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The State Pension Funding Gap: 2016

Investment shortfalls, insufficient contributions reduced funded levels for public worker retirement plans

Overview

Many state retirement systems are on an unsustainable course, coming up short on their investment targets and having failed to set aside enough money to fund the pension promises made to public employees. Although contributions from state taxpayers nearly doubled as a share of revenue since 2000, the total still fell short of what is needed to improve the funding situation.

There is no one-size-fits-all solution to the pension funding shortfall and the budgetary challenges facing individual states, but without new policies that commit states to fully funding retirement systems, the impact on other essential services—and the potential for unpaid pension promises—will increase.

The Pew Charitable Trusts analyzed the state pension funding gap for fiscal year 2016, the most recent year for which comprehensive data were available for all 50 states. This brief outlines the primary factors that caused the widening divide in most states between assets and liabilities, and identifies tools that can help legislators strengthen policies and better manage risk for their state's retirement plans.

In 2016, the state pension funds in this study cumulatively reported a \$1.4 trillion deficit—representing a \$295 billion jump from 2015 and the 15th annual increase in pension debt since 2000. Overall, state plans disclosed assets of just \$2.6 trillion to cover total pension liabilities of \$4 trillion.

Investment returns that fell short of state assumptions caused a major part of the increase in the funding gap. The median public pension plan's investments returned about 1 percent in 2016, well below the median assumption of 7.5 percent—a disparity that added about \$146 billion to the debt.¹ Assumption changes—primarily states lowering the assumed rate of return used to calculate pension costs—accounted for another \$138 billion in increased liabilities.

Even if plan assumptions had been met in 2016, the funding gap would have increased by \$13 billion because states did not allocate enough to their systems. As a whole, they would have needed to contribute \$109 billion to pay for both the cost of new benefits and interest on pension debt; the actual amount contributed, \$96 billion, fell short.

Preliminary information for 2017 indicates that the year's strong investment performance will decrease reported unfunded liabilities, as public pension funds—which continue to allocate an ever greater share of assets to complex investments such as equities, hedge funds, real estate, and commodities that can produce higher returns than other assets but may also expose plans to increased risk—experienced gains from the upswing in financial markets. However, that same market volatility could have an adverse impact in the long term, especially if lawmakers also fail to make adequate annual contributions to state plans.

Even small changes to projected returns can significantly increase liabilities. Pew applied a 6.5 percent return assumption, instead of the median assumption of 7.5 percent, to estimate the total liability for state pension plans and found that it would increase to \$4.4 trillion—\$382 billion more than the current amount. The funding gap would then jump to \$1.7 trillion.

Similarly, public pension disclosures are now required to estimate funding levels using investment assumptions at 1 percentage point above and below the plan's assumed rate of return.

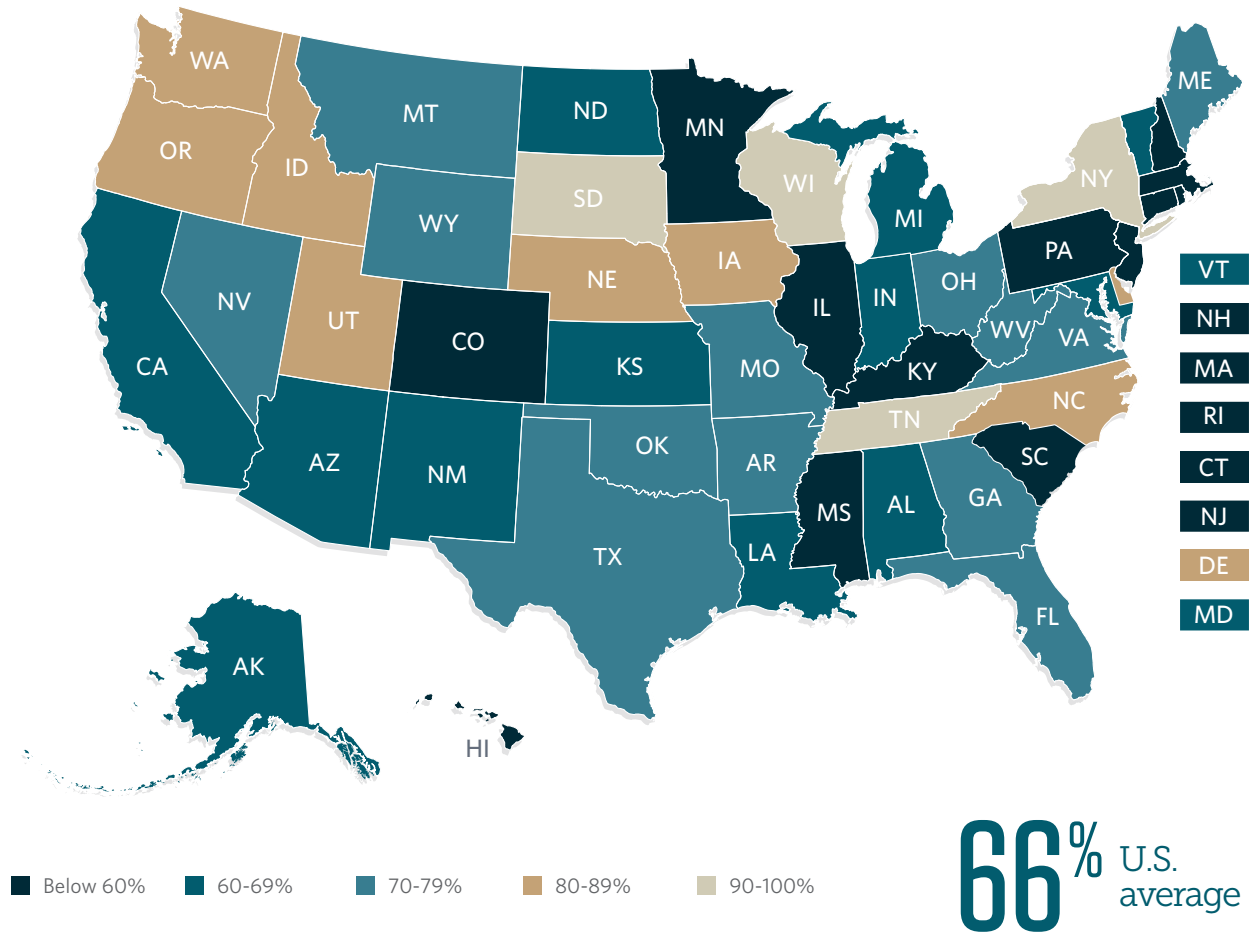
Ultimately, differences in state pension funding levels are driven by policy choices, with well-funded states having records of making actuarial contributions, managing risk, and avoiding unfunded benefit increases. Measures of plan assets as a percentage of liabilities in 2016 ranged from 31 percent in New Jersey to 99 percent in Wisconsin. Colorado, Connecticut, Illinois, Kentucky, and New Jersey were less than 50 percent funded, and another 17 states had less than two-thirds of the assets needed to pay promised benefits. Only New York, South Dakota, Tennessee, and Wisconsin were at least 90 percent funded. (See Figure 1.)

Other metrics of pension plans' financial health can indicate whether contribution policies are sufficient to make progress in paying down pension debt and keeping assets from being depleted. For example, net amortization measures whether expected contributions would have been enough to reduce unfunded liabilities—if return assumptions are accurate—while a new indicator, the operating cash flow ratio, can give a better sense of annual changes. These tools can help policymakers better track the financial health of state pension plans and act when warranted.

