Causes and Consequences of the Crises in State and Local Pension Funding

Research to Inform the Development of a Road Map for Reform

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About This Report

A state or local pension crisis occurs when a pension system faces substantial and persistent underfunding. There is not a single national pension crisis: There are many small crises throughout the United States, reflecting local circumstance, history, and constraints, including legacy pension costs associated with current retirees and former employees. Although concern about the crises surrounding state and local pension systems is not new, much of the research has tended to focus on specific topics, such as the relationship between pension liabilities and the actuarial methods and assumptions used to discount future liabilities, asset portfolio allocation, workforce incentives, and the effects of pension reform. The consequence of a lack of a global perspective is that practitioners aiming to address a pension crisis lack a framework or road map informed by rigorous research and analysis to consider the full extent of the problem, the underlying causes, the consequences, the array of reform options, the impacts of those reforms, and the elements of implementation that are likely to have the greatest chance of success.

The objective of this report is to holistically consider the extent and causes of pension crises; the contextual setting, such as legal constraints; and downstream effects, such as the crowding out of public services, financial well-being of public employees, and effective management and retention of the workforce. The aim is to lay the foundation for a road map for reform. We synthesized the available research, data, and resources for the development of a prototype road map for reform, and we supplement this information with insights garnered from discussions with subject-matter experts. This report summarizes the research and findings. The analysis in this report may be of interest to practitioners and policymakers, as well as the research community concerned with the underfunding of public pensions.

A companion brief provides a prototype road map to help guide state and local pension policymakers and inform stakeholders about the dimensions of public-sector pension reform and policy options (Asch and Knapp, 2023).

RAND Education and Labor

This study was undertaken within RAND Education and Labor, a division of the RAND Corporation that conducts research on early childhood through postsecondary education programs, workforce development, and programs and policies affecting workers, entrepreneurship, and financial literacy and decisionmaking. Questions about this report should be directed to Beth Asch, asch@rand.org, and questions about RAND Education and Labor should be directed to educationandlabor@rand.org.
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Summary

Many state and local pension systems are facing a funding crisis. The average U.S. public pension plan cannot cover a quarter of its obligations to provide pension benefits to current, retired, and former employees, and 17 systems are unable to cover more than half of their obligations. Nationally, unfunded state and local pension obligations total $1.5 trillion. There is not a single national pension crisis: There are many small crises reflecting local circumstance, history, and constraints, including legacy pension costs. To address funding crises, pension systems often increase contributions to their pension funds, but doing so can mean higher taxes for residents, fewer public services, or more government debt. Another approach to addressing the crises is to reduce the generosity of the pension benefits, but these changes target future employees because current employees and retirees are often legally protected from major changes to their pension plans. Reductions in pension benefits can also reduce the retirement security of the public workforce, and, as we show in this report, such changes can affect the recruitment and retention of public employees.

Concern about the pension crises is not new, and many researchers and organizations have examined different aspects of the crises. Past studies have considered such topics as the role of actuarial assumptions and, in particular, the discount rate used to compute the present value of liabilities (to determine the extent of liabilities), political representation and governance, pension asset portfolio allocation, workforce, pension reforms, and legal constraints. Few studies take a comprehensive perspective on the crises, and those that do tend to focus on the circumstances around the Great Recession and their effects on pension underfunding, thereby missing many of the experiences from the past decade. The consequence of a lack of a holistic view is that practitioners aiming to address a pension crisis lack a framework that considers the full extent of the problem, the underlying causes, the consequences, the array of reform options, the impacts of those reforms, and the elements of implementation that are likely to have the greatest chance of success.

This report takes a comprehensive approach to understanding the origins of state and local pension crises, their consequences, efforts for reform, and the effects of those reforms. Our aim is to develop a prototype road map that can inform practitioners’ understanding of the crises and provide a menu of reform options. A companion brief provides a prototype road map to help guide state and local pension policymakers and inform stakeholders about the dimensions of public-sector pension reform and policy options (Asch and Knapp, 2023). As part of research, we identified four dimensions of pension crises:

- pension finance and funding history
- the consequences of underfunding
- pension plan reforms
• the institutional context and political economy.

For our approach, we reviewed and synthesized what is known about these dimensions using available data and research in past studies, as well as the tools available to inform actions. We also conducted discussions with subject-matter experts to garner insights from their experiences with pension crises and reforms. Drawing on these inputs, we identified a set of key insights for informing a tailored road map for reform that can reflect a pension system’s local circumstance, history, and constraints, as well as the objectives of its stakeholders. A limitation of our approach is that there are gaps in what is known, especially pertaining to evidence related to how policy options affect pension underfunding, and we did not conduct additional analyses to fill these gaps. Consequently, the available evidence does not permit analyses of the trade-offs between specific policy options that are tailored to the context of a given state or local pension system. Instead, the insights we glean are intended to provide a holistic view of the key issues surrounding the crises.

This report summarizes what we learned from our approach, including the key insights. A separate document presents the prototype road map. The road map is a prototype because of the gaps in what is known. We summarize those gaps below.

Key Insights

Pension Crises Are Multifaceted

Pension systems are complex. Substantial knowledge and expertise are needed to understand the financial aspects of the systems, as well as the entire ecosystem of regulations, policies, constituencies, governance structure, past reform efforts, and downstream consequences of poor funding that affect sustainability. We find that the pension crises manifest themselves in multiple forms. They can exhibit substantial and persistent underfunding (or the threat of underfunding), or they can exhibit an array of budgetary, workforce, and public service issues. Making additional pension contributions to the system can lead to other budgetary challenges, including reduced spending on other government services and higher taxes. A crisis can also manifest itself in the form of reductions in pay and benefits to current or future employees, including pension benefits. For some governments, substantial pension underfunding coincides with broader fiscal or management problems that cannot be easily separated. Our discussions with subject-matter experts suggest that getting a handle on defining the pension crises means understanding the entire ecosystem surrounding the system.

The Underlying Causes of the Crises Are Complex

Our review of the available literature and data, as well as the discussions with subject-matter experts, led us to six common contributors to pension crises.
The first is the use of inaccurate or overly optimistic assumptions when valuing pension assets and liabilities. These assumptions include economic and demographic assumptions (e.g., rate of return on assets, mortality and retirement rates, and employee turnover rates) and assumptions about amortization and the rate at which to discount future pension liabilities. For example, an overly optimistic discount rate will result in an underestimate of the pension system’s liabilities. As the annual contribution to the pension system is based on the estimate of the liabilities, an underestimate of those liabilities can result in contributions that are too low to meet pension obligations.

The second is institutional setting. The setting can affect what policies can be feasibly implemented. For example, unlike private-sector plans that are governed by federal law, state and local plans are subject to state and local laws that provide a myriad of protections to public employees. In some cases, these laws provide contractual or constitutional guarantees that prevent reductions in benefits for current retirees and, in some cases, for current employees. Because pension benefits for new employees are not protected, benefit reforms tend to disproportionately target this group.

The third is governance. Governance is the systems and processes that compose the oversight and control of public pensions and includes four main actors (National Association of State Retirement Administrators, 2020): the plan sponsor (e.g., the state legislature), the chief executive (e.g., the governor), the pension board that oversees the management and administration of the pension system, and the pension system actuary. As discussed in many studies and as raised in our discussions with subject-matter experts, lack of transparency and accountability, conflicts of interest, lack of expertise, poorly functioning processes, and poorly defined fiduciary duties can hamper effective management of public pensions and slow or prevent effective reform.

The fourth is lack of expertise. Pensions design and funding issues are highly complex, as are the governance structure and accounting practices that affect pension design and funding. A common theme that arose in the discussions with subject-matter experts was that key stakeholders in the pension system and decisionmakers may lack the knowledge and expertise required for pursuing effective solutions to the pension crises.

