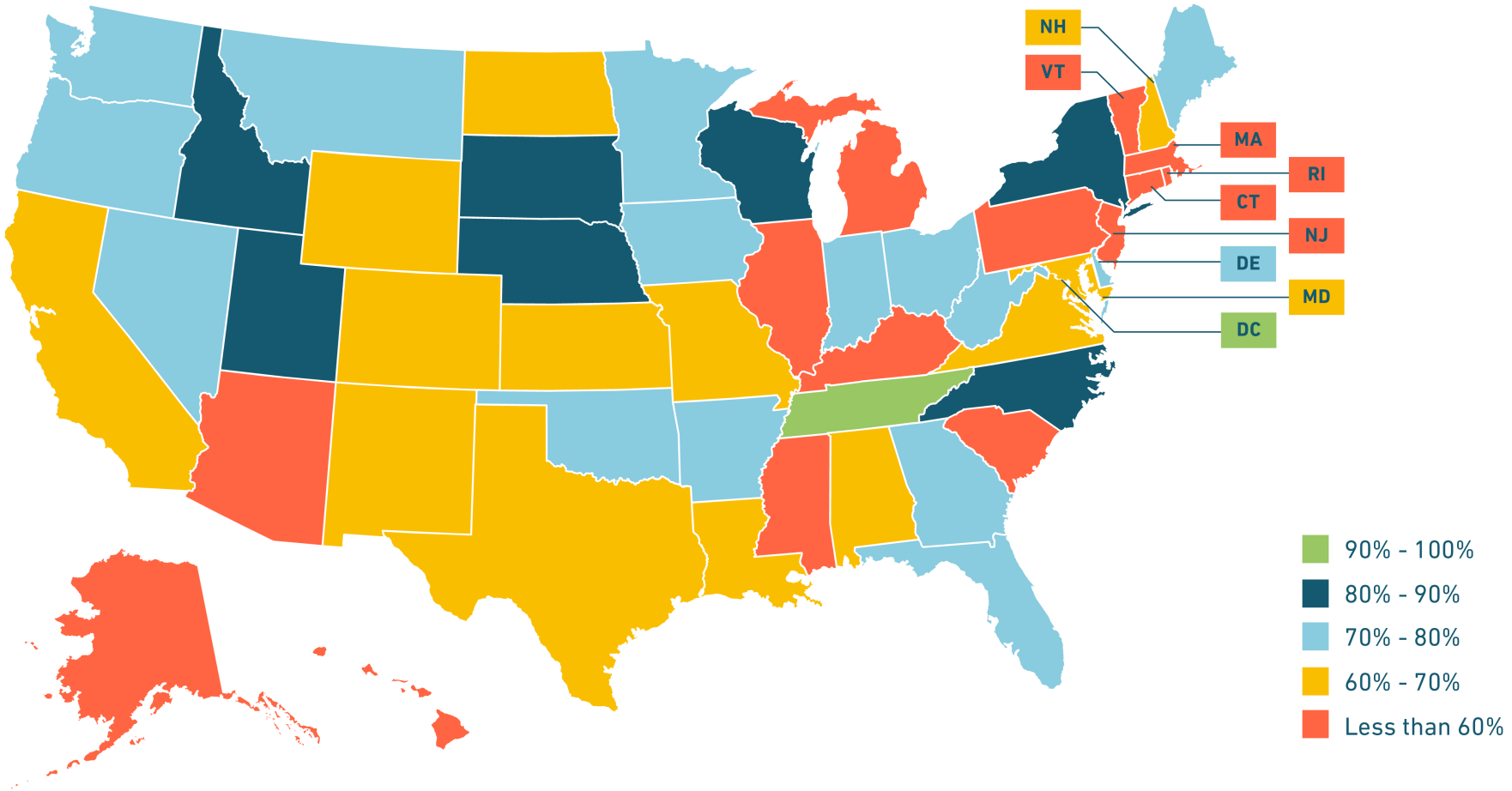
2. The economic recession will reduce tax revenue for state and local governments, putting pressure on their budgets while public health costs are increasing. This will lead to states and cities taking actions that reduce their near-term pensions costs:

Reducing government contributions into pension funds

Increasing contribution rates from employees

Reducing benefits (where legal), such as cutting retiree COLAs

2020 ESTIMATED AGGREGATE STATE FUNDED RATIOS, BY STATE

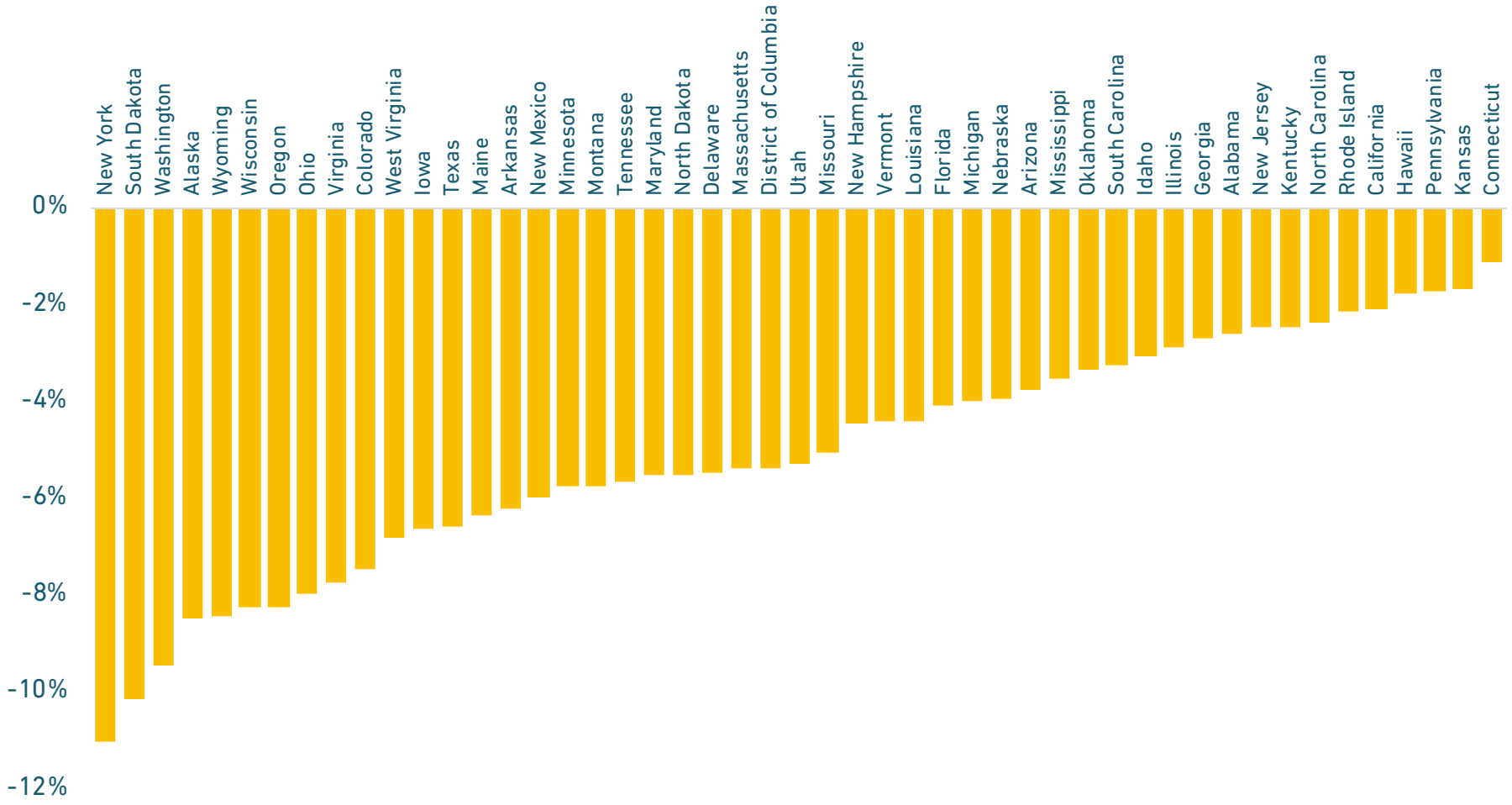


Equable estimates the average investment return for statewide plans as of June 30, 2020 is **-0.44%** based on the most recent asset allocation reports from each plan. This is **763 basis points** below the average 7.19% assumed return for the fiscal year.

Half of the plans with a resilient funded status (greater than 90%) at the end of 2019 slipped into a fragile position (60% to 90%). Another 12 plans moved from fragile to distressed funded status (less than 60%).

Source: Equable Institute forecast based on investment returns as of June 30, 2020 and reported asset allocation levels for each plan. For plans with fiscal year end dates after June 2020 the change in funded ratio shown is based only on the part of their fiscal year complete as of the measurement date. See methodology section for complete details.

ESTIMATED DECLINE IN FUNDED RATIO FROM 2019 TO 2020

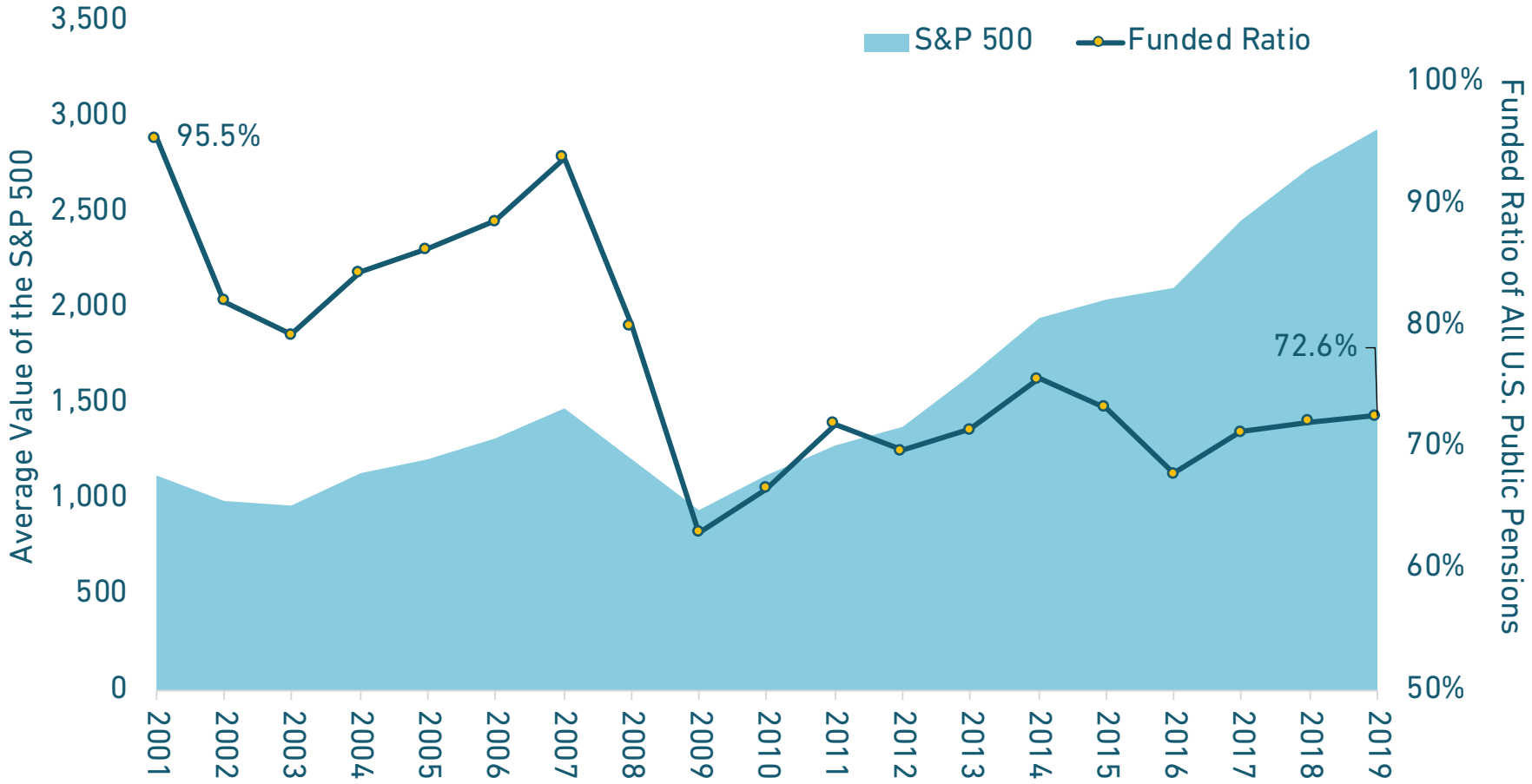


States with higher funded ratios were affected by the March 2020 market crash more than poorly funded states because the better-funded plans had more assets to lose. Many plans bounced back from the asset shock, but they will likely report underperforming against their assumed returns for the fiscal year ending 2020.

Note: Indiana and Nevada are not shown because we project the collective 2020 funded ratio for their statewide plans will improve slightly.

Source: Equable Institute forecast based on investment returns as of June 30, 2020 and reported asset allocation levels for each plan. For plans with fiscal year end dates after June 2020 the change in funded ratio shown is based only on the part of their fiscal year complete as of the measurement date. See methodology section for complete details.

FUNDED RATIO RELATIVE TO POST-GREAT RECESSSION BULL MARKET



Despite the run-up for financial markets between 2009 and 2019, statewide pension funds are entering the COVID-19 Recession at a lower funded status than going into the Great Recession.

It is reasonable to expect over the next few years similar patterns of state budgeting behavior that was seen after the Great Recession. This means statewide plans are facing a very real risk of further funded status erosion even if financial markets bounce back.

Source: Equable Institute analysis of public plan valuation reports and CAFRs; Yahoo Finance.