Figure 1

Funded Ratios for State Pension Plans, 2016

Only 4 states had at least 90% of the assets needed to pay promised benefits



Note: Percentages reflect 2016 Governmental Accounting Standards Board reporting standards.

Sources: Comprehensive annual financial reports, actuarial reports and valuations, other public documents, or as provided by plan officials

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Key Terms

Operating cash flow: The difference, before investments, between expenses (including benefit payments) and employer and employee contributions. When divided by assets, it is a benchmark for the rate of return required to ensure that asset balances do not decline.

Funded ratio: The level of a plan's assets, at market value, in proportion to accrued pension liability. This is an annual point-in-time measure, as of the valuation date.

Net amortization: Measures whether total contributions to a public retirement system would have been sufficient to reduce unfunded liabilities if all actuarial assumptions—primarily investment expectations—had been met for the year. The calculation uses the plan's reported numbers and assumptions about investment returns. Plans that consistently fall short of this benchmark can expect to see the gap between the liability for promised benefits and available funds grow over time.

Net pension liability: Current-year pension debt calculated as the difference between the total value of pension benefits owed to current and retired employees or dependents and the plan assets on hand. Pension plans with assets greater than accrued liabilities show a surplus.²

Sensitivity analysis: A method for measuring the impact of differing assumptions, particularly around investments, on key pension funding measures. Sensitivity analyses showing an investment return assumption 1 percentage point higher or lower than the base assumption are included in Governmental Accounting Standards Board (GASB) disclosures.

Debt drivers

Investment returns that fell short of plan assumptions accounted for a significant portion of the \$295 billion growth in net pension liability from 2015 to 2016. (See Figure 2.) Data collected by the Wilshire Trust Universe Comparison Service show median state pension plan returns of about 1 percent for 2016, the worst performance since the end of the Great Recession in 2009. That year the median investment return assumption used to calculate expected pension costs was 7.5 percent—a difference of 6.5 points. Because of investment market volatility, public pension plans in the aggregate missed their return targets in five of the preceding 10 years.³ Investment underperformance in 2016 added about \$146 billion to the overall funding gap—on top of the \$125 billion increase from investment shortfalls in 2015.

Changes to assumptions about investment performance also were a major driver of increased pension debt in 2016. Several state pension plans made more conservative projections about performance—or were forced to do so because of new standards set by the General Accounting Standards Board (GASB) in 2014. The lower assumed rates of return, along with other changes to actuarial assumptions, increased the reported liability by \$138 billion.

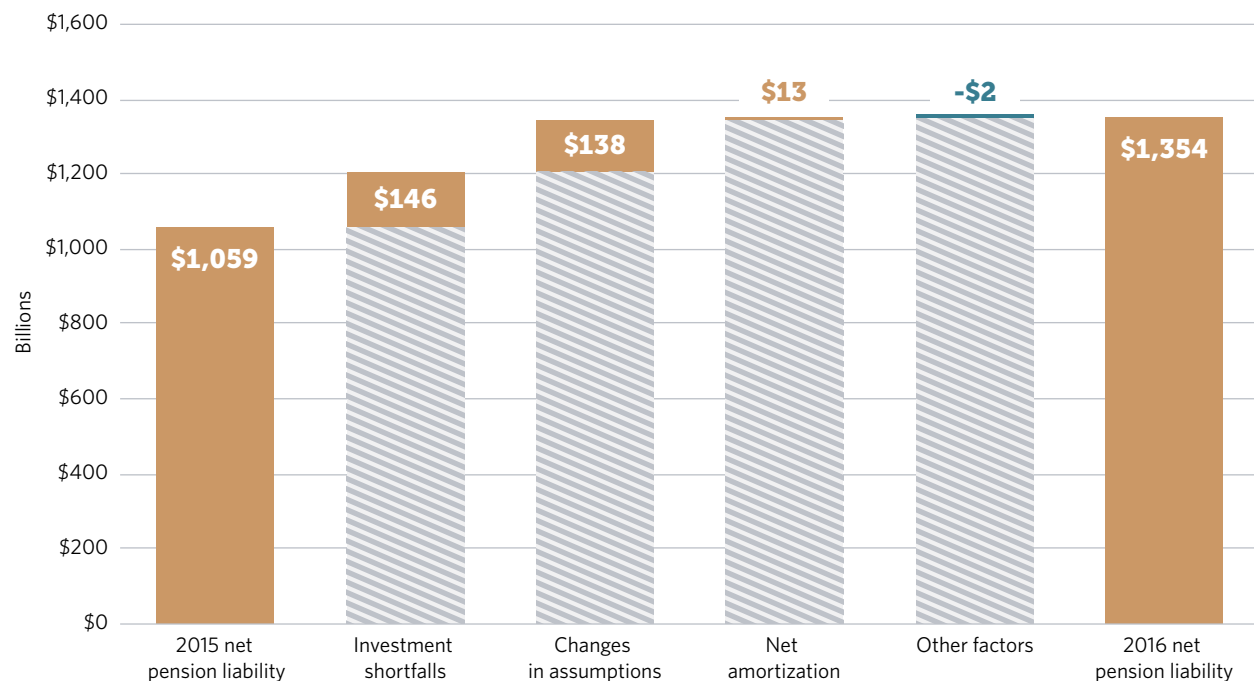
Two other factors contributed to the increase in net pension liability. Even if the assumptions of every plan had been met in 2016, the aggregate funding gap would have increased because contribution policies did not bring in sufficient resources to meet the growing costs. States in the aggregate would have needed to contribute \$109 billion for both the cost of new benefits and interest on pension debt; actual employer contributions fell short by a total of about \$13 billion. Finally, benefit changes and demographic experience reduced liabilities by about \$3 billion. The latter could include factors such as salaries growing more slowly than expected or retirees' life spans not increasing as quickly as projected.

Recent changes to accounting rules also play a role in the fluctuations in reported net pension liability. Under the new GASB standards, pension assets are reported using actual market values rather than the traditional calculations that smoothed gains and losses over time. As a result, continued volatility in reported annual funding levels is likely.

Figure 2

Sources of Change in Pension Debt, 2015-16

Investment losses, altered investment assumptions raised net pension liability



Sources: Comprehensive annual financial reports, actuarial reports and valuations, other public documents, or as provided by plan officials