The fifth is political culture. The complexity of public pensions, the large number of stakeholders and decisionmakers, and the complexity of the institutional environment in which pensions are set mean that effective pension policy requires close cooperation and productive coordination among different groups. Existing research indicates that political culture is related to funding outcomes. For example, Bagchi (2021) finds that more politically competitive jurisdictions have lower pension funded ratios (i.e., the actuarial value of assets as a percentage of the actuarial accrued liability), whereas Stalebrink and Donatella (2021) find that the likelihood of opportunistic accounting choices—meaning choices that enhance the welfare of specific stakeholders—increases when the sponsoring government is more divided in terms of
partisan control. Lack of cooperation among key stakeholders may inhibit effective pension policy and lead to decisions that hurt the sustainability of pension funding to meet obligations.

The sixth is conflicting incentives and interests. Pension boards, by policy, are often composed of political leaders, plan members, or union leaders. These groups can have incentives (e.g., reelection) that conflict with making policy changes necessary to ensure that there are sufficient contributions to the pension fund for it to be fully funded. Ideally, conflicting incentives would be addressed by pressure from groups responsible for their oversight (e.g., for politicians, voters; for pension systems, the participating employers; for unions, employees who are their members). However, research suggests that the public tends to inaccurately assess the costs or benefits of pensions. Pensions and their funding are highly complex. With pension costs spread across all taxpayers, employers, and employees (in cost-sharing systems), solving a pension system’s funding crisis may be a less salient concern than other competing issues.

Prior studies suggest that the choice of people to serve on pension boards may not necessarily conform with what is best for the fund’s finances. For example, boards with a larger fraction of state officials underperform within asset classes and are more likely to invest in assets beneficial to the local economy (Andonov, Hochberg, and Rauh, 2018). Also, boards with a higher share of union trustees were more likely to adopt higher discount-rate assumptions for the estimated actuarial cost of pension liabilities (Anzia and Moe, 2019). These decisions could reflect either lack of expertise or conflicts of interest.

These contributors to pension crises interact. For example, poor governance structure can lead to misaligned incentives or the use of inaccurate assumptions.

Pension Reform Should Address Both Short- and Long-Term Goals

To ensure effective reform, pension systems must identify the objectives of the reform effort. These goals can include outcome objectives, meaning the outcomes the system aims to achieve in the short and long term, and process objectives that facilitate reaching the outcome objectives. More specifically, the goals of the reform typically focus on one or more of the following:

- sustaining funding for new and legacy benefit obligations
- providing quality public services and a quality public-sector workforce by enabling public employers to attract and retain a qualified workforce
- ensuring employee retirement security
- developing an effective governance structure
- ensuring accurate and reasonable actuarial assumptions.

According to our review of the literature and the inputs of the subject-matter experts, most pension reforms in the past decade have prioritized the first goal—funding obligations—over public consideration of the other goals. Part of the difference may be that the other goals can be judged only over a longer time horizon and do not have as many immediate manifestations of the reform. Unfortunately, we found limited research on effective approaches for achieving each of these goals.
Pension System Reform Can Take Different Paths

We find that states have varied substantially in how they address pension crises. Nearly all states have increased their contributions to pension systems. We find that 56 percent of states had at least one statewide system that increased current employee contribution rates, 70 percent increased contribution rates for new employees, and 44 percent increased contribution rates for both. States have also changed pension benefits. Between 2009 and 2021, 78 percent of states had a statewide system that reduced pension benefits for new hires, and 52 percent of states reduced benefits for current members. Thirty-four percent reduced benefits for both current members and new hires. More rarely, states introduced an alternative pension system for new hires, such as hybrid defined benefit and defined contribution plan or a defined contribution plan in place of a legacy defined benefit plan. Additional research is required to understand whether making benefit design reforms is effective at reducing pension underfunding in the long run.

Beyond contribution and benefit reform, achieving the goals of pension reform may involve changes to the governance structure to improve accountability, operational effectiveness, and knowledge and expertise, as well as to address conflict-of-interest issues and other barriers to achieving the fiduciary responsibilities of the board, executives, legislators, and pension sponsor. This effort may also involve improvements in actuarial practices to establish more-realistic assumptions. However, research is lacking about how reforms on these dimensions affect the different goals, including sustainable funding, retirement security, and ensuring a quality public-sector workforce.

Implementation of Reform Is an Ongoing Process That Requires a Knowledgeable Navigator

A common theme from the subject-matter experts was that reform came after a particular person or group of persons in the legislative or executive branches of government adopted the issue, became informed, and went out to communicate the challenges brought on by underfunding to other constituencies and stakeholders. Although not verifiable in the research literature, the independent and repeated nature of this concept in our stakeholder discussions suggests to us that it is a critical component for implementing effective reform. On the other hand, a considerable body of research has been conducted on the topic of implementation science and the steps for successful implementation of change. This literature provides practical steps for implementing reforms. One of the key themes is the need for consistent problem detection and problem-solving and the recognition that reform is an ongoing process.

Gaps

Our research has highlighted a few important knowledge gaps that are critical to informing would-be reformers. The most critical gap is evidence based on rigorous analysis on the effectiveness of pension reforms on unfunded obligations. Despite the substantial reform efforts
since 2009, the funded ratio across plans has remained largely flat since 2015. Analysis is also needed on how pension underfunding affects plan sponsors and specifically on the relationship between underfunding and recruiting for positions covered by the pension system or people’s willingness to stay in or move to these localities. In addition, although past studies have estimated the effects of pension reform on retirement annuities available to retirees, the literature provides no information on the effects of pension reforms on the economic security—or lack of security—of retirees.

Wrap-Up

For this report, we took a comprehensive approach to understanding the origins of state and local pension crises. We identified the dimensions of pension crises, synthesized what is known about those dimensions, and supplemented that knowledge with input from subject-matter experts. We then blended the ideas we learned from research and experience into the five key insights summarized above. Leveraging the insights in this report into a road map for reform requires tailoring the development of reform pathways to reflect a pension system’s local circumstance, history, and constraints, as well as the objectives of its stakeholders. In the companion brief, we develop a prototype road map for reform, with the aim to eventually extend that road map to accommodate a broad range of pension crises and to be capable of providing a tailored menu of plausible reform options (Asch and Knapp, 2023).
## Contents

About This Report ................................................................................................................................. iii  
Summary ....................................................................................................................................................... v  
Figures and Tables ......................................................................................................................................... xiii  

<table>
<thead>
<tr>
<th>Chapter 1. Introduction</th>
<th>1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Study Aim and Approach</td>
<td>2</td>
</tr>
<tr>
<td>Dimensions of Pension Crises</td>
<td>3</td>
</tr>
<tr>
<td>Pension Plan Design Basics</td>
<td>3</td>
</tr>
<tr>
<td>Organization of This Report</td>
<td>4</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Chapter 2. Pension Finance and Funding History</th>
<th>6</th>
</tr>
</thead>
<tbody>
<tr>
<td>Actuarial Terminology, Methods, and Assumptions</td>
<td>6</td>
</tr>
<tr>
<td>Accounting and Reporting Standards for State and Local Pensions</td>
<td>8</td>
</tr>
<tr>
<td>State and Local Pension Plan Funding 2002–2020</td>
<td>11</td>
</tr>
<tr>
<td>Summary</td>
<td>19</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Chapter 3. Financial Options to Address Underfunded Pensions and Their Consequences</th>
<th>20</th>
</tr>
</thead>
<tbody>
<tr>
<td>Changes to Investment Strategies</td>
<td>20</td>
</tr>
<tr>
<td>Pension Obligation Bonds</td>
<td>22</td>
</tr>
<tr>
<td>Tax Policy, Budget Cuts, and Bankruptcy</td>
<td>24</td>
</tr>
<tr>
<td>Summary</td>
<td>25</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Chapter 4. Pension Plan Reforms</th>
<th>27</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pension Design Changes</td>
<td>27</td>
</tr>
<tr>
<td>Pension Type Changes</td>
<td>32</td>
</tr>
<tr>
<td>Workforce Effects of Defined Benefit Plans</td>
<td>32</td>
</tr>
<tr>
<td>Workforce Effects of Defined Contribution Plans</td>
<td>34</td>
</tr>
<tr>
<td>Effects on Retirement Security</td>
<td>35</td>
</tr>
<tr>
<td>Summary</td>
<td>35</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Chapter 5. The Institutional Context and Political Economy of Public Pensions</th>
<th>37</th>
</tr>
</thead>
<tbody>
<tr>
<td>Legal Protections for State and Local Pensions</td>
<td>37</td>
</tr>
<tr>
<td>Public Pension Plan Governance and Stakeholders</td>
<td>39</td>
</tr>
<tr>
<td>Summary</td>
<td>45</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Chapter 6. Major Themes from Discussions with Subject-Matter Experts</th>
<th>47</th>
</tr>
</thead>
<tbody>
<tr>
<td>Approach</td>
<td>47</td>
</tr>
<tr>
<td>Plans Face Persistent Pressure to Increase Benefit Obligations, yet True Costs of Benefits Are Obscured</td>
<td>48</td>
</tr>
<tr>
<td>Actuarial Assumptions Can Hide the Costs of Benefit Obligations, While Realistic Assumptions Can Limit Underfunded Benefit Increases</td>
<td>48</td>
</tr>
</tbody>
</table>
Political Systems Underlie a Pension System’s Design, Funded Status, Actuarial Assumptions, and Reform Efforts, but Increased Financial Sophistication of Stakeholders Lead to Higher Funding Levels................................................................................................................................................49