WHAT HAPPENED AFTER THE GREAT RECESSION IS A GUIDE TO WHAT IS LIKELY TO TRANSPIRE OVER THE NEXT DECADE

- From 2008 to 2010 there was a drop off in the percentage of required contributions that was actually paid by state governments (Page 36), driven by low tax revenues and budget constraints.
  - States began to improve their funding practices in 2013 and 2014, around five years after the recession ended.
- Unfunded liabilities jumped because of losses during the Financial Crisis and grew steadily in the decade that followed. This led to a steady increase in employer contributions, doubling from 14.01% to 27.9% as a percentage of payroll between 2009 and 2019 (Page 11).
  - The funded ratio average leveled off between 2011 and 2019. But remaining perpetually underfunded has contributed to ever growing costs.
- States turned to member contributions to help pay for increasing costs following the Great Recession (Page 10).
  - Within six years of the Great Recession, employees were paying over 0.75% more from their paychecks for the same (or lessor) benefits, with the average increasing from 5.84% to 6.66% of payroll.
- A positive trend (from the perspective of long-term resilience) was in the decline of assumed rates of return (Pages 27, 29, 30). But states did not start making meaningful moves until around three to four years after the end of the Great Recession.
- States increased their asset allocations to higher risk, higher reward investments, starting in 2008, to try and increase returns (Page 9).
- States also pursued various changes to benefits that would reduce their long-term costs, including the reduction or elimination of cost-of-living adjustments.* Sometimes these changes were for new members, other times (where legal) they were for active employees and/or retirees.

EQUABLE

*See analyses from the National Council of State Legislatures and National Association of Retirement System Administrators.

Analysis: How We See COVID-19 Influencing National Trends

COVID's financial effects and economic effects will accelerate the pre-existing state pension fund trends.

- We expect that the negative effects of the pandemic on pension funds will accelerate the upward trends of:
  - Unfunded liabilities (lower returns compared to investments; states reducing actual contributions),
  - Unfunded liability to GDP ratios (both because of growing pension shortfalls and economic contraction),
  - Asset allocations shifting to riskier investments (in a search for better yields),
  - Actuarially required contribution rates (because of increased unfunded liabilities), and
  - Retiree-to-active member ratios (because states are likely to lay off employees or slow down hiring amid the recession).
- The pandemic will also accelerate the downward trends of funded ratios, investment performance, and COLA distributions.
- On the positive side, we think plans that did adopt risk-sharing tools and moved more aggressively to reduce investment assumptions during the past decade will provide example policies for other states to adopt during the coming decade, accelerating that trend.
- The exception is that low tax revenues will mean a reversal of the recent trend for states paying nearly 100% of their ADEC.*

Looking to the future: This means there isn't anything particularly new that was created by the pandemic. It is just another data point consistent with the long-run new normal for investment volatility and pension plan fragility.

***Note :** ADEC is the actuarially determined employer contribution.

Takeaways

- Some states have been making strides toward improving the resilience of their pension plans, adopting various kinds of risk-sharing policies (Page 39), and contribution rate ramp-ups (Page 37).

- Plus, after decades of states failing to ensure they were paying at least the actuarially determined contribution rates, in 2019 states as a group paid 100% of required contributions (Page 36).

- However, those contributions represented the highest actual employer contribution rates in history (Page 36), even though employee contributions have also grown to 6.7% of payroll (Page 40).

- In 2019, there were 18 states where required contributions for their combined statewide plans were 8% or more of all state own-source expenditures, and eight states with required contributions greater than 10% of state spending (Page 45).

- The total funded ratio for statewide pensions is near its lowest point in modern history (Page 5). And this is despite a decade long bull market from 2009 to 2019 driving up pension assets and record levels of contributions into those pension funds.

- Within the states, funded ratios and unfunded liability levels vary considerably from state to state (Page 15). The vast majority have a fragile or distressed funded status.

- The decline in interest rates over the past few decades (Page 26) has had significant, negative effects on pension plans. Returns from relatively safe fixed income investments have declined, leading to states shifting their asset allocation to private equity, hedge funds, and real estate (Page 9). Meanwhile, the average assumed rate of return has declined relatively slowly (Page 30). Only a few states have made meaningful steps away from relatively high assumed returns (Page 30).

- It is going to be harder and harder to earn investment returns going forward. Most major capital market forecasts project a decade of average returns well below the 7.2% statewide pensions are assuming. Plans are cash flow negative from contributions and benefit payments (Page 12). There are more retirees (drawing down assets) than active members (contributing assets) (Page 49). And the available asset base to earn investments from, relative to promised benefits, is trending down (Page 6, 50).

Looking to the future: We do not expect these negative trends will reverse without some intervention. Pension funds will not be able to invest their way out of the shortfall relative to growing promised benefits. Contribution levels based on status quo funding policies have not kept up with the growing rate of liabilities (Page 6). But there is a theoretical limit to the contribution rates that state leaders will accept drawing on their general funds, school district funding, or city budgets. The larger a state's unfunded liability relative to GDP, the harder it will be for that state's tax base to pay down the pension funding shortfall (Page 7).

- There is a range of interventions that could help improve the trends outlined in this paper, and like the details within the trends themselves, the specifics vary from state to state. States that have fragile, but not distressed pension plans should be looking to make funding policy improvements while the costs of doing so are not prohibitively expensive, as is likely the case for states with some of the worse funded plans. States on the cutting edge of pension plan management (ex. MI, CO, NM) are focused on adopting risk-sharing policies that give pension boards tools to balancing the goals of protecting benefits and ensuring a well-funded plan.

- Public plans are likely to continue the trend of lowering their assumed returns in the coming years due to lower probable actual returns. The speed at which this change is made will likely influence how much risk persists within public plans. Each year investment returns underperform expectations perpetuate a vicious cycle.

APPENDIX 1: GLOSSARY

KEY TERMS TO KNOW

Liabilities

- **Accrued liability (AAL):** Total amount of promised pension benefits, counting up all expected pension checks for active members and retirees, and then reporting those in today's dollars.
- **Total pension liability (TPL):** A technical definition from the Governmental Accounting Standards Board for the value of promised benefits. All retirement systems that want to comply with GASB reporting requirements are required to measure their pension obligations in a particular way that sometimes can be slightly different from AAL.

Assets

- **Actuarial value of assets (AVA):** A "smoothed" value of assets, typically used for the purposes of determining contribution rates and measuring unfunded liabilities. Actuaries "smooth" any gains and losses of a particular number of years to minimize year-to-year changes in the value of the AVA. For example, actuaries typically smooth investment gains and losses over a five-year period, only recognizing 20% of the market valued return each year for the purposes of determining the AVA.
- **Market value of assets (MVA):** The actual, fair market value of the plan's total assets, measured by the price that would be received to sell an asset in an orderly transaction.
- **Fiduciary net position:** A technical definition from the Governmental Accounting Standards Board for the market value of assets. All retirement systems that want to comply with GASB reporting requirements are required to measure the real value of their assets, instead of the actuarial value.

Pension Debt

- **Unfunded liabilities:** The difference between the value of promised benefits and assets available to pay those benefits. This is the shortfall in assets that should be in the pension fund and invested so that all promised benefits can be paid. An easy way to think about unfunded liabilities is as pension debt.
- **Net pension liability (NPL):** A technical definition from the Governmental Accounting Standards Board for pension funding shortfalls. All retirement systems that want to comply with GASB reporting requirements are required to measure their obligations as total pension liabilities (TPL), and their assets using a market value called fiduciary net position (FNP). The difference between these two accounting metrics is the net pension liability.
- **Pension debt:** A non-technical way to think about "unfunded liabilities," which is the difference between the value of promised benefits and the assets available to pay those benefits. Pension debt isn't like typical government debt. Money isn't borrowed and put into the pension fund. Instead, it is money the pension fund needs to make up for past contributions that weren't enough to appropriately pre-pay for benefits.