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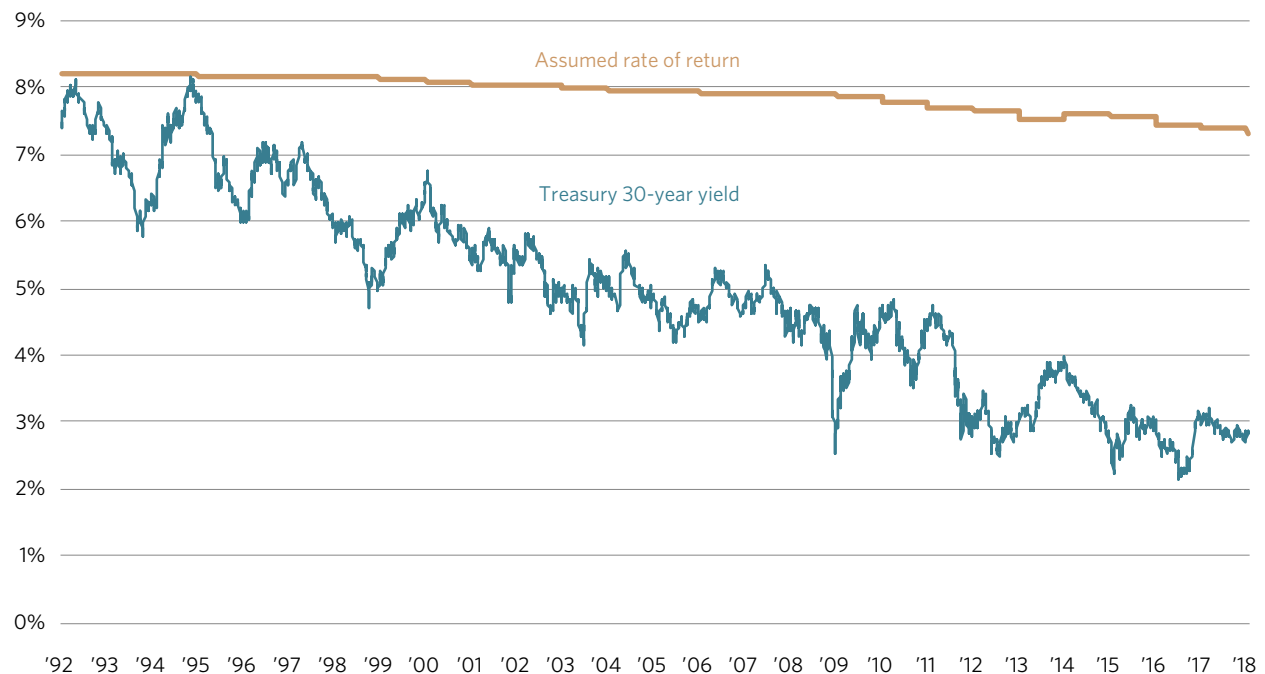
Investment volatility contributes to funding volatility

While state pension plans have been lowering their assumed rates of return—from a median of more than 8 percent in 1992 to 7.5 percent in 2016—the level of risk that states take on to meet investment targets has never been higher. Twenty years ago, states needed only to exceed the yield on a 30-year Treasury bond by 1 percentage point to meet their investment targets. Currently, the typical state would need to outperform a 30-year Treasury bond by 5.2 percentage points to meet its now-lower investment assumption. That reality has forced plans to take on higher levels of investment risk. (See Figure 3.)

Figure 3

Annual Returns: Median Pension Plan Assumed Return vs. 30-Year Treasury Rates, 1992-2018

State plans turn to riskier investments to meet return targets



Sources: Pew analysis of comprehensive annual financial reports, actuarial valuations, and related reports from states; U.S. Treasury data; and Public Plans Data

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The share of public funds' investments in stocks, private equity, and other risky assets has increased by over 30 percentage points since 1990—to over 70 percent of the portfolio of state pension plans. As a result, pension plan investment performance now closely follows equity returns.⁴ (See Figure 4.)

Since 2009, overall median returns for public pension plans have ranged from 0.7 percent in 2016 to 19.2 percent in 2011, volatility attributable in part to increased investment portfolio risk.⁵ While one or two years of weak returns may not indicate fiscal danger for a pension plan, such volatility presents long-term policy challenges.

Figure 4

Annual Returns: Median Public Pension Plan vs. S&P 500, 2006-17

Public pension investments track stock market volatility



Note: Data are reported gross of fees on a June 30 fiscal year basis.

Source: Wilshire Trust Universe Comparison Service (TUCS)

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Assuming 6.5% return provides useful perspective

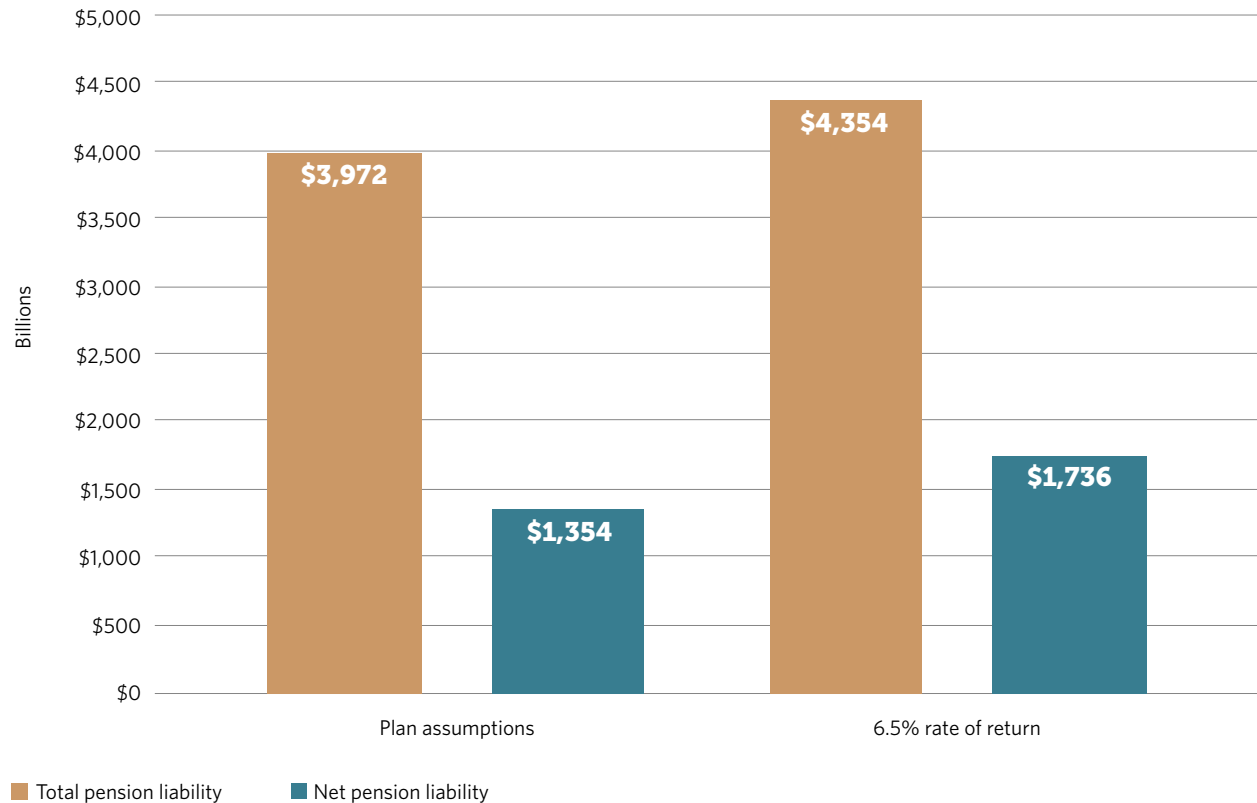
To better understand the risk exposure of public funds, policymakers need access to stress testing or sensitivity analyses, which simulate scenarios that can measure the fiscal impact of lower investment performance or other missed assumptions. The most basic approach is to evaluate pension liabilities at alternative assumed rates of return. The median return assumption used by state pension plans to calculate liabilities in 2016 was 7.5 percent, according to data collected by Pew. However, state plans generated just 6 percent returns over the past decade, and various projections suggest that returns will be around 6.5 percent a year for the next 10 years or longer.⁶

To illustrate the impact of lower-than-expected returns, Pew estimated the total and net pension liabilities at a 6.5 percent assumed rate of return. The return assumptions were not changed if already below 6.5 percent. (See Figure 5.)