The Great Recession Exposed Multiple Weaknesses in Pension Funding, and Resulting Underfunding Was One Driver of Substantial Reform ................................................................................50

Unfunded Pension Liabilities Disadvantage Governments in Hiring and Retaining Workers and Put Pressure on Other Government Services ..........................................................................................51

Automatic or Ratcheting Mechanisms Can Keep Obligations in Check or Exacerbate Underfunding ....................................................................................................................................52

Summary .................................................................................................................................................52

Chapter 7. Publicly Available Tools and Resources on Pensions .................................................54

Resources on Reforms .............................................................................................................................55

Resources on Funding .............................................................................................................................55

Chapter 8. Conclusion and Insights ...............................................................................................57

Key Insights .............................................................................................................................................58

Gaps .........................................................................................................................................................66

Concluding Thoughts and Future Direction ............................................................................................67

Appendix A. Illustrative Application of Actuarial Concepts ........................................................68

Appendix B. Pension Resources and Tools ...................................................................................72

Abbreviations ................................................................................................................................ 78

References ..................................................................................................................................... 79
Figures and Tables

Figures

Figure 2.1. Funded Ratio and Plan Returns, 2002–2022 ............................................................... 12
Figure 2.2. Distribution of Change in Plan-Funded Ratio Across Plans, 2002–2012 .................... 13
Figure 2.3. Distribution of Change in Plan-Funded Ratio from 2012 to 2020, Conditional on
   Decline in Funded Ratio of 20+ Percentage Points from 2002 to 2012 ..................................... 14
Figure 2.4. Percentage of Required Contributions Paid and Contribution Amount per Active
   Member, 2002–2020 .............................................................................................................. 15
Figure 2.5. Percentage of Current Contributions Attributable to Current Work ........................... 16
Figure 2.6. Distribution of Change in Unfunded Actuarial Liability from 2015 to 2020,
   Conditional on Meeting Actuarially Required Contribution ................................................. 16
Figure 2.7. Average Portfolio Composition, 2002–2020 .............................................................. 18
Figure 4.1. States That Increased Employee Contribution Rates, New and Current
   Employees, 2009–2021 ......................................................................................................... 28
Figure 4.2. Percentage of Plans Making Benefit Changes to Current or New Employees, by
   Type of Reform, 2009–2021 ................................................................................................. 29
Figure 4.3. States That Reduced Pension Benefits, 2009–2021 .................................................. 31
Figure 4.4. States That Introduced Defined Contribution or Hybrid Plans, 2009–2021 ............... 32
Figure 4.5. Predicted Retention Effects of Increasing DB Generosity for South Carolina Teachers ................................................................................................................................. 33
Figure 4.6. Predicted Retention Effects of Converting from DB to DC Plan for South Carolina Teachers ................................................................................................................................. 35

Tables

Table 7.1. Resources by Theme and Primary Audience ................................................................ 54
Table A.1. Funding History of Example Plan If Realized Return Matches Expected Return ......... 69
Table A.2. Funding History of Example Plan If Realized Return Misses Expected Return
   Before Fourth Period ............................................................................................................. 69
Table A.3. Funding History of Example Plan If Realized Return Never Matches Expected
   Return and Amortization Window Is Closed ........................................................................ 70
Table A.4. Funding History of Example Plan If Realized Return Never Matches Expected
   Return and Amortization Window Is Open ......................................................................... 71
Chapter 1. Introduction

Many public pension systems in the United States are facing a funding crisis. Pension contributions to state and local governments per public-sector worker rose by 390 percent between 2002 and 2020, from $2,900 to $11,500.¹ These higher contributions may mean higher taxes, fewer public services, or more government debt, as we describe in detail in this report. Further, government policies to address the funding crisis that involve cutting pension benefits or requiring employees to contribute more to their pension systems can adversely affect the recruitment and retention of qualified public-sector employees and their retirement security. There are other ways of framing the crisis, as of 2020:

- Most of these pension contributions went to cover past obligations of current, retired, and former employees.
- The average pension plan could not cover a quarter of its obligations, with 17 systems out of 196 unable to cover more than half of its obligations.
- Nationally, unfunded state and local pension obligations totaled $1.5 trillion.²

There is not a single national pension crisis: There are many small crises, reflecting local circumstance, history, and constraints, including legacy pension costs. For many pension systems, widescale reform has been elusive due to complications caused by multiple stakeholders, the long-term nature of payouts and obligations, differing short-term incentives, and an array of reform options. A further complication is the limited information on the relative effectiveness of these reforms at addressing system-specific funding crises.

The crises emerge because of the dynamics of paying for the deferred compensation of today’s workers. The deferred nature of pension benefits allows pension sponsors to decide between funding the obligation today with sufficient contributions to cover the future benefits or to delay those contributions until a future date. Without new income, such as increasing taxes or issuing bonds, contributing funds to cover new pension obligations today means crowding out public funds for other government projects. However, persistent deferral can lead to overwhelming financial obligations in the future. For many pension funds and their government

¹ See Chapter 2 for more information; we show these contributions in Figure 2.4.
² These values are based on our calculation of the database Pension Plans Data (using data from 2002 to 2020), described in more detail in Chapter 2 (Public Plans Data, undated-a). Specifically, (1) 59 percent of pension payments went to pay for past obligations (Figure 2.5), (2) pension plans can cover only 74 percent of their average obligations (Figure 2.1), and (3) 17 systems (representing more than 1.8 million people) have less than 50 percent of the funds required to cover their obligations (our tabulations for 2020 using Pension Plans Data). We use data through 2020 to avoid volatility in investment returns in 2021 and 2022. Many public pension funds had exceptional performance in 2021 (Aubry and Wandrei, 2021; Pew Charitable Trusts 2021b, 2022), but performance suffered in 2022, which had not been realized in pension system financial reports when this report was drafted in late 2022 (Gillers, 2022; Pew Charitable Trusts, 2022).
sponsors, the future has arrived, and they are now faced with contributing funds to cover substantial pension obligations.