KEY TERMS TO KNOW

Contributions

- **Actuarially determined contribution (ADC):** Annual amount actuarially necessary to cover the normal cost and amortization payment. (Previously known as the "annual required contribution" or ARC payment.)
- **Actuarially determined employer contribution (ADEC):** The value of the ADC after accounting for any employee contributions.
- **Amortization payments:** Contributions necessary to pay down the unfunded liability shortfall over time. These can be stretched over varying periods of time, and based on an equal dollar per year basis, or calculated as an equal percentage of payroll for each year of the amortization schedule.
- **Funded ratio:** The funded ratio measures the ratio of dollars in the pension fund compared to the value of promised lifetime income benefits.

Assumptions

- **Actuarial assumptions:** Estimates used to forecast uncertain future events affecting future benefits or costs associated with a pension fund. Examples of these assumptions include investment rate of return, inflation, payroll growth, mortality, retirement patterns, and other demographic data.
- **Assumed rate of return (ARR):** The investment return on assets that the pension fund expects to earn over a long-term period of time.
- **Expected rate of return:** This term is often used interchangeably with "assumed rate of return." Technically, the expected rate of return refers to the middle of the possible investment returns for a given pension fund's portfolio. Investment advisors forecast what the probability is for different rates of return based on a given portfolio (such as the mix of stocks and bonds). The 50th percentile—or 50% probability—in that forecast is formally known as the expected rate of return. Pension board trustees do not always choose the expected rate of return as the assumed rate of return, but they do use it as a guidepost.
- **Payroll:** The total amount paid to employees that are participating in a retirement system. The costs and contribution rates of a pension plan are often expressed as a percentage of the total plan payroll.

Benefits

- **Cost-of-living adjustment (COLA):** An annual change to a pension benefit for retirees, usually pegged to some measure of the rate of inflation.
- **Defined benefit plan:** A retirement plan that determines benefits by a formula in advance of your retirement. This term is often used to refer to pensions, but technically it can refer to a range of retirement plan designs.
- **Normal cost:** The contribution necessary to pay for benefits earned each year. This amount gets invested, and the combined total is intended to pay all promised benefits. The normal cost "prefunds" or "pays in advance" for promised pension benefits.
- **Pension plan:** A guaranteed income plan that provides a fixed, guaranteed monthly income based on two factors: years worked and average salary during final working years. The years worked are usually multiplied by an accrual rate as a component of the benefit.

APPENDIX 2: METHODOLOGIAL NOTES

WHO ARE WE COUNTING?

- For our analyses we focus on statewide retirement systems and the various defined benefit plans within those systems. Eligible plans hold at least $1 billion in accrued liabilities.
- We note, however, that we separate several retirement systems into their respective plans (e.g. Colorado PERA is split into 4 plans), as they have independently measured and reported assets, liabilities, contribution rates, and other data.
- Numerous states have hybrid systems (e.g. Michigan, Pennsylvania, and Tennessee) that include both defined benefit and defined contribution portions. For those plans we include the defined benefit portions in our data and analyses.
- We treat guaranteed return/cash balance plans in the same fashion as hybrid plans. We report defined benefit totals as they are presented in plan actuarial valuations and comprehensive annual financial reports.
- The result of this approach is a population of 143 pension plans across the 50 states and Washington, D.C.
- A full list of included plans is available on slides 78 to 80.

WHAT YEARS ARE WE MEASURING?

- Our analyses focus on the years 2001 through 2019 (for reported data) and 2020 for our projections.
- We use reported figures for fiscal year ending (FYE) 2019 for all plans who have published their actuarial valuation reports or annual reports for those years. For all plans that do not yet report those values, we either roll them forward using the reported assumptions of the retirement system (e.g., payroll growth) or simply carry forward their reported values for FYE 2018 when a roll-forward is not possible.
- We will update this report later this year when all FYE 2019 data have been reported.
- We have also published a table online with each plan, the measurement date, the topline funding numbers, assumed returns, and other metrics used in our analyses. That table can be accessed here.

TECHNICAL NOTES ON SELECT CHARTS

- Page 5. "Funded Ratio Average for Statewide Pension Plans" measures the aggregate funded ratio for statewide pension plans weighted by total liabilities. The trendline shown here is using the fair market value of assets to measure funded status. An alternative measure using an "actuarial" value of assets shows 2019 was the lowest level since the 1990s.

- Page 22. "Unfunded Liability of Public Pensions as a Share of National GDP" uses the Federal Reserve's asset and liability data, which differs from the rest of the asset and liability data in this report on two points: (1) the total plans covered are larger, meaning the asset base is larger; (2) the Federal Reserve applies their own methodology for measuring pension liabilities that differs from how some states report their own accrued liabilities, usually resulting in a higher estimation of the value of promised benefits and thus a higher unfunded liability figure. The points of comparison on the slide are formally defined by the Federal Reserve as "state and local government debt securities" (Municipal Debt), "outstanding university student debt" (Student Debt), "revolving consumer debt" (Credit Card Debt).

- Page 26. A common proxy for the trend line of interest rates is the yield on Treasury bonds as they represent a "risk-free" rate of return. We show the 10-year, 20-year, and 30-year returns to demonstrate that at issue is not the specific yield, but rather the overall downward trend.

- Pag 30. We measure "meaningful" in this context to be steps made after 2008 that eventually go below the national average of 7.2% There are several plans that made big steps from 8% or higher down to 7.25%, but that was still above the national average and based on current trends likely to be revised again in the near-term.

- Page 73. The member contribution rate data for plans with mixed Social Security participation is not complete for 2001. Roughly half of the plans in that sample do not have publicly available data for that year. In our overall sample of 143 plans this does not meaningfully change the 2001 contribution rate data, but it does influence the smaller sample. So we started this chart at 2002.

DATA SOURCES

- Our primary source for state plan data between 2001 and 2019 is the actuarial valuation published by the retirement system.
- For pension finance data not available in the valuation, we also use the system's CAFR and separately published GASB 67 statements.
- State GDP data are compiled from both the Bureau of Economic Analysis and Federal Reserve.
- State budget data is drawn from the National Association of Budget Officers' annual State Expenditure Report.
- Interest rate data and pre-2001 pension finance data is drawn from the Federal Reserve.

HOW WE PRODUCED OUR 2020 FUNDED RATIO ESTIMATE

- We collected asset allocation data for each plan using their most recent published report, usually in the CAFR but occasionally via an investment report on the plan's website. We broke this data into the following categories: U.S. Equities, Global Equities, U.S. Fixed Income, Global Fixed Income, Private Equity, Hedge Funds, Real Estate, Commodities, and Cash.

- We collected actual returns for benchmarks for these categories and applied those benchmarks to each plan's allocation to get an approximate estimated return.

- This methodology has some clear disadvantages: it does not account for the actual strategies employed by each fund, for instance the actual equity allocation may differ significantly from broad market metrics; it does not account for special leverage or hedges that might aid or harm a fund's overall performance. However, as a tool for approximating a return our methodology has the advantage of working with a large number of plans. For some we will overestimate, and other underestimate.