Figure 5

Total Pension and Net Pension Liability at Assumed vs. 6.5% Return Rate, 2016

Net pension liabilities jump by \$382 billion over plan assumptions



Sources: Comprehensive annual financial reports, actuarial reports and valuations, other public documents, or as provided by plan officials
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As shown in Figure 5, states' pension liabilities would grow to nearly \$4.4 trillion using a 6.5 percent return assumption. That equals a \$1.7 trillion funding gap between assets and liabilities.

Net amortization

Public pension plans typically set an actuarially determined rate for government employers to contribute to the plan so the plan will have sufficient resources to pay out expected benefits while trying to keep employer contribution rates relatively stable. Historically, many states have fallen short on these contributions, but even those that make the full actuarial contribution still may not reduce their funding gap. To address the potential inadequacy of the contribution rates set by plan actuaries, credit rating agencies and other pension analysts can use data collected under the new GASB standards. Pew's net amortization metric, introduced in its 2014 funding gap brief, creates a contribution benchmark. This is the third year that data have been available to calculate net amortization.

The net amortization benchmark for the required employer contribution is the combined cost of new benefits earned in a given year—known as the service cost—plus the interest on the pension debt minus the expected employee contributions. The interest on the pension debt represents the net pension liability at the beginning of the year multiplied by the assumed rates of return. Employee contributions totaled \$39 billion in 2016, after factoring in interest.

If the employer’s annual contribution, with interest, equals the net amortization benchmark, then the net pension liability will neither grow nor shrink if all plan assumptions are met. If the employer sets aside more than the benchmark, the net pension liability will shrink in a given year and there will be positive amortization of the debt. Alternatively, if the employer contribution falls below the benchmark, the funding gap will increase, resulting in negative amortization.

In the aggregate, states have not set aside enough funds to keep their pension debt from growing, let alone to make significant progress on closing the current funding gap. States and participating local governments contributed \$96 billion—including interest—to state pension plans in 2016, \$13 billion less than the \$109 billion needed to avoid further debt growth. In other words, even if every plan had met its investment target and other assumptions, the unfunded liability would have grown because state contributions were insufficient. The net amortization therefore would be negative.

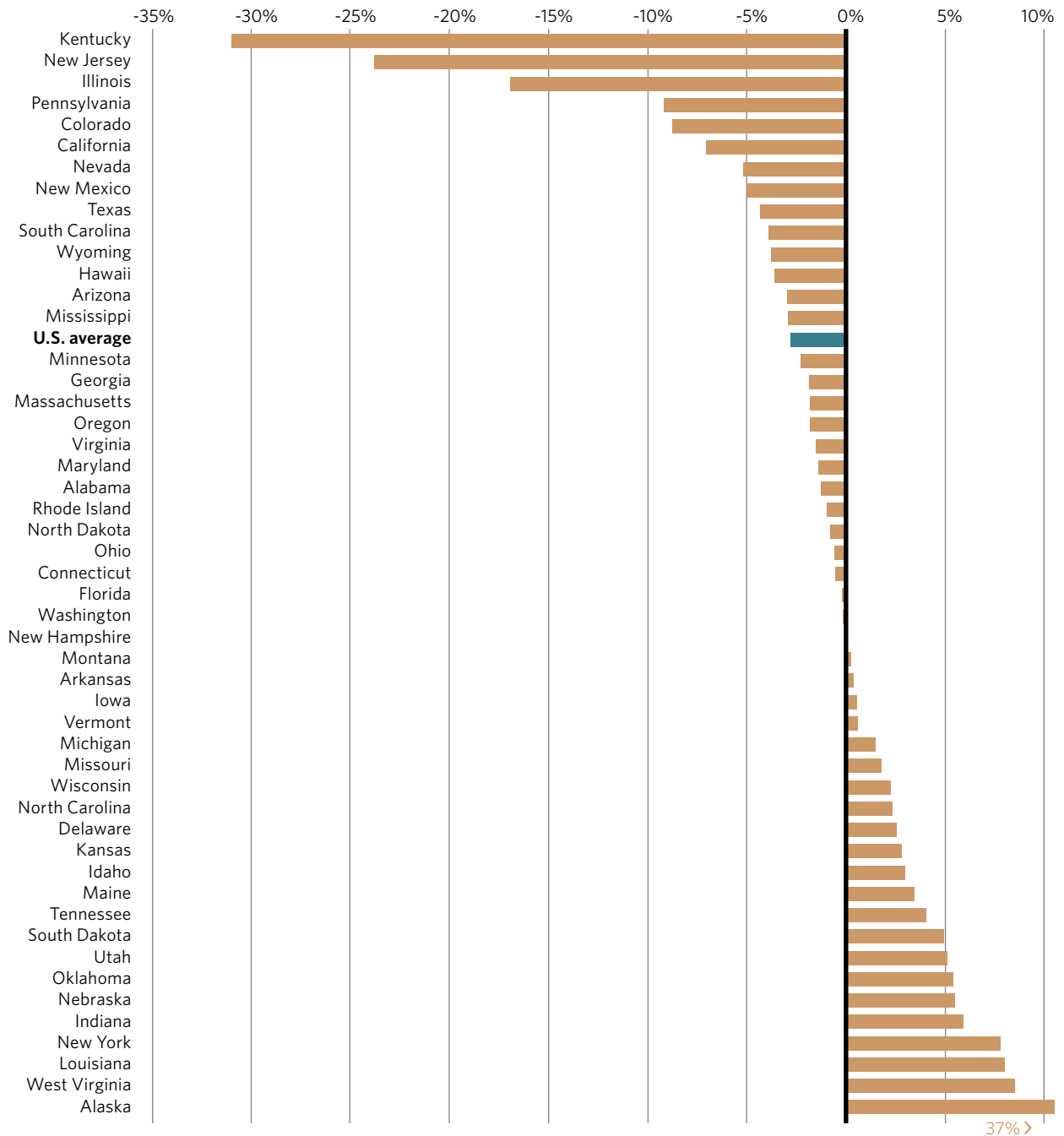
Only 27 states contributed enough in 2016 to expect their funding gaps to decline if actuarial assumptions were met, while 23 fell short. From 2014 through 2016, 23 states exceeded the net amortization benchmark on average, although only 14 did so in all three years.

Figure 6 shows net amortization as a share of payroll for each state from 2014 to 2016. Factoring in total payroll helps to normalize the results of states of different sizes; it also allows the number to be expressed as the increase in the contribution rate a state would have needed in order to achieve positive amortization over that period. Because volatile investment returns, among other factors, can cause the benchmark to fluctuate, aggregating over three years gives a better picture of the long-term trend.

Figure 6

Net Amortization of Pension Debt as Share of Payroll, 2014-16

27 states contributed less than the benchmark



Note: Alaska credited a \$1 billion contribution from the state's Constitutional Budget Reserve Fund in 2015; in 2014 and 2016, the state had negative amortization.

Sources: Comprehensive annual financial reports, actuarial reports and valuations, other public documents, or as provided by plan officials

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A new indicator: Operating cash flow ratio

Most pension analyses focus on actuarial measures, which are designed to look at a fund's long-term balance sheet. Financial metrics such as cash flow, however, can provide early warnings of liquidity concerns and insolvency risk, particularly for state pension plans in severe distress. Cash flow measures also can highlight the annual impact of volatility for plans with comparatively healthy fiscal situations.