Although concern about the crises surrounding state and local pension systems is not new, much of the research has tended to focus on specific topics, as we describe in detail in this report, leading to a piecemeal view of the issue. In particular, past studies focused on such topics as how the size of the pension liability depends on the accounting method of discounting future liabilities (e.g., Brown and Wilcox, 2009; Novy-Marx and Rauh, 2009, 2011), political representation and governance (e.g., Bradley, Pantzalis, and Yuan, 2016; Andonov, Hochberg, and Rauh, 2018), portfolio allocation (e.g., Pennacchi and Rastad, 2011; Andonov, Bauer, and Cremers, 2017), workforce incentives (e.g., Costrell and Podgursky, 2009), pension reforms (e.g., Ni and Podgursky, 2016; Aubry and Crawford, 2017; Brainard and Brown, 2018b), and legal constraints (e.g., Monahan, 2010; Munnell and Quinby, 2012).

Few studies take a broad or comprehensive perspective on the crises. That is, few studies recognize the full array of stakeholder objectives and incentives, the political setting, legal constraints, the consequences of underfunding, and the range of effects of pension reform policies. Further, those studies that do are focused on the circumstances around the Great Recession (e.g., Pew Center on the States, 2010; Munnell, 2012), thereby missing many of the lessons and experiences from the past decade.

The consequence of a lack of a global perspective is that practitioners aiming to address a pension crisis lack a road map that is informed by rigorous research and analysis that consider the full extent of the problem, the underlying causes, the consequences, the array of reform options, the impacts of those reforms, and the elements of implementation that are likely to have the greatest chance of success.

Study Aim and Approach

For this study, we collected and synthesized research, data, and resources for the development of a prototype road map for reform. The road map is intended to inform and support stakeholders of state and local government pension systems. The aim is to take a holistic view that considers the extent and causes of pension crises; the contextual setting, such as legal constraints; and downstream effects, such as the crowding out of public services, financial well-being of public employees, and effective management and retention of the workforce. The road map is a prototype because of gaps in what we know. A companion brief provides a prototype road map to help guide state and local pension policymakers and inform stakeholders about the dimensions of public-sector pension reform and policy options (Asch and Knapp, 2023).

Our comprehensive approach identifies the dimensions of pension crises, reviews and synthesizes what is known about these dimensions, and distinguishes tools and resources that can help stakeholders contextualize their circumstance and inform potential reform pathways. To supplement what we learn from existing research and resources, we held discussions with
subject-matter experts, such as pension system administrators and political leaders, to learn about their experiences with pension crises and reforms, focusing on issues and experiences that cannot be gleaned from actuarial reports and background information. From our synthesis of the past research, available data, and the discussions with subject-matter experts (see Chapter Six for more detail), we developed a set of key insights that can inform and support a tailored prototype road map for reform based on a pension system’s local circumstance, history, and constraints, as well as the objectives of its stakeholders. Furthermore, we identified gaps in which more research is needed to inform the road map. A limitation of our approach is that we did not conduct additional analyses to fill these gaps, so we do not provide analyses of the trade-offs between specific policy options that are tailored to the context of a given state or local pension system. Instead, the insights we develop provide a holistic view of the key issues surrounding the crises. This report summarizes the findings of these tasks.

Dimensions of Pension Crises

We identified four dimensions of pension crises, with the goal of informing the development of a road map for reform:

1. **Pension finance and funding history**: How are pension plans currently funded to ensure that they can pay benefits, and is there a system of oversight? What is the history of pension finance that has led to underfunding across state and local pension systems?
2. **Consequences of underfunding**: How does pension system underfunding interact with the provision of other public services and other steps states and municipalities can take to mitigate underfunding, including raising taxes and issuing bonds?
3. **Pension plan reforms**: How have pension systems changed their plans to address current or future funding shortfalls, and what are the effects of these reforms on the public-sector workforce, including the retirement security of public-sector employees?
4. **Institutional context and political economy**: How do pension systems’ policies interact with their local environment and institutional setting (i.e., laws, governance, and politics)?

Pension Plan Design Basics

Basic background information on pension plans is important context for our analysis. Pension plans are employee benefit plans sponsored by an employer that provide deferred income, usually in retirement or after separation from employment (U.S. Department of Labor, undated). There are two main types of retirement plans: defined benefit (DB) and defined contribution (DC) plans. DB plans specify a benefit to be paid once an employee meets the plan’s benefit eligibility criteria, while DC plans specify only the contribution by employees and employers, leaving how those contributions are invested to the employee within the constraints of the plan. As discussed later, nearly all state and local public pension plans have a DB component. Issues of pension funding typically revolve around DB plans because they are a current liability for future benefits and do not necessarily require full payment at the time the
liability is created. The current liability is paid through current contributions or, in the future, through investment returns or supplementary contributions.

Traditional DB plans provide a benefit based typically on the product of creditable service years, a benefit multiplier, and average final pay. For example, an employee who worked for 32 years under a plan with a multiplier of 0.0125 and an average final pay of $75,000 would receive $30,000 per year in retirement until death (32 × 0.0125 × $75,000 = $30,000). These benefits are deferred compensation—compensation earned by employees at one point in time that is paid at a future point in time. We refer to the sum of all past earned entitlements to a future DB benefit as an employee’s accrued pension benefit. In the private sector, an employer is under a contractual obligation to pay this accrued pension benefit based on the formula and other design features that exist at the time it is earned. This is known as an anti-cutback rule in tax law (Internal Revenue Service, 2021). However, state and local plans are specifically exempt from the anti-cutback rule, resulting in state-by-state variation in the requirement to pay an employee’s accrued pension benefit (Monahan, 2010). Most states define an employee’s accrued pension benefit as a contractual obligation; in some cases, the accrued pension benefit is given constitutional protections. In cases in which it is not a contractual obligation, it is considered property, a protected promise, or a gift (Munnell and Quinby, 2012). The nature of the contractual obligation is important for the broader question of pension reform in the context of underfunded systems and is addressed in Chapter 5, on pension environment and institutions.

Most DB plans pay a permanent-level benefit to a beneficiary that may be adjusted for inflation (this is known as a cost-of-living adjustment [COLA]). A funded DB plan is one in which contributions are made during the period when an employee is earning their future entitlement to the DB plan such that, when combined with investment earnings, the accrued amount is sufficient to pay the future benefits for as long as the employee (and their spouse, if the retiring employee so elects) is alive. DB plans in which there is no accrued funding but there exists a legal requirement to pay the benefits are known as pay-as-you-go pension plans. The sponsors of pay-as-you-go plans must cover current benefit payments from current revenues. Pay-as-you-go plans require intergenerational transfers—benefit payments to former employees are paid from current employee and employer contributions. In 2020, of 209 state and local plans, 190 (91 percent) were unable to fully cover their liabilities, placing most state and local pension plans between a fully funded DB plan and a pay-as-you-go plan (author calculations using Public Plans Data, undated-a). What defines pension liabilities and how contributions are set to ensure a funded DB plan are the subject of a large literature that we consider in the next chapter.

Organization of This Report

In Chapters 2 to 5, we highlight what is known and what is missing in understanding, measuring, and characterizing the dimensions of pension crises we identified in this chapter. In
Chapter 6, we identify common experiences among the subject-matter experts regarding circumstances surrounding the underfunding of their pension systems, how reforms were achieved, and factors they considered pivotal for putting their systems on a better path. In Chapter 7, we review existing publicly available tools, models, and resources that can inform stakeholders about the extent of the issue in their communities, can provide comparisons to other systems, or can more generally support efforts to consider other approaches to ensure that pension systems are sound footing for the future. In Chapter 8, we conclude by identifying key insights from past research, existing resources, and expert input that can be used for understanding pension crises and developing possible pathways for successful reform. A companion brief provides a prototype road map (Asch and Knapp, 2023).
Chapter 2. Pension Finance and Funding History

At the center of any state or local pension crisis is insufficient funding to pay for current and future pension obligations. To understand the extent of the crisis and the history, we begin this chapter by providing a broad description of the major components of pension finance, including methods for determining whether a pension system is fully funded, accounting standards, and actuarial methods. We then review past research on the causes for the decline in pension system funding, including the relative importance of long-term underfunding relative to insufficient current contributions. In reviewing past analyses, we highlight how a system’s characteristics and circumstances may alter the incentives of that pension system’s government sponsor to ensure that it is funded. We also document the funding history of major state and local pension systems since 2002. Note that we distinguish between plans and systems intentionally: A plan provides a retirement benefit to a type of employee, but a system may provide multiple plans based on employee type. Employee types may differ based on personnel characteristics, such as employer, hire date, and occupation. For example, public safety employees or public school employees may be eligible for their own plans but be part of a single system. Pension finance is typically focused on the system’s financing, not the financing of each plan individually. Actuarial valuations and costs generally are reported at the plan level.