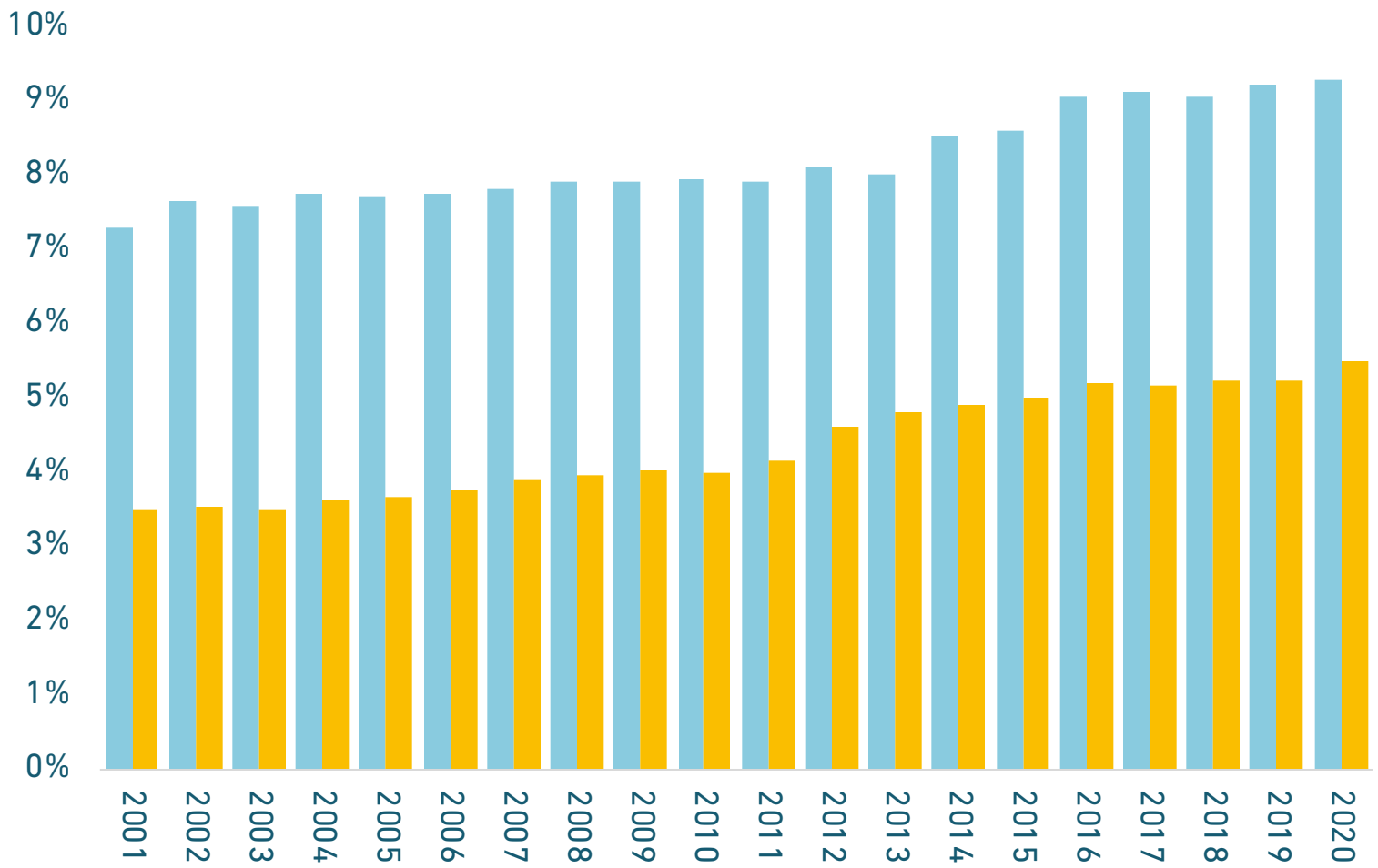
- We rolled forward each plan's liabilities using their TPL (or AAL if the TPL was not available) as the base. We rolled forward each plan's assets using their FNP (or MVA if the FNP was not available) and the approximate return generated by the above methodology. Back tests of these methodologies were with a reasonable range of actual figures on a one- and two-year roll forward basis.

- We used these approximate figures for assets and liabilities to estimate 2020 unfunded liability and funded ratio levels.

- For plans with fiscal years ending later than June 2020, we only rolled their assets and liabilities forward as far as June 30, 2020. Their actual asset performance during the rest of their fiscal year may vary considerably based on market trends, and could cause the final funded ratio figure for the full fiscal year ending 2020 to vary from our current estimate.

APPENDIX 3: CONTRIBUTION RATES BASED ON SOCIAL SECURITY PARTICIPATION

AVERAGE MEMBER CONTRIBUTIONS, BASED ON SOCIAL SECURITY PARTICIPATION | 2001-2020



Statewide pension plans where members do not participate in Social Security (SSA) tend to offer benefits with larger values than plans where members will also receive Social Security.

As a result, the normal costs of the plans without companion SSA benefits tend to be relatively higher. Member contribution rates tend to be relatively higher too.

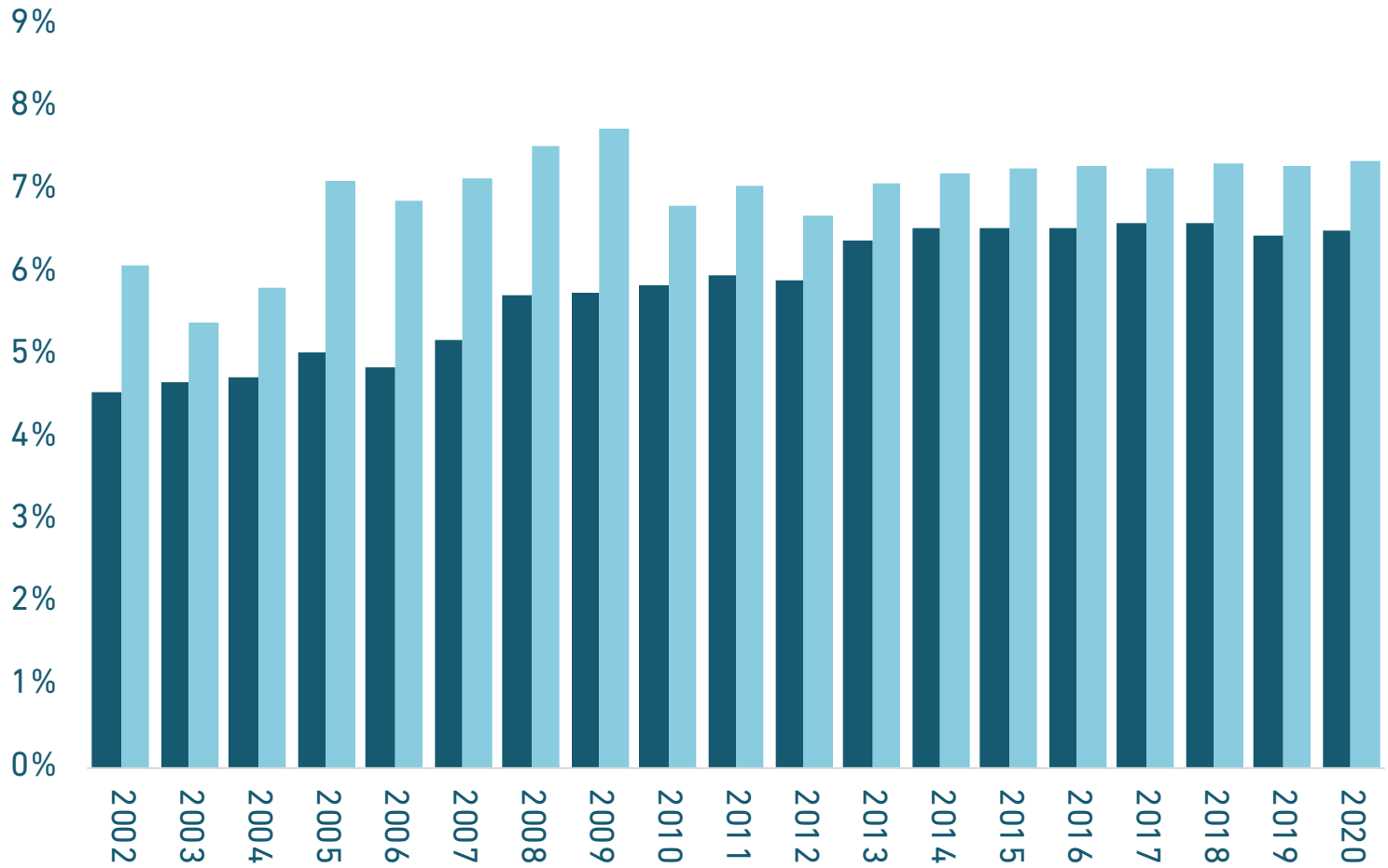
However, the overall trend of increases member contributions has been consistent no matter whether a plan has companion SSA benefits.