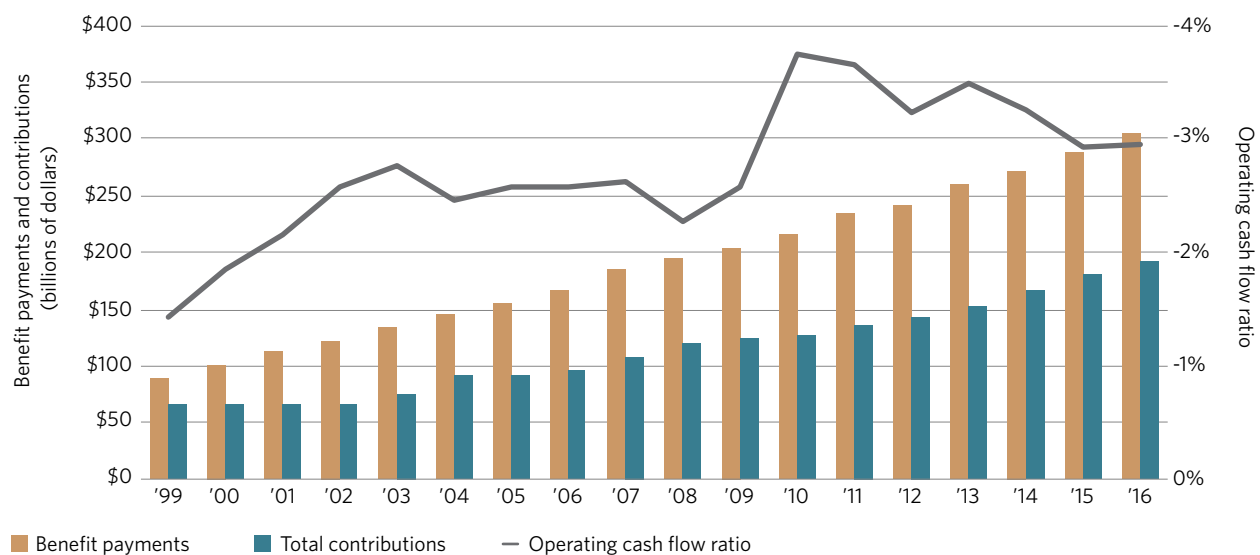
A new indicator, the operating cash flow ratio, represents the difference between financial outflows (primarily benefit payments) and cash coming in before investments (primarily employer and employee contributions) divided by the level of assets at the beginning of the year. A plan with an operating cash flow ratio of 3 percent, for example, would need to achieve investment returns of at least 3 percent that year to keep assets from dropping.

Most public pension plans are long-standing and mature, and are therefore likely to have negative ratios because they see more money going out in benefits than coming in from current workers. However, the aggregate trend for this ratio has worsened since 2000—some plans falling to 5 percent or lower—indicating that state pension plans are growing more dependent on investments to pay anticipated benefits. The operating cash flow ratio has improved slightly since hitting a low in 2010, but the recovery after each recession since 2000 has not been as great as the decline during the financial downturn. (See Figure 7.)

Figure 7

State Operating Cash Flow as a Share of Assets, 1999-2016

Increase in negative cash flow for state and local pension plans



Source: U.S. Census Bureau, Annual Survey of Public Pensions

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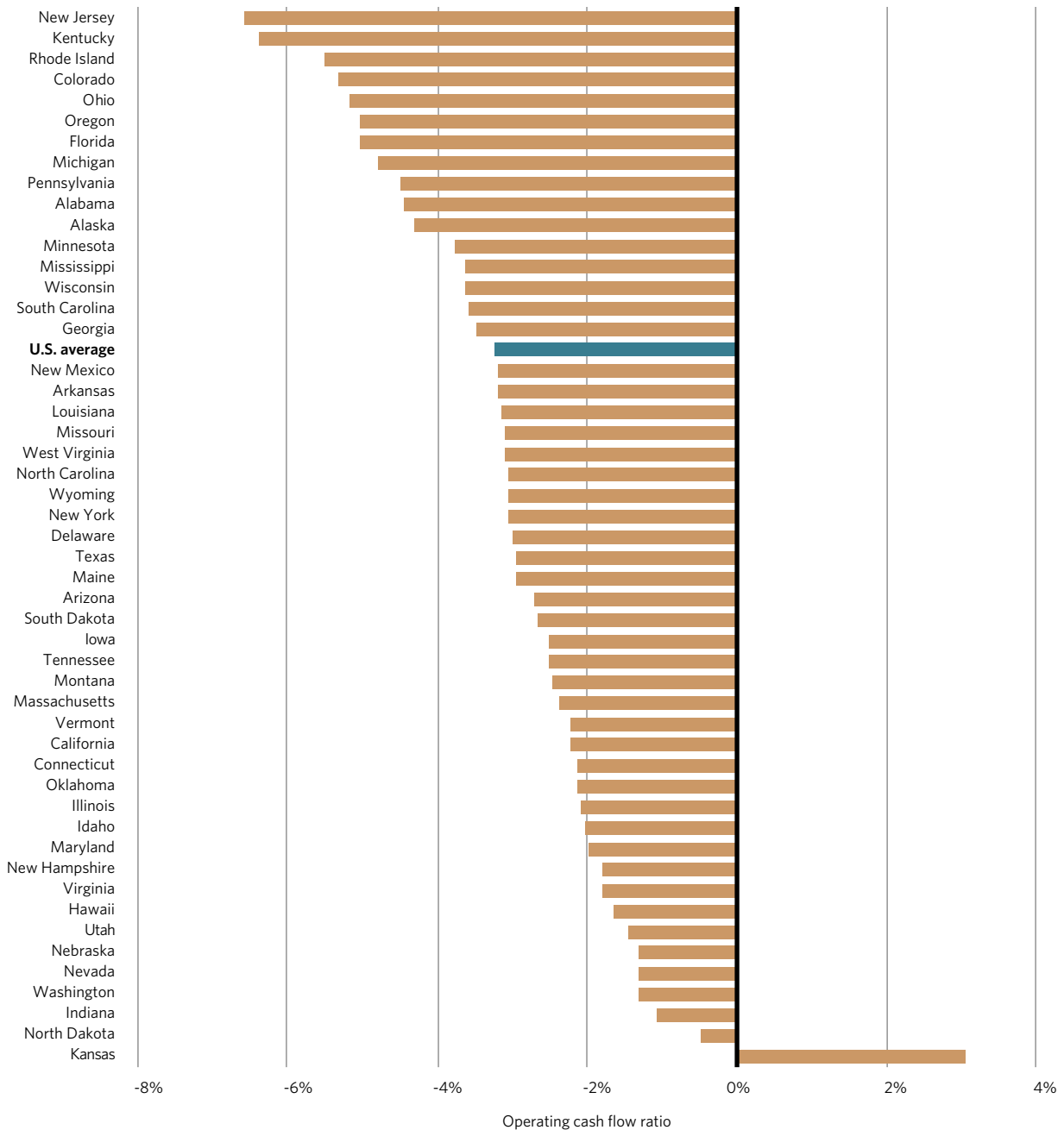
In total, state pension plans paid out \$214 billion in pension benefits in 2016, and took in \$37 billion in employee contributions and \$93 billion from employers. Dividing the cash flow by the total asset value of \$2.6 trillion results in an average operating cash flow ratio of 3.2 percent for states in 2016. Seven states had ratios below 5 percent; 10 had ratios above 2 percent.