Actuarial Terminology, Methods, and Assumptions

Actuaries have established terminology and methods for determining valuations associated with DB pension funding. These methods and their underlying assumptions play a central role in discussions about the financial status of state and local pensions, and we discuss these methods in detail here.

The two main components for valuing pension liabilities are the actuarial present value of pension benefits and the actuarial cost method. The actuarial present value (APV) of pension benefits is the value at a particular date of an employee’s accrued pension benefits paid out according to the plan’s design based on a particular set of actuarial assumptions regarding future events, observations of market or other valuation data, or a combination of assumptions and observations (Actuarial Standards Board [ASB], 2013, p. 3). For a funded pension plan to make benefit payments to employees, the plan must accrue sufficient assets while the employee is an active plan participant (i.e., not collecting benefits and still employed by a sponsoring employer of the plan). The process for allocating APV into payment periods while the employee is employed is known as an actuarial cost method (ASB, 2013, p. 2). For example, contributions to the pension fund can be designed to remain constant over a person’s career or increase as they get closer to retirement.
The most common actuarial cost method in public plans is *entry age normal*. The entry age normal approach takes the APV of projected benefits and allocates them evenly between entry age and assumed exit age of the employee (ASB, undated). The annualized value is known as the *normal cost*. Applying the actuarial cost method to the APV and excluding future entitlements results in an *actuarial accrued liability* (AAL), which effectively represents an employee’s accrued pension benefit. A system’s actuarial value of assets is more directly measured and is typically based on current market prices but may account for unrealized gains and losses (ASB, 2011, pp. 2, 6). If the AAL of current and former employees’ accrued pension benefits exceeds the actuarial value of the system’s assets, the difference is considered the unfunded AAL—the unfunded accrued liability (UAL). The UAL is often considered the pension system’s legacy liability and is often at the heart of concerns about the adequacy of pension funding.

Assumptions underlying the actuarial cost methods have driven much of the debate in recent years about the appearance of a pension plan’s funded position. Assumptions can be split into two main types: economic and demographic. Economic assumptions include the discount rate on future benefit payments, inflation rates, compensation growth, and payroll growth (ASB, 2020b). Demographic and other assumptions include retirement rates, employee turnover, mortality rates, and household composition (ASB, 2020a).

The assumption that has received the greatest focus in recent years has been the discount rate used to apply to future benefit payments (e.g., Brown and Wilcox, 2009; Novy-Marx and Rauh, 2009, 2011; Andonov, Bauer, and Cremers, 2017). A series of studies around the time of the Great Recession highlighted a finding from the theory of finance: The valuation of future pension obligations should reflect the riskiness of those liabilities (Brown and Wilcox, 2009; Novy-Marx and Rauh, 2009). Here, risk reflects the certainty that the payments will be made. The contractual nature of most pension obligations requires that the pension plan and its government sponsor (i.e., the state or local government that employed the workers and offered the pension plan as deferred compensation) ensure that it is paid. A government can no more escape paying its pension obligations than it can escape paying owners of its municipal bonds. This is particularly true in states where pension obligations are protected by the state constitution; barring a constitutional amendment, these obligations typically cannot be reduced or discharged in a bankruptcy, whereas municipal bonds typically can be reduced or discharged. A key implication of the theory is that the discount rate used to value future pension obligations should be a risk-free rate.

The theoretical approach to discounting future benefit obligations contrasts with the actual approach taken by state and local pension funds, which is to use their assumed long-run investment return. The average return in 2002 of the pension plans covered in Public Plan Data (for 2002–2020) was 8.0 percent but decreased to 7.2 percent by 2020 (author calculations using Public Plans Data, undated-a). The ten-year U.S. Treasury securities, a plausible risk-free rate of return, was 4.6 percent in 2002 and declined to 0.9 percent in 2020 (Federal Reserve Economic Data, 2022). Using a Treasury rate instead of the stated assumptions, Novy-Marx and Rauh
(2009) finds that the reported pension liabilities of the 50 states in 2009 would increase from $2.975 trillion to $5.167 trillion. Examining state-by-state variation, these authors find that pension liabilities using a risk-free rate are 1.7 to 8.7 times annual state tax revenues in 2009, with a median rate of 4.1 times annual state tax revenue. In short, pension liabilities are far larger using the risk-free rate than using pension plan’s actual rates.

Although we have highlighted the assumptions necessary to determine the AAL, further assumptions are made when determining the government sponsor’s necessary annual contribution to ensure that the system is funded. The APV and unfunded AAL are transformed into annual payments to a pension fund, known as the annual required contribution (ARC), by totaling the system’s normal cost for its current employees and amortization of the unfunded AAL.\(^3\) Although the system’s normal cost is based on the actuarial cost method, the amortization process, generally intended to pay off the unfunded AAL over time, is separate and based on additional assumptions.

There are three main assumptions pertaining to amortization: (1) amortization period, (2) whether the amortization is closed (i.e., set against a fixed date) or open (i.e., set against a fixed period), and (3) how costs are allocated over time (as a level dollar amount or as a level percentage of payroll).\(^4\) Longer amortization periods, open amortization periods, and allocation of costs as a level percentage of a growing payroll would all reduce current costs and increase future payments. Amortization periods and whether they are open or closed have been the subject of some debate. Less commonly debated are assumptions surrounding whether costs are distributed across payrolls. As Franken (2017) notes, optimistic assumptions about payroll growth can lead to negative amortization—i.e., growth in unfunded AAL despite making the ARC.

Appendix A provides an illustrative numerical application of most of these actuarial concepts.

**Accounting and Reporting Standards for State and Local Pensions**

The federal government does not set accounting standards for state and local pension plans. The Government Accounting Standards Board (GASB) was established in 1984 to create standards of accounting and financial reporting for state and local governments. These standards come in the form of GASB statements that serve as guidelines and not necessarily requirements for the accounting profession. GASB has unified methods for reporting benefit obligations and pension fund assets. In 1994, GASB issued two standards pertaining to public-sector pensions

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\(^3\) See the next section for the history of the term ARC.

\(^4\) This is one example of closed versus open amortization periods: Suppose a pension plan has an unfunded liability in 2022. The plan may set an amortization period of 20 years. It is a fixed date if in future years the amortization end date remains 2042 and a fixed period if the amortization end date remains at 20 years (e.g., in 2023, it will be recomputed to be 2043). An open period is akin to refinancing a debt.
that would serve as key state and local pension plan guidelines for the next two decades: Statement No. 25 (GASB 25) focused on financial reporting for DB plans and disclosures for defined contribution plans, and Statement No. 27 (GASB 27) focused on accounting for pensions by state- and local-government employers (GASB, 1994a, 1994b). These statements allowed state and local DB plan sponsors satisfying certain parameters to use their actuary’s funding analyses for reporting purposes (Munnell, 2012). This differs from the private sector, in which an actuary is required to make separate valuations for funding determinations and for reporting purposes. GASB 25 defined standards for determining actuarial liabilities and assets, such as benefits to be included, the actuarial valuation of assets, and the ARC (GASB, 1994a). It also linked actuarial assumptions to actuarial standards of practice (see ASB, 2013) and defined the discount rates as based on the system’s estimated long-term investment yield (GASB, 1994a, pp. 15–17). GASB 25 further defined the funded ratio as the actuarial value of assets as a percentage of the AAL, and GASB 25 required amortization periods to be no more than 40 years before June 2006 and no more than 30 years from June 2006 (GASB, 1994a, pp. 17–18).