For Plans Not Participating in Social Security

For Plans Participating in Social Security

Source: Equable Institute analysis of public plan valuation reports and CAFRs. Contribution rates show for the year actually paid.

AVERAGE MEMBER CONTRIBUTIONS FOR MIXED SSA PARTICIPATION PLANS | 2001-2020



There are a few statewide retirement systems (17) where the participating employers may or may not be also enrolling their members in Social Security. One of these pension plans is CalPERS, which because of its size, accounts for 48% to 55% of the liabilities of the group over time. As a result, CalPERS on its own changes the overall trendline for member contributions meaningfully.

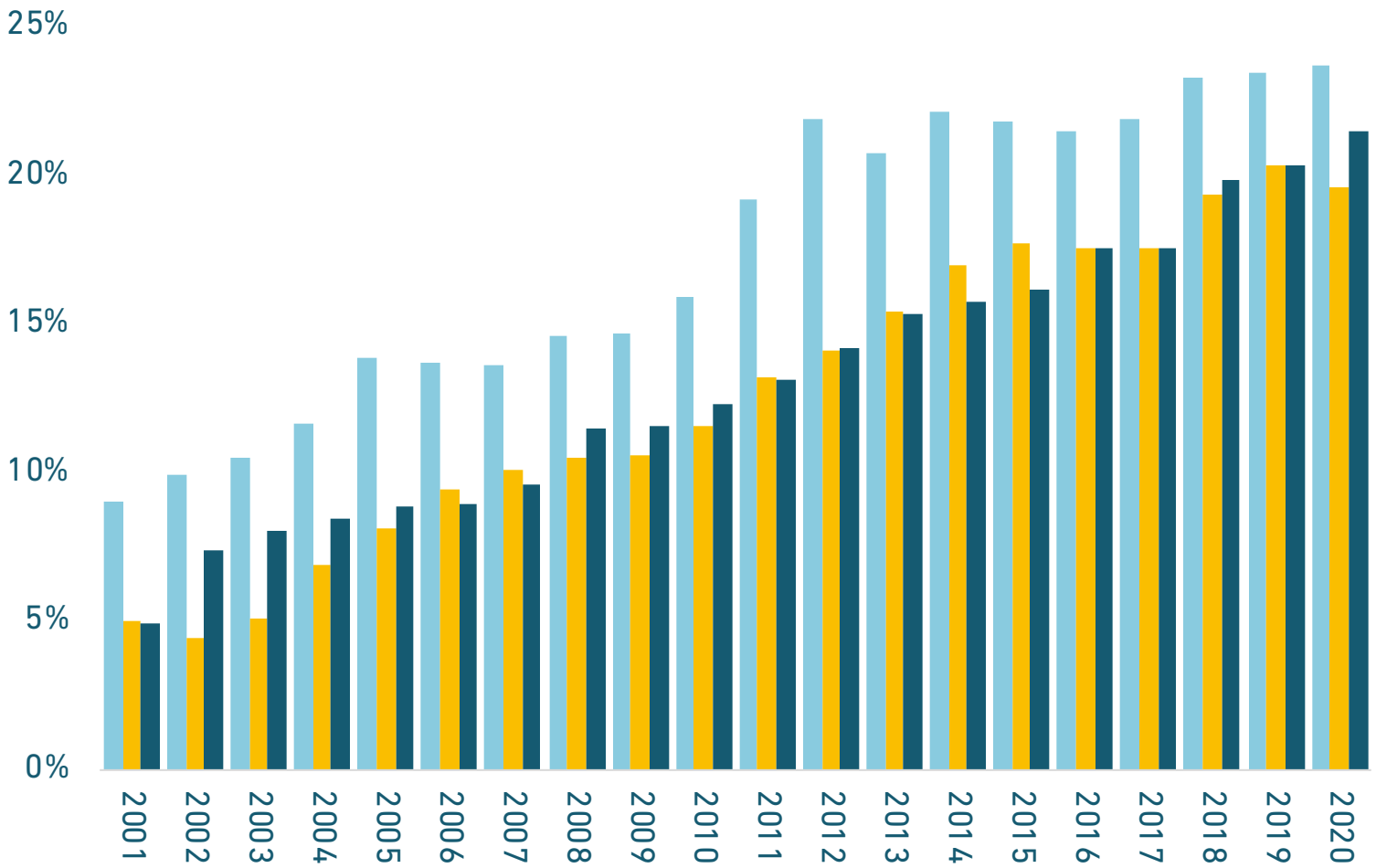
The average for the 16 non-CalPERS plans steadily increased between 2002 and 2014 and has been flat since. Including CalPERS in the average shows a more varied average member rate from year to year.

For Plans With Mixed SSA, including CalPERS

For Plans With Mixed SSA, without CalPERS

Source: Equable Institute analysis of public plan valuation reports and CAFRs. Contribution rates show for the year actually paid. Note: In these cases the pension benefit levels tend to be the same across all plans, so the contributions into the retirement system for members (and employers) are also the same even if Social Security taxes are collected at the same time.