As overall operating cash flow declines, mediocre investment performance is more likely to cause a drop in plan assets, which makes it harder for plans to generate returns in the future. When the absolute value of the operating cash flow ratio exceeds the assumed rate of return, plan managers can expect assets to decline over time—with the possibility of insolvency if the trend is not arrested. For plans with very low funding levels, growing negative ratios can indicate liquidity concerns. States such as New Jersey and Kentucky, which have the lowest operating cash flow ratios, are facing real risks and challenges, but all except the top 10 performers have worse ratios than the average state had in 2000.

Figure 8

Operating Cash Flow Ratios by State, 2016

7 states had ratios below -5%; 10 had ratios above -2%



Note: Kansas had a large positive operating cash flow after crediting \$1 billion from a pension obligation bond sale to its state pension plan in 2016.

Sources: Comprehensive annual financial reports, actuarial reports and valuations, other public documents, or as provided by plan officials

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Conclusion

The funding gap for the state pension plans studied reached \$1.4 trillion in 2016—an increase of \$295 billion from 2015. State contribution policies proved insufficient to deal with the unfunded liabilities already on the books. Even if all assumptions had been met, the funding gap would have grown by \$13 billion. Instead, investments fell short of assumptions for the second year in a row, leaving state pension debt at historic highs.

Other measures of fiscal vulnerability also show cause for concern. The gap between returns on safe investments and state pension plan investment assumptions was the highest in decades. Independent analyses suggest that states can assume returns of about 6.5 percent a year for at least the next 10 years; 5 percent or lower returns are a real possibility over the next 20 years.⁷ While strong investment performance in 2017 would lower reported unfunded liabilities in the short term, measures of plan cash flow show that state pension plans increasingly depend on investment performance to keep assets from declining. All of these measures show that plans are more vulnerable to volatility than in the recent past, which could have an adverse impact on funds in the future.

But policymakers have options. As well-funded states have shown, combining strong contribution policies with a focus on managing risk and avoiding unfunded benefit increases can help states offer secure retirement benefits in a sustainable and affordable way. The data, however, show that most states are falling short of this standard.

By many measures, the riskiness of states' investments is higher than it has been in decades. Stress testing and sensitivity analyses can help policymakers understand the risk and uncertainty under current policies and decide how best to manage or reduce that risk.

Finally, policymakers should monitor measures of cash flow to make sure that their state plans are not in danger of insolvency or illiquidity. Recent results are showing that states are growing more dependent on investments to keep assets from declining since 2000. States vary significantly on this measure; understanding where their state lies can help policymakers manage retirement policies.

Appendix A: Methodology

All figures presented are as reported in public documents or as provided by plan officials. The main data sources used were the comprehensive annual financial reports produced by each state and pension plan, actuarial reports and valuations, and other state documents that disclose financial details about public employment retirement systems. Pew collected data for over 230 pension plans.

Pew shared the collected data with plan officials to give them an opportunity to review and to provide additional information. This feedback was incorporated into the data presented in this brief.

Pew assigns funding data to a year based on the valuation period, rather than when the data are reported. Because of lags in valuation for many state pension plans, only partial 2017 data were available, and fiscal 2016 is the most recent year for which comprehensive data were available for all 50 states. Data on Tennessee aggregate political subdivisions were not available for fiscal 2016, so data were rolled forward from 2015.

Each state retirement system uses different key assumptions and methods in presenting its financial information. Pew made no adjustments or changes to the presentation of aggregate state asset or liability data for this brief. Assumptions underlying each state's funding data include the assumed rate of return on investments and estimates of employees' life spans, retirement ages, salary growth, marriage rates, retention rates, and other demographic characteristics.

Although the accounting standards dictate how pension data must be estimated for reporting purposes, state pension plans may use different actuarial assumptions or methods for the purpose of calculating contributions. Pew has consistently used reported data based on public accounting standards in order to have comparable information on plan financials.

Appendix B: Detailed state data, 2016

(millions of dollars)

State	Assets (fiduciary net position)	Liabilities (total pension liability)	Net pension liability	Funded ratio
Alabama	\$34,395	\$51,174	\$16,778	67%
Alaska	\$13,351	\$21,299	\$7,949	63%
Arizona	\$40,744	\$67,414	\$26,670	60%
Arkansas	\$23,862	\$31,036	\$7,174	77%
California	\$382,333	\$550,349	\$168,016	69%
Colorado	\$43,396	\$94,238	\$50,842	46%
Connecticut	\$26,438	\$63,890	\$37,452	41%
Delaware	\$8,807	\$10,857	\$2,050	81%
Florida	\$141,895	\$178,799	\$36,905	79%
Georgia	\$80,619	\$106,392	\$25,773	76%
Hawaii	\$14,070	\$27,439	\$13,369	51%
Idaho	\$14,305	\$16,302	\$1,997	88%
Illinois	\$78,184	\$219,353	\$141,169	36%
Indiana	\$30,256	\$47,998	\$17,743	63%
Iowa	\$28,891	\$35,389	\$6,498	82%
Kansas	\$17,192	\$26,411	\$9,218	65%
Kentucky	\$19,868	\$63,286	\$43,418	31%
Louisiana	\$30,697	\$51,377	\$20,680	60%

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State	Assets (fiduciary net position)	Liabilities (total pension liability)	Net pension liability	Funded ratio
Maine	\$12,390	\$16,031	\$3,641	77%
Maryland	\$45,608	\$70,317	\$24,709	65%
Massachusetts	\$52,218	\$90,715	\$38,497	58%
Michigan	\$56,108	\$87,708	\$31,600	64%
Minnesota	\$57,944	\$108,853	\$50,909	53%
Mississippi	\$24,462	\$42,513	\$18,050	58%
Missouri	\$51,765	\$67,494	\$15,728	77%
Montana	\$10,056	\$14,126	\$4,071	71%
Nebraska	\$12,056	\$13,572	\$1,516	89%
Nevada	\$35,108	\$48,588	\$13,481	72%
New Hampshire	\$7,484	\$12,849	\$5,365	58%
New Jersey	\$75,348	\$243,591	\$168,243	31%
New Mexico	\$25,537	\$39,030	\$13,494	65%
New York	\$183,640	\$202,651	\$19,011	91%
North Carolina	\$87,120	\$98,639	\$11,519	88%
North Dakota	\$4,702	\$7,135	\$2,434	66%
Ohio	\$145,519	\$202,060	\$56,541	72%
Oklahoma	\$27,954	\$38,891	\$10,937	72%
Oregon	\$62,082	\$77,094	\$15,012	81%
Pennsylvania	\$76,220	\$145,037	\$68,817	53%
Rhode Island	\$5,976	\$11,119	\$5,143	54%
South Carolina	\$28,067	\$52,184	\$24,117	54%

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State	Assets (fiduciary net position)	Liabilities (total pension liability)	Net pension liability	Funded ratio
South Dakota	\$10,513	\$10,851	\$338	97%
Tennessee	\$43,129	\$45,840	\$2,712	94%
Texas	\$159,809	\$218,843	\$59,034	73%
Utah	\$28,544	\$33,195	\$4,651	86%
Vermont	\$3,778	\$5,878	\$2,100	64%
Virginia	\$66,364	\$91,652	\$25,289	72%
Washington	\$75,505	\$89,938	\$14,433	84%
West Virginia	\$13,125	\$18,258	\$5,133	72%
Wisconsin	\$92,580	\$93,433	\$853	99%
Wyoming	\$7,715	\$10,532	\$2,817	73%
U.S. total	\$2,617,730	\$3,971,623	\$1,353,892	66%