Before GASB 25, state and local pension funding valuation was the “wild west” (Munnell, 2012). GASB 25 provided guidelines by which to measure pension obligations, representing a substantial step forward in standardizing the reporting of state and local pension systems’ benefit obligations. However, the relative flexibility that the statement granted plans to set assumptions also introduced conflicting incentives that had the potential to encourage pension systems to make favorable assumptions if they wanted to reduce the appearance of their unfunded liability. Reducing the appearance of an unfunded liability does not diminish the associated obligation. An often-noted assumption is that pension funds can reduce their ARC by taking on riskier investments that have higher expected returns, since the valuation of assets is based on the expected returns without consideration for the associated uncertainty (Novy-Marx and Rauh, 2009). Conflicting incentives, such as pursuing riskier assets to lower pension contributions, may exacerbate the impact of market downturns, such as the Great Recession. We return to this topic in Chapter 5.

In 2012, GASB replaced GASB 25 and 27 with GASB 67 and 68, respectively. GASB 67 replaced the GASB 25’s actuarial values of assets, which permitted smoothing based on unrealized gains and losses, with the net position of assets valued at market rates (GASB, 2012a, pp. 18–19). GASB 67 also stated that liabilities could be discounted by a blended rate if a cash flow projection indicates the plan will deplete its assets before all benefits are paid; the blended rate effectively imposes a lower discount rate (GASB, 2012a, pp. 19–21). Finally, GASB 67

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5 For example, note that the term ARC, established by GASB 25 (GASB, 1994a), prevailed until the onset of GASB 67 (GASB, 2012a), when it was displaced by the actuarially determined contribution (ADC). These terms refer to essentially the same thing, but the nomenclature has changed.

6 The blended rate is the result of a cash flow projection to determine whether the plan will deplete its assets before all benefits are paid. If the projection shows that the plan will not exhaust its assets before all benefits are paid, the plan continues to use the assumed return as the discount rate for liabilities. If the projection results in an asset
limited the actuarial cost method to entry age normal (GASB, 2012a, p. 22). The statement replaced the AAL with total pension liability, with the major changes attributed to the blended rate and the required use of entry age normal for the actuarial cost method. Given the revision in terminology, there is no funded ratio defined in GASB 67. Conceptually, the equivalent calculation for funded ratio under the revised rules is the net position of assets as a percentage of the total pension liability. This is the definition we use for a funded ratio under GASB 67 when reviewing pension fund performance later in the chapter. GASB 67 continued some long-standing concerns regarding the interactions of guidelines to produce bad incentives, including that a plan can lower its pension obligations by taking on riskier assets that have greater expected rates of return (Munnell, 2012; Novy-Marx, 2013).

GASB standards are guidelines, not legal requirements. States may establish their own rules for pension system or plan funding and may also establish requirements for local pension systems or plans within their state. Further, GASB standards are developed around the concept of a funded DB plan. The alternative to a funded DB plan is a pay-as-you-go plan, meaning that the plan’s current receipts pay current beneficiaries. In this case, the unfunded AAL rolls over indefinitely.

GASB’s new standards also highlight two aspects of pension systems that we discuss later in this chapter and in the report. First, systems differ in whether they have single or multiple employers. Single-employer systems have an explicit connection between the plan and government sponsor; there is no ability to share costs with others. Among the multiple-employer systems, there are cost-sharing systems and agent-based systems. In cost-sharing systems, employees’ accrued pension benefits are pooled across government employers participating in the system, and the system’s assets can be used to pay the benefits of any system participant, regardless of employer or plan. Conversely, an agent-based system pools assets for investment purposes but maintains separate accounts for each employer, and the assets in each account are reserved for the employer’s beneficiaries. GASB 67 eliminated the need for agent-based systems to report information about the actuarially determined contribution, as the funding requirements included the use of the blended rate for discounts when a cash flow projection indicates the plan will deplete its assets before all benefits are paid and requires the use of entry age normal as the actuarial cost method. AAL differs in that it uses the plan’s discount rate (not the blended rate) and is based on the plan’s actuarial cost method, which before GASB 67 could have been a few alternatives to entry age normal, including project unit credit and aggregate cost methods (GASB, 1994a, pp. 54–58).

Partially funded plans, which are not pay-as-you-go plans, may also have unfunded AAL that could be rolled over indefinitely.
for the plan may differ from the funding requirement of an employer within the plan (GASB, 2012a, p. 54).10

Standards established by GASB and ASB form the basis for funding determinations and for reporting purposes. In this section, we have also highlighted that, within these policies, there is flexibility in the assumptions that actuaries can use that can affect reported valuations and determinations of the ARC or its successor value, the ADC. Beyond the discount rate, these assumptions include inflation rates, compensation growth, payroll growth, retirement rates, employee turnover, mortality rates, amortization periods, and amortization methods, which all influence the actuarially determined contribution. Next, we explore variation in key plan finance statistics over time, including funded ratio, investment return assumptions, contribution requirements and percentage achieved, and investment portfolio allocations.

State and Local Pension Plan Funding 2002–2020

In this section, we provide aggregate statistics using the Public Plans Data produced by the Center for Retirement Research at Boston College for the years 2002–2020. Public Plans Data includes detailed information on 210 plans (119 state run and 91 locally run), accounting for 95 percent of state and local pension assets and members (Public Plans Data, undated-a, undated-b).

Funded Ratio and Investment Returns

As discussed above, the funded ratio under GASB 25 is the percentage of actuarial liabilities covered by actuarial assets (GASB, 1994a). It is one of the most common benchmarks for describing the state of pension funding. Using this measure, we observe that the funded ratio, depicted by the solid red line in Figure 2.1, has declined from 93 percent in 2002 to 74 percent in 2020. The decline from the well-funded positions in the early 2000s was associated with investment losses during the Great Recession, insufficient contributions, and increased unfunded liabilities arising from pension enhancements during the relatively flush times of the late 1990s (Munnell, 2012; Koedel, Ni, and Podgursky, 2014). Since the Great Recession, the average funded ratio has been effectively flat, but this conceals substantial differences in funding trajectories across plans. There is some evidence that average funding improved in 2021 with the broader market (Aubry and Wandrei, 2021; Pew Charitable Trusts, 2021c). The alternative definition of the funded ratio based on GASB 67, depicted by the dashed red line in Figure 2.1, varies around the original metric that used market performance, consistent with the revised definition (GASB, 2012a).11

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10 As a result of the change in GASB guidance, the term ARC was replaced with the term ADC. That said, many plans still refer to this term as ARC, as do many researchers and practitioners. We use both terms throughout the report.

11 The revised definition requires using a blended rate incorporating lower municipal bond rates for plans whose projected cash flows indicate they will exhaust their assets before all accrued benefit obligations are paid.
Figure 2.1 also depicts planned and realized returns. Although hard to discern, the average planned returns declined from an average of 8.0 percent in 2002 to 7.2 percent in 2020. Realized returns varied substantially over time but have improved, although a ten-year moving average would suggest an average return below the planned rate prior to 2018. This finding highlights that realized returns have not consistently achieved the expected returns used to value pension benefit obligations.\textsuperscript{12}

\textbf{Figure 2.1. Funded Ratio and Plan Returns, 2002–2022}

\begin{figure}
\centering
\includegraphics[width=\textwidth]{figure2.1.png}
\caption{Funded Ratio and Plan Returns, 2002–2022}
\end{figure}

\textbf{Sources:} Authors' estimates using the Public Plan Data, undated-a; also see GASB, 1994a, 2012a.
\textbf{Note:} To determine average values, we first computed weighted averages for each value by state based on total plan membership of each state and local pension plan in the Public Plan Data. We then computed cross-state averages, which are presented here, giving equal weight to each state.