AVERAGE EMPLOYER CONTRIBUTIONS, BASED ON SOCIAL SECURITY PARTICIPATION | 2001-2020



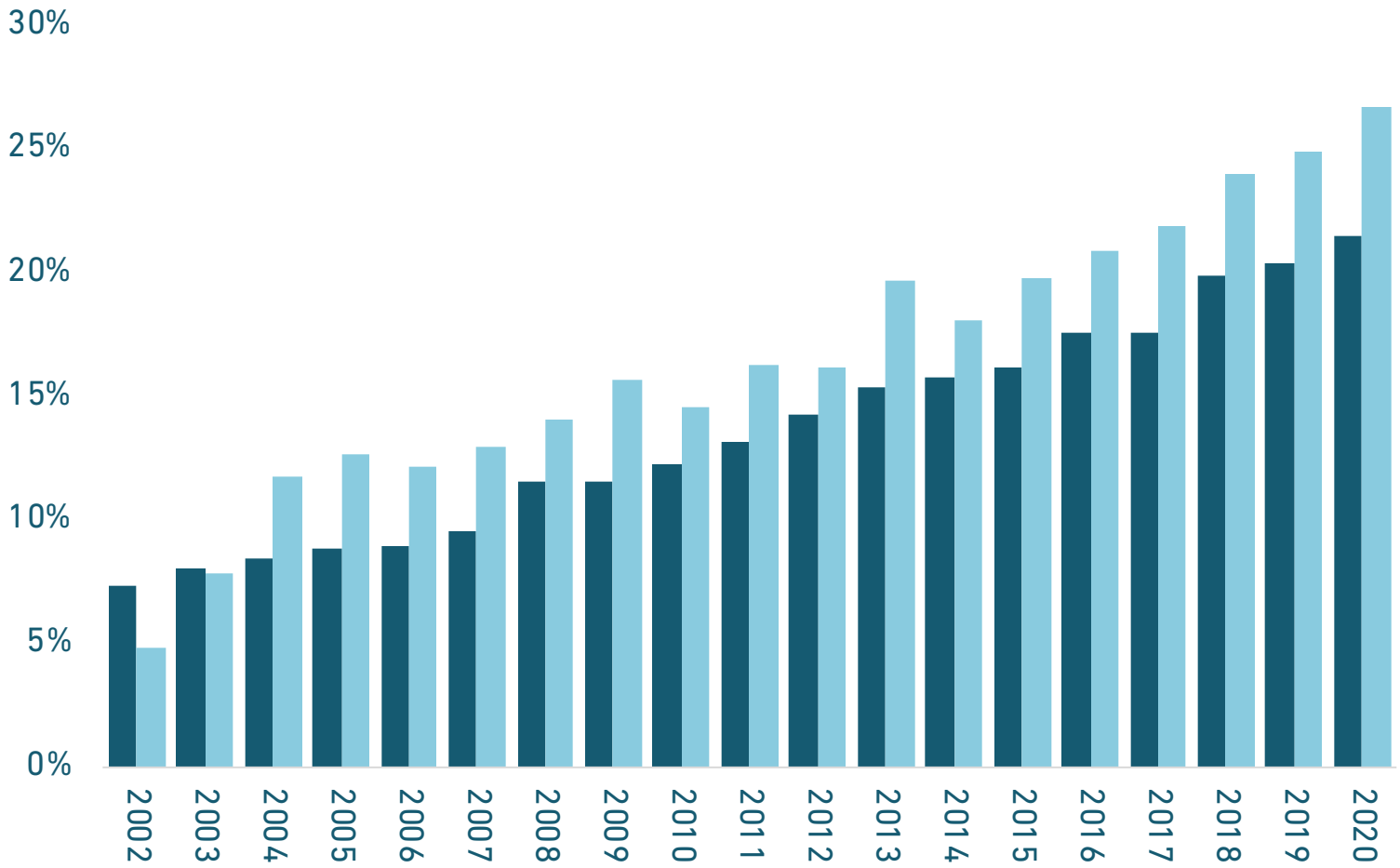
The total employer contribution rates for statewide pension plans varies depending on the degree to which those employers participate in Social Security.

However, the overall trend of increases employer contributions has been consistent across all three kinds of participation levels.

- For Plans Not Participating in Social Security
- For Plans Participating in Social Security
- For Plans with Mixed Participation in SSA

Source: Equable Institute analysis of public plan valuation reports and CAFRs. Contribution rates show for the year actually paid.

AVERAGE EMPLOYER CONTRIBUTIONS FOR MIXED SSA PARTICIPATION PLANS | 2001-2020



Unlike member contribution rates, there is a similar average employer contribution rate trendline for retirement systems with mixed participation in Social Security.

Like member contributions, the absolute average does increase when adding CalPERS costs into the average.

For Plans With Mixed SSA, including CalPERS

For Plans With Mixed SSA, without CalPERS

Source: Equable Institute analysis of public plan valuation reports and CAFRs. Contribution rates show for the year actually paid. Note: In these cases the pension benefit levels tend to be the same across all plans, so the contributions into the retirement system for members (and employers) are also the same even if Social Security taxes are collected at the same time.

APPENDIX 4: STATEWIDE RETIREMENT SYSTEMS IN OUR DATA SET

STATEWIDE RETIREMENT SYSTEMS IN OUR DATA SET (Alabama - Michigan)

Retirement System Full Name	Pension Plan Shorthand
Alabama Employees' Retirement System	Alabama ERS
Alabama Teachers' Retirement System	Alabama TRS
Alaska Public Employees' Retirement System	Alaska PERS
Alaska Teachers' Retirement System	Alaska TRS
Arizona Elected Officials Retirement Plan	Arizona EORP
Arizona Public Safety Personnel Retirement System	Arizona PSPRS
Arizona State Retirement System	Arizona SRS
Arizona Corrections Officers Retirement Plan	Arizona CORP
Arkansas Public Employees Retirement System	Arkansas PERS
Arkansas Teacher Retirement System	Arkansas TRS
California Judges Retirement Fund	California JRF
California Judges Retirement Fund II	California JRF II
California Public Employees Retirement Fund	CalPERS
California State Teachers' Retirement System	CalSTRS
University of California Retirement System	California URS
Colorado Public Employee Retirement Association - Local Division Fund	Colorado Local
Colorado Public Employee Retirement Association - Schools Division Fund	Colorado Schools
Colorado Public Employee Retirement Association - State Division Fund	Colorado State
Colorado Public Employee Retirement Association - Denver Public Schools Fund	Colorado Denver
Connecticut Municipal Employees Retirement System	Connecticut MERS
Connecticut State Employees Retirement System	Connecticut SERS
Connecticut State Teachers' Retirement System	Connecticut TRS
Delaware State Employees' Pension Plan	Delaware SEPP
District of Columbia Police Officers and Fire Fighters' Retirement Fund	D.C. POFRP
District of Columbia Teachers' Retirement Fund	D.C. TRP
Florida Retirement System - Defined Benefit Plan	Florida RS
Georgia Employees' Retirement System	Georgia ERS
Georgia Teachers Retirement System	Georgia TRS
Employees' Retirement System of the State of Hawaii	Hawaii ERS
Public Employee Retirement System of Idaho	Idaho PERS
Illinois Municipal Retirement Fund	Illinois MRF
Illinois State Employees Retirement System	Illinois SERS
Illinois State University Retirement System	Illinois TRS
Illinois State University Retirement System	Illinois SURS
Indiana 1977 Police Officers' and Firefighters' Pension and Disability Fund	Indiana POFPDF
Indiana Public Employees Retirement Fund	Indiana PERF
Indiana State Teachers Retirement Fund - Pre-1996 Account	Indiana TRF Pre-96
Indiana State Teachers Retirement Fund - 1996 Account	Indiana TRF
Iowa Municipal Fire and Police Retirement System	Iowa MFPRS
Iowa Public Employees' Retirement System	Iowa PERS
Kansas Public Employees Retirement System - School Employees	Kansas PERS-T
Kansas Public Employees Retirement System - State Employees	Kansas PERS-S
Kansas Public Employees Retirement System - Local Employees	Kansas PERS-L
Kansas Police and Firefighter's Retirement System	Kansas PF
Kansas Retirement System for Judges	Kansas JRS
Kentucky County Employees' Retirement System	Kentucky CERS
Kentucky Employees' Retirement System	Kentucky ERS
Kentucky Teachers' Retirement System	Kentucky TRS
Louisiana Municipal Police Employees Retirement System	Louisiana MPERS
Louisiana School Employees' Retirement System	Louisiana SRS
Louisiana State Employees' Retirement System	Louisiana LASERS
Louisiana State Parochial Employees Retirement System	Louisiana SPERS
Louisiana Teachers' Retirement System	Louisiana TRS
Maine Consolidated Plan for Participating Local Districts	Maine PERS Local
Maine State Employee and Teacher Program	Maine PERS STRP
Maryland State Retirement - Employees Combined System	Maryland ECS
Maryland State Retirement - Teachers' Combined System	Maryland TCS
Massachusetts State Employees' Retirement System	Massachusetts SERS
Massachusetts Teachers' Retirement System	Massachusetts TRS
Michigan Municipal Employees' Retirement System	Michigan MERS
Michigan Public School Employees' Retirement System	Michigan PSERS
Michigan State Employees' Retirement System	Michigan SERS