Sources: Comprehensive annual financial reports, actuarial reports and valuations, other public documents, or as provided by plan officials

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Appendix C: Net amortization, 2016

(millions of dollars)

State	Beginning-of-year debt	Assumed rate of return (weighted average across plans) ¹	Assumed interest due on 2016 beginning-of-year debt	Normal cost ²	Total expected cost ³	Employee contributions with interest	Employer contribution benchmark ⁴	Actual employer contributions with interest	Percent of employer benchmark paid	Net amortization ¹¹
Alabama	\$16,036	8.0%	\$1,283	\$947	\$2,229	\$746	\$1,484	\$1,252	84%	-\$232
Alaska	\$6,773	8.0%	\$542	\$240	\$782	\$145	\$637	\$479	75%	-\$158
Arizona	\$24,168	7.9%	\$1,897	\$1,546	\$3,443	\$1,329	\$2,114	\$1,806	85%	-\$309
Arkansas	\$5,246	7.8%	\$409	\$505	\$915	\$204	\$711	\$746	105%	\$36
California	\$139,041	7.6%	\$10,470	\$11,707	\$22,176	\$5,892	\$16,284	\$13,363	82%	-\$2,921
Colorado	\$27,924	7.5%	\$2,091	\$1,049	\$3,140	\$773	\$2,367	\$1,488	63%	-\$879
Connecticut	\$27,671	8.3%	\$2,269	\$750	\$3,019	\$448	\$2,571	\$2,596	101%	\$25
Delaware	\$1,108	7.2%	\$66	\$215	\$281	\$73	\$209	\$288	138%	\$80
Florida	\$23,115	7.6%	\$1,376	\$2,390	\$3,765	\$737	\$3,028	\$3,052	101%	\$25
Georgia	\$19,517	7.5%	\$1,461	\$1,636	\$3,097	\$760	\$2,338	\$2,343	100%	\$5
Hawaii	\$8,733	7.7%	\$668	\$484	\$1,152	\$2	\$1,151	\$1,029	89%	-\$122
Idaho	\$1,283	7.1%	\$91	\$400	\$492	\$229	\$262	\$358	137%	\$96
Illinois	\$119,072	7.3%	\$8,675	\$3,253	\$11,927	\$1,557	\$10,370	\$7,771	75%	-\$2,599
Indiana	\$16,571	6.8%	\$1,119	\$568	\$1,687	\$348	\$1,339	\$1,981	148%	\$642
Iowa	\$5,087	7.5%	\$382	\$820	\$1,202	\$485	\$717	\$774	108%	\$56
Kansas	\$8,979	8.0%	\$718	\$571	\$1,290	\$421	\$869	\$1,807	208%	\$939
Kentucky	\$35,412	5.3%	\$2,015	\$1,295	\$3,310	\$455	\$2,855	\$1,182	41%	-\$1,674
Louisiana	\$18,440	7.7%	\$1,422	\$734	\$2,156	\$531	\$1,625	\$2,149	132%	\$524
Maine	\$2,692	7.1%	\$192	\$279	\$471	\$173	\$298	\$373	125%	\$75

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State	Beginning-of-year debt	Assumed rate of return (weighted average across plans) ¹	Assumed interest due on 2016 beginning-of-year debt	Normal cost ²	Total expected cost ³	Employee contributions with interest	Employer contribution benchmark ⁴	Actual employer contributions with interest	Percent of employer benchmark paid	Net amortization ⁵
Maryland	\$21,452	7.5%	\$1,601	\$1,331	\$2,932	\$793	\$2,139	\$1,979	93%	-\$160
Massachusetts	\$34,363	7.7%	\$2,657	\$1,771	\$4,428	\$1,431	\$2,997	\$2,769	92%	-\$228
Michigan	\$31,279	8.0%	\$2,498	\$779	\$3,277	\$467	\$2,810	\$3,227	115%	\$417
Minnesota	\$15,265	7.9%	\$1,189	\$1,393	\$2,582	\$1,057	\$1,525	\$1,298	85%	-\$227
Mississippi	\$15,617	7.8%	\$1,210	\$742	\$1,952	\$597	\$1,355	\$1,076	79%	-\$279
Missouri	\$12,032	8.0%	\$957	\$1,278	\$2,235	\$894	\$1,341	\$1,496	112%	\$155
Montana	\$3,456	7.7%	\$267	\$262	\$529	\$201	\$328	\$338	103%	\$10
Nebraska	\$1,130	8.0%	\$90	\$321	\$411	\$234	\$178	\$299	168%	\$121
Nevada	\$11,481	8.0%	\$918	\$1,090	\$2,009	\$136	\$1,873	\$1,637	87%	-\$236
New Hampshire	\$4,001	7.7%	\$310	\$270	\$579	\$217	\$363	\$377	104%	\$15
New Jersey	\$135,787	4.9%	\$6,350	\$5,268	\$11,618	\$2,051	\$9,567	\$3,175	33%	-\$6,392
New Mexico	\$10,798	7.7%	\$836	\$753	\$1,589	\$585	\$1,004	\$756	75%	-\$248
New York	\$3,654	7.5%	\$274	\$3,545	\$3,819	\$318	\$3,501	\$5,329	152%	\$1,828
North Carolina	\$4,228	7.2%	\$307	\$2,289	\$2,596	\$1,295	\$1,301	\$1,792	138%	\$490
North Dakota	\$1,969	7.9%	\$155	\$197	\$352	\$158	\$194	\$181	93%	-\$13
Ohio	\$45,316	7.9%	\$3,555	\$2,840	\$6,396	\$2,784	\$3,611	\$3,299	91%	-\$312
Oklahoma	\$7,609	7.7%	\$601	\$762	\$1,363	\$443	\$919	\$1,319	143%	\$399
Oregon	\$5,742	7.8%	\$445	\$1,017	\$1,462	\$15	\$1,447	\$1,014	70%	-\$433
Pennsylvania	\$61,499	7.5%	\$4,612	\$2,885	\$7,498	\$1,415	\$6,083	\$4,989	82%	-\$1,095
Rhode Island	\$4,767	7.5%	\$357	\$145	\$502	\$97	\$405	\$406	100%	\$1
South Carolina	\$21,352	7.5%	\$1,601	\$927	\$2,528	\$904	\$1,624	\$1,314	81%	-\$311

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State	Beginning-of-year debt	Assumed rate of return (weighted average across plans) [*]	Assumed interest due on 2016 beginning-of-year debt	Normal cost [†]	Total expected cost [‡]	Employee contributions with interest	Employer contribution benchmark [§]	Actual employer contributions with interest	Percent of employer benchmark paid	Net amortization
South Dakota	-\$424	7.3%	-\$31	\$185	\$154	\$119	\$36	\$118	331%	\$82
Tennessee	\$1,901	7.5%	\$143	\$806	\$948	\$301	\$647	\$1,029	159%	\$382
Texas	\$49,638	7.8%	\$3,791	\$5,631	\$9,423	\$3,772	\$5,650	\$4,039	71%	-\$1,611
Utah	\$4,463	7.5%	\$335	\$604	\$939	\$41	\$898	\$1,125	125%	\$227
Vermont	\$1,809	8.0%	\$144	\$107	\$251	\$88	\$163	\$148	91%	-\$15
Virginia	\$22,579	7.0%	\$1,581	\$1,820	\$3,401	\$868	\$2,533	\$2,569	101%	\$36
Washington	\$11,105	7.5%	\$829	\$1,815	\$2,644	\$876	\$1,768	\$2,182	123%	\$414
West Virginia	\$4,066	7.5%	\$305	\$284	\$589	\$169	\$420	\$655	156%	\$235
Wisconsin	\$1,495	7.2%	\$108	\$1,814	\$1,922	\$954	\$967	\$997	103%	\$30
Wyoming	\$2,731	7.8%	\$212	\$261	\$473	\$181	\$291	\$183	63%	-\$108
U.S. average	\$1,059,028	7.5%	\$75,353	\$72,581	\$147,935	\$38,765	\$109,169	\$95,955	88%	-\$13,215

* The assumed rate of return is weighted for the plan in each state by the assets at the beginning of 2016.

† The normal cost refers to the cost of benefits earned by employees in any given year. Also called the service cost.

‡ The total expected cost represents the projected increase in the funding gap before taking employer and employee contributions into account. It is equal to the normal cost plus the assumed interest on the unfunded liability.

§ The employer contribution benchmark is the contribution level employers need to meet to keep pension debt from growing.

|| For net amortization, positive numbers mean expected progress in paying down pension debt. Negative numbers mean expected growth in pension debt.

Sources: Comprehensive annual financial reports, actuarial reports and valuations, other public documents, or as provided by plan officials

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Appendix D: Operating cash flow ratio, 2016

(millions of dollars)

State	Total contributions	Benefit payments	Beginning-of-year assets	Operating cash flow-to-assets ratio
Alabama	\$1,922	\$3,338	\$32,564	-4.4%
Alaska	\$600	\$1,193	\$14,035	-4.3%
Arizona	\$3,017	\$4,107	\$41,570	-2.7%
Arkansas	\$915	\$1,680	\$24,581	-3.2%
California	\$18,564	\$26,800	\$387,494	-2.2%
Colorado	\$2,180	\$4,414	\$42,658	-5.3%
Connecticut	\$2,926	\$3,497	\$26,978	-2.1%
Delaware	\$349	\$620	\$9,234	-3.0%
Florida	\$3,662	\$11,075	\$148,505	-5.0%
Georgia	\$2,993	\$5,816	\$82,498	-3.5%
Hawaii	\$993	\$1,246	\$14,505	-1.6%
Idaho	\$568	\$850	\$14,386	-2.0%
Illinois	\$9,006	\$10,624	\$80,017	-2.1%
Indiana	\$2,254	\$2,542	\$30,268	-1.1%
Iowa	\$1,214	\$1,930	\$29,004	-2.5%
Kansas	\$2,144	\$1,627	\$16,636	3.0%
Kentucky	\$1,589	\$2,941	\$21,501	-6.4%
Louisiana	\$2,583	\$3,544	\$31,819	-3.1%
Maine	\$527	\$888	\$12,711	-2.9%
Maryland	\$2,673	\$3,563	\$46,028	-2.0%

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State	Total contributions	Benefit payments	Beginning-of-year assets	Operating cash flow-to-assets ratio
Massachusetts	\$4,046	\$5,234	\$52,612	-2.4%
Michigan	\$3,555	\$6,146	\$54,738	-4.8%
Minnesota	\$2,268	\$4,506	\$60,257	-3.8%
Mississippi	\$1,611	\$2,512	\$25,246	-3.6%
Missouri	\$2,300	\$3,912	\$52,781	-3.1%
Montana	\$520	\$761	\$10,106	-2.5%
Nebraska	\$513	\$662	\$11,901	-1.3%
Nevada	\$1,706	\$2,144	\$34,714	-1.3%
New Hampshire	\$572	\$701	\$7,557	-1.8%
New Jersey	\$5,103	\$10,394	\$81,355	-6.6%
New Mexico	\$1,292	\$2,098	\$25,938	-3.2%
New York	\$5,447	\$11,060	\$189,412	-3.0%
North Carolina	\$2,980	\$5,673	\$89,165	-3.0%
North Dakota	\$326	\$345	\$4,677	-0.5%
Ohio	\$5,857	\$13,327	\$146,642	-5.2%
Oklahoma	\$1,697	\$2,291	\$28,931	-2.1%
Oregon	\$992	\$4,206	\$64,924	-5.0%
Pennsylvania	\$6,176	\$9,588	\$77,641	-4.5%
Rhode Island	\$485	\$835	\$6,339	-5.5%
South Carolina	\$2,139	\$3,172	\$29,306	-3.6%
South Dakota	\$229	\$510	\$10,777	-2.7%
Tennessee	\$1,283	\$2,338	\$43,030	-2.5%

Continued on next page

State	Total contributions	Benefit payments	Beginning-of-year assets	Operating cash flow-to-assets ratio
Texas	\$7,524	\$11,990	\$153,835	-2.9%
Utah	\$1,125	\$1,505	\$26,687	-1.5%
Vermont	\$227	\$308	\$3,814	-2.2%
Virginia	\$3,322	\$4,460	\$66,407	-1.8%
Washington	\$2,950	\$3,907	\$74,705	-1.3%
West Virginia	\$795	\$1,201	\$13,567	-3.1%
Wisconsin	\$1,885	\$5,062	\$88,505	-3.6%
Wyoming	\$351	\$569	\$7,416	-3.0%
U.S. total	\$129,956	\$213,716	\$2,649,975	-3.2%

Note: Assets represented by fiduciary net position at the beginning of the year. Numbers may not be exact due to rounding.

Sources: Comprehensive annual financial reports, actuarial reports and valuations, other public documents, or as provided by plan officials

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Endnotes

- 1 Median data from Wilshire Trust Universe Comparison Service (June 30, 2017), compiled for Pew.
- 2 For a technical description of net pension liability and other pension accounting terms, see Governmental Accounting Standards Board, "Statement No. 67" (2012), http://www.gasb.org/jsp/GASB/Document_C/DocumentPage?cid=1176160220594&acceptedDisclaimer=true; Governmental Accounting Standards Board, "Statement No. 68" (2012), http://www.gasb.org/jsp/GASB/Document_C/DocumentPage?cid=1176160220621&acceptedDisclaimer=true.
- 3 Median annual return data from Wilshire Trust Universe Comparison Service (2005-16), compiled for Pew.
- 4 The Pew Charitable Trusts and the Laura and John Arnold Foundation, "State Public Pension Investments Shift Over Past 30 Years" (2014), http://www.pewtrusts.org/-/media/assets/2014/06/state_public_pension_investments_shift_over_past_30_years.pdf.
- 5 Median 10-year data from Wilshire Trust Universe Comparison Service (June 30, 2016), compiled for Pew.
- 6 Pew, along with outside experts, developed a capital markets assumption model that projects a median long-run return of 6.4 percent for a plan with a typical investment portfolio. Other analysts with similar projections include Voya Financial Advisors (6.4 percent), JPMorgan and Wilshire (both 6.5 percent), Aon Hewitt (6.6 percent), and Bank of New York Mellon (7.2 percent).
- 7 This is derived from a model taking into account the riskiness of pension plan fund investments. A long-term model of returns with a median of 7.5 percent and 12 percent standard deviation will show a 25th percentile of about 5 percent.

For further information, please visit:

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