Figures 2.2 and 2.3 investigate the distribution of plan experience that is concealed by the average values shown in Figure 2.1. To separate the Great Recession’s impact on funding outcomes through investment losses, we separate experiences from a period distinctly after—i.e., from 2012—from experiences before and during the Great Recession.\textsuperscript{13} From 2002 to 2012, the average funded ratio decreased by 20.8 percentage points, as shown in Figure 2.1. However there

\textsuperscript{12} We use a ten-year return for illustrative purposes, since we have recorded returns only since 2002. Returns over shorter and longer periods could be better or worse. Pension fund investment horizons are typically 30 years or longer.

\textsuperscript{13} The S&P 500 peaked at 1,565 points on October 9, 2007, and it was not until March 28, 2013, that this level was achieved again.
appears to be a normal distribution around this value across plans in Figure 2.2, with some plans experiencing very large declines and some experiencing positive changes in funding. Focusing on those plans that experienced a decline in funding from 2002 to 2012, Figure 2.3 demonstrates that a majority improved from 2012 to 2020, while a nontrivial minority of plans continued to do worse over this period. The distribution of the plans performing poorly from 2002 to 2012 is uneven, with an average funded ratio effectively unchanged over this period but a significant concentration of systems with negative returns.

**Figure 2.2. Distribution of Change in Plan-Funded Ratio Across Plans, 2002–2012**

![Histogram showing the distribution of change in plan-funded ratio](image.png)

<table>
<thead>
<tr>
<th>Difference between Funded Ratio in 2012 and 2002</th>
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**SOURCE:** Authors' estimates using the Public Plan Data, undated-a.
**NOTE:** The red vertical line depicts –20 percentage points. Estimated values: average = –20.8 percentage points; median = –20.2 percentage points. The sample size is 202 plans.

An important question is: What is the source of the large declines shown in these figures, especially the persistent poor performers shown in Figure 2.3? Understanding the source of these negative pension funding experiences requires us to develop common themes associated with the pension funding crises. These could be as simple as employers or the legislature not making contributions, or it can be much more complicated, such as unanticipated reductions in the workforce, greater retention, or poor investments. Often, it is a combination. We next discuss the roles of contributions, portfolio choice, and investment return.
Figure 2.3. Distribution of Change in Plan-Funded Ratio from 2012 to 2020, Conditional on Decline in Funded Ratio of 20+ Percentage Points from 2002 to 2012

![Histogram showing distribution of change in plan-funded ratio.]

**SOURCE:** Authors’ estimates using the Public Plan Data, undated-a.

**NOTE:** The red vertical lines depict 0 and +10 percentage points. Estimated values: average = +0.3 percentage points; median = +1.4 percentage points. The sample size is 102 plans.

**Actuarially Determined Contributions Versus Realized Employer Contributions**

The ADCs required to fully fund a pension plan are not legally required by federal law, as discussed above. Figure 2.4 demonstrates that the average percentage of the ARC paid in our sample (as indicated by the blue line) was regularly below 100 percent from 2002 to 2014. Since 2015, states and localities in the data are generally meeting their required contribution, leading to greater contributions per member (as indicated by the red line). Required contributions per active member increased from $2,900 in 2002 to $11,500 in 2020.

As a funded ratio drops below 100 percent, a larger fraction of the ADC must pay for unfunded AAL and the interest on those liabilities. Because of the anti-cutback clause, the system can opt not to contribute to cover current or future employees, although it is obligated by law to cover the existing obligations. The unfunded AAL is the legacy cost, and as it expands, a larger fraction of employer and employee contributions must be devoted to it and a lower fraction to current workers, as depicted in Figure 2.5. From 2002 to 2020, the fraction of contributions going to cover current workers decreased from 91 percent to 41 percent.
Figure 2.4. Percentage of Required Contributions Paid and Contribution Amount per Active Member, 2002–2020

SOURCE: Authors’ estimates using the Public Plan Data, undated-a.
NOTE: To determine average values, we first compute weighted averages for each value by state based on total plan membership of each state and local pension plan in the Public Plan Data. We then compute cross-state averages, which are presented here, giving equal weight to each state. GASB 67 became effective June 15, 2013, so the vertical line marks fiscal year 2014 (GASB, 2012a).

A pension plan can make its ADC and still experience an increase in UAL if the combined payments are insufficient to cover the interest on the unfunded liability (Franken, 2017). As shown in Figure 2.1, the funded ratio is effectively flat despite plans regularly making their ADCs from 2015. To investigate this further, Figure 2.6 depicts the distribution of the percentage change in UALs between 2015 and 2020 for plans making 100 percent or more of their ARCs every year over this period. Given that the amortization of unfunded actuarial liabilities is intended to reduce the liability over time, we would expect these plans to exhibit a decrease in their liability. Counterintuitively, a substantial majority of these plans exhibit an increase in their unfunded liability despite making their ARC. This suggests that amortization methods are an important mechanism for explaining declining funded ratios in instances where the ARCs are regularly made.
Figure 2.5. Percentage of Current Contributions Attributable to Current Work

SOURCE: Authors’ estimates using Public Plan Data, undated-a.
NOTE: To determine average values, we first compute weighted averages for each value by state based on total plan membership of each state and local pension plan in the Public Plan Data. We then compute cross-state averages, which are presented here, giving equal weight to each state. GASB 67 became effective June 15, 2013, so the vertical line marks fiscal year 2014 (GASB, 2012a).

Figure 2.6. Distribution of Change in Unfunded Actuarial Liability from 2015 to 2020, Conditional on Meeting Actuarially Required Contribution

SOURCE: Authors’ estimates using Public Plan Data, undated-a.
NOTE: Positive values correspond to an increase in pension liability from 2015 to 2020. To determine average values, we first compute weighted averages for each value by state based on total plan membership of each state and local pension plan in the Public Plan Data. We then compute cross-state averages, which are presented here, giving equal weight to each state. The sample size is 81 plans.
Portfolio Choice and Investment Return

Research has pointed out that GASB standards linking investment returns with discounting creates incentives to invest in riskier assets that will both justify higher discount rates and reduce their reportable actuarial liability (Brown and Wilcox, 2009; Lucas and Zeldes, 2009; Novy-Marx and Rauh, 2009). From 1952 to 2009, public pension funds moved from safer assets, such as fixed income (from a high of 95 percent in 1952 to a low of 25 percent during 2004–2006), toward riskier assets, such as equities (from near zero in 1952 to a high of 64 percent during 2004–2006) (Pennacchi and Rastad, 2011, p. 222). A notable uptick from near zero in 1994 to 10 percent in 2009 is in “other assets,” which includes alternative assets, such as commodities, real estate, and investments in hedge funds or private equity. Using Public Plans Data, Figure 2.7 shows that this trend has continued. As depicted on the left axis (the blue lines), shares of equities and fixed income have declined from approximately 61 percent and 29 percent, respectively, during the 2004–2006 period to 46 percent and 24 percent in 2020. To compensate for this decline, there has been a marked increase in alternatives, from 8.2 percent (primarily real estate and private equity) during 2004–2006 to a combined 26 percent in 2020, spread across the four main alternative investment types: real estate, private equity, hedge funds, and commodities.

We discuss alternative hypotheses about why this is the case and supporting evidence in Chapter 3. An interesting topic for future research would be an assessment of the counterfactual: What would have happened had assets remained primarily in more-traditional investments? Such an assessment would also need to consider the balance between lower returns and lower volatility.
Andonov, Bauer, and Cremers (2017) proposed a “regulatory incentives hypothesis” in which the “regulatory link between the liability discount rate and the expected rate of return on assets gives U.S. public funds an incentive to increase their allocation to risky assets.” Using data on public and private pension funds both in the United States and internationally, the authors found empirical support for their theory: U.S. public pension plans with a high level of underfunding are more likely to use higher discount rates and pursue riskier asset allocations. Further, the authors attributed U.S. public pension fund asset allocation and liability discount rate choices to differences in regulation (by comparing U.S. public and private pension funds) and dismissed the possibility that it was due to fund type (by comparing U.S. public pension funds with Canadian and European pension funds). A consequence of regulation promoting greater investments in risker assets is that pension funds may be more incentivized to take this approach during periods of poor market performance when declines in the value of more-traditional assets

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16 From our review, Andonov, Bauer, and Cremers (2017) did not account for whether the plans are open or closed to new workers. Closed plans may have lower discount rates, and there has been a trend in the U.S. private sector toward closing DB pension plans. Closed plans tend to have a larger percentage of retired workers, which is accounted for in their authors’ model. It is unclear whether accounting for plan closure would meaningfully alter their findings.
would otherwise increase the sponsor’s actuarially determined contributions. After fixing allocation decisions, Andonov, Bauer, and Cremers (2017) found that U.S. public pension plans underperformed benchmarks by 0.51 percentage points per year and that their underperformance was substantially worse in mature plans (i.e., plans with a higher ratio of beneficiaries per active member). We discuss other hypotheses in the next chapter.

Summary

GASB establishes standards for financial reporting by state and local pension plans. The goals of these reporting standards, first introduced in 1994 and subsequently revised in 2012, have been to provide useful information for decisionmaking and accountability, including promoting transparency in how valuations are determined. These standards provide measures of a pension system’s funding situation—notably, whether the system’s accrued assets are sufficient to cover the accrued liabilities, the ratio of assets to liabilities being the funded ratio, and the difference being the unfunded liability.

In this chapter, we summarized state and local pension plan funding from 2002 to 2020. Figure 2.1 highlighted how the average funded ratio of 210 plans has declined from 93 percent in 2002 to 72 percent in 2012 and then remained in the range of 72 to 75 percent through 2020. The average obscures substantial heterogeneity, with many plans continuing to see a decline since 2012 (Figure 2.3). Consequently, required contributions per active member have increased from $2,900 in 2002 to $11,500 in 2020, a nearly 400 percent increase (Figure 2.4).

During this period, contribution increases have been insufficient to reduce unfunded pension liabilities for many plans. Rather than covering newly earned pension benefit obligations for current work, most current contributions now help cover legacy liabilities. Also, during this period, there has been a shift from a traditional mix of fixed income and public equity toward an investment mix that includes a substantial allocation to alternative investments (real estate, private equity, hedge funds, and commodities) that are often less liquid and more difficult to value.

A pension plan becomes underfunded when contributions are less than the ARC or when the assumptions underlying the ARC are incorrect. Much of the decline is likely attributable to many plan sponsors not ensuring that the ARC was fully paid before by 2014 (Figure 2.4). Stagnant or declining funded ratios for plans paying their ARC may be attributable to differences between assumed and realized values that determine the ARC or revisions to assumed values that increase the unfunded liability (e.g., lowering the expected rate of return). Key assumptions underlying the ARC include economic assumptions (e.g., discount rate on future benefit payments, inflation rates, compensation growth, and payroll growth) and demographic and other assumptions (e.g., retirement rates, employee turnover, mortality rates, and household composition). Aside from the discount rate on future benefit payments, which is often linked to the expected rate of return on investments, there has been limited research on identifying key sources of unfunded liabilities.
Chapter 3. Financial Options to Address Underfunded Pensions and Their Consequences

This chapter discusses financial or budgetary options for improving the funding status of state and local pension systems. In Chapter 2, we observed trends toward investments in alternative asset classes that typically provide higher returns. Inasmuch as this approach lessens the expected costs of benefit obligations, it is one option for increasing the long-run funding status of a pension system without relying on additional revenues or cuts to other expenditures. However, seeking higher returns through investing in riskier assets by its nature increases the riskiness of the pension portfolio. We discuss three types of techniques for addressing underfunded pension systems and the available evidence on their effects:

1. changes to investment strategies
2. increasing leverage of the pension system through the issuance of pension obligation bonds (POBs) and investing these borrowed funds
3. budgetary relief through raising taxes, collecting revenue from a dedicated funding source, reducing spending in other categories, or discharging debt through bankruptcy.

In short, this chapter discusses options other than pension plan reform (including increased employee or employer contributions) available to states or municipalities when their pension systems have UALs. The next chapter discusses options for reforming the pension system itself, including increased employee or employer contributions, available to states or municipalities when their pension systems have UALs.

Changes to Investment Strategies

A sizable literature focuses on the investment decisionmaking of public pension systems, how they differ from private plan decisionmaking, and the political structures and representation or financial literacy of managers that can affect that decisionmaking (see the discussion in Chapter 5; also see Andonov, Hochberg, and Rauh, 2018, for a recent example and review of this literature). However, less research has been done on the particular role underfunding plays in investment strategies by public pension systems, with the exception of one behavior: riskier investments. We find four competing hypotheses in the literature for why plans increase the riskiness of their portfolio when underfunded, with each hypothesis suggesting a slightly different cause and consequence of risky investing.

Pennacchi and Rastad (2011) examined state pension plans, finding that funds invest in riskier assets after periods of poor fund performance. One mechanism for this relationship is a “regulatory incentives hypothesis”: Riskier investments with higher expected returns justify a higher assumed rate of return, thereby shrinking the system’s UAL (Andonov, Bauer, and
Cremers, 2017). The consequence of this hypothesis is more than just a more volatile portfolio; a higher assumed rate of return systematically lowers ARCs going forward, potentially exacerbating underfunding beyond a temporary market downturn.

Another mechanism invoked to account for riskier investing after poor market performance is the “risk transfer hypothesis” (Mohan and Zhang, 2014): Instead of imposing the costs of addressing underfunding on current taxpayers through higher taxes, the authors argue that fund managers seek greater average returns but do so by increasing risk for future taxpayers. If managers or politicians have a relatively short-term horizon (e.g., through approaching term limits), the risk transfer hypothesis would predict even riskier investment allocations (Giertz and Papke, 2007). Future stakeholders thus inherit a riskier portfolio; however, reallocation is possible in every year, and in contrast to the regulatory incentives hypothesis (Pennacchi and Rastad, 2011), this risk transfer is not necessarily factored into all future contributions.

A third hypothesis is the “fiscal constraint hypothesis,” whereby governments would prefer to make up for poor market performance by reallocating more money to their pension systems (Eaton and Nofsinger, 2004). However, in the presence of fiscal constraints, governments may invest in riskier assets instead of using relatively more-expensive alternative funding mechanisms, such as reducing funding for other budget priorities. Mohan and Zhang (2014) operationalized fiscal constraints for state systems via state general obligation bond ratings, debt-to-income ratios, or the percentage of ADCs paid (an inverse measure). The authors found that states that were more fiscally constrained allocate more assets to equity, with an example credit downgrade of one notch, from AA3 (high quality) to A1 (upper-medium quality), being associated with an increase in equity allocation of 0.72 to 0.74 percent (equivalent to more than $130 million in their sample).

Myers (2021) also explored a “moral hazard hypothesis” for municipal pension fund managers. Because the downside risk of poor performance with riskier investments is minimized due to the expectation of either state-level bailouts or lack of internalization of budgetary cuts to other services, managers can attempt to address underfunding through riskier investments, focusing on upside risk.

All four hypotheses examine underfunding that results in riskier investment strategies by pension funds; the extent to which each hypothesis holds depends on the environment facing the pension system. If assumed rates of return are transparent and kept low through either legislative restrictions or strong oversight, if policymakers have long horizons, if governments are not highly fiscally constrained, and if there is limited likelihood of bailouts in the event of future downturns, then we would expect limited increases in risky investment by underfunded pensions. However, if any of these conditions does not hold, pension funds may increase their risk exposure to make up for underfunding.

Furthermore, since underfunded pension obligations represent a source of default risk for municipalities—and, hypothetically, for states as well—investors should theoretically require