STATEWIDE RETIREMENT SYSTEMS IN OUR DATA SET (Minnesota - Vermont)

Retirement System Full Name	Pension Plan Shorthand
Minnesota General Employees Retirement Plan	Minnesota GERF
Minnesota Public Employees Police & Fire Plan	Minnesota PEPFP
Minnesota State Employees Retirement Fund	Minnesota SERF
Minnesota Teachers Retirement Association	Minnesota TRA
Missouri Department of Transportation and Highway Patrol Employees' Retirement System	Missouri DOT
Missouri Local Government Employees Retirement System	Missouri LGERS
Missouri Public Education Employee Retirement System	Missouri PEERS
Missouri State Employees' Retirement System	Missouri SERS
Missouri Public School Retirement System	Missouri PSRS
Montana Public Employees' Retirement System	Montana PERS
Montana Teachers' Retirement System	Montana TRS
Nebraska Public Employees Retirement Systems - School Employees Plan	Nebraska SEP
Public Employees' Retirement System of Nevada - Police and Fire Subfund	Nevada PERS PF
Public Employees' Retirement System of Nevada - Regular Subfund	Nevada PERS Reg
New Hampshire Retirement System	New Hampshire RS
New Jersey Public Employees' Retirement System - State Plan	New Jersey PERS-S
New Jersey Public Employees' Retirement System - Local Plan	New Jersey PERS-L
New Jersey Police & Firemen's Retirement System - State Division	New Jersey PF-S
New Jersey Police & Firemen's Retirement System - Local Division	New Jersey PF-L
New Jersey Teachers' Pension & Annuity Fund	New Jersey TPAF
New Mexico Educational Retirement Board	New Mexico ERB
New Mexico Public Employees Retirement Association	New Mexico PERA
New York State Teachers' Retirement System	New York STRS
New York State and Local - Employees' Retirement System	New York SLRS ERS
New York State and Local - Police and Fire Retirement System	New York SLRS PFRS
North Carolina Local Government Employees' Retirement System	North Carolina LGERS
North Carolina Teachers' and State Employees' Retirement System	North Carolina TSERS
North Dakota Public Employees Retirement System	North Dakota PERS
North Dakota Teachers' Fund for Retirement	North Dakota TFR
Ohio Public Employees' Retirement System	Ohio PERS
Ohio Police and Fire Pension Fund	Ohio PFPF
Ohio School Employees' Retirement System	Ohio SERS
Ohio State Teachers' Retirement System	Ohio STRS
Oklahoma Public Employees Retirement System	Oklahoma PERS
Oklahoma Police Pension and Retirement System	Oklahoma PPRS
Oklahoma Teachers' Retirement System	Oklahoma TRS
Oregon Public Employees Retirement System	Oregon PERS
Pennsylvania Municipal Retirement System	Pennsylvania MRS
Pennsylvania Public School Employees' Retirement System	Pennsylvania PSERS
Pennsylvania State Employees' Retirement System	Pennsylvania SERS
Employees' Retirement System of Rhode Island - State Employees	Rhode Island State
Employees' Retirement System of Rhode Island - Teachers	Rhode Island Teachers
Municipal Employees' Retirement System of Rhode Island	Rhode Island MERS
South Carolina Police Officers' Retirement System	South Carolina PORS
South Carolina Retirement System	South Carolina RS
South Dakota Retirement System	South Dakota RS
Tennessee Teacher Legacy Pension Plan	Tennessee TLPP
Tennessee Teacher Retirement Plan	Tennessee TRP
Tennessee Public Employees Retirement Plan	Tennessee PERP
Texas County & District Retirement System	Texas CDRS
Texas Employees Retirement Fund	Texas ERS
Texas Law Enforcement & Custodial Officer Retirement Plan	Texas LECOS
Texas Municipal Retirement System	Texas MRS
Texas Teachers Retirement System	Texas TRS
Utah Public Employees Contributory Retirement System	Utah CRS
Utah Public Employees Noncontributory Retirement System	Utah NRS
Utah Tier 2 Public Employees Contributory Retirement System	Utah CRS-T2
Utah Public Safety Retirement System - Contributory	Utah PSC
Utah Public Safety Retirement System - Noncontributory	Utah PSN
Utah Firefighters Retirement System	Utah FRS
Utah Tier 2 Public Safety and Firefighter Contributory Retirement System	Utah PSC-T2
Vermont State Employees' Retirement System	Vermont SERS
Vermont State Teachers' Retirement System	Vermont STRS

STATEWIDE RETIREMENT SYSTEMS IN OUR DATA SET (Virginia - Wyoming)

Retirement System Full Name	Pension Plan Shorthand
Virginia Retirement System - State Employees Division	Virginia RS-S
Virginia Retirement System - Teachers Division	Virginia RS-T
Virginia Retirement System - Political Subdivisions	Virginia RS-L
Virginia State Police Officers' Retirement System	Virginia SPORS
Virginia Judicial Retirement System	Virginia JRS
Virginia Law Officers' Retirement System	Virginia LORS
Washington Law Enforcement Officers' Retirement System - Plan 1	Washington LEOFF 1
Washington Law Enforcement Officers' Retirement System - Plan 2	Washington LEOFF 2
Washington Public Employees' Retirement System - Plan 1	Washington PERS 1
Washington Public Employees' Retirement System - Plan 2 & 3	Washington PERS 2/3
Washington School Employees' Retirement System - Plan 2/3	Washington SERS 2/3
Washington Teachers Retirement System Plan 1	Washington TRS 1
Washington Teachers Retirement System Plan 2 & 3	Washington TRS 2/3
West Virginia Public Employees' Retirement System	West Virginia PERS
West Virginia Teachers' Retirement System	West Virginia TRS
Wisconsin Retirement System	Wisconsin RS
Wyoming Retirement System	Wyoming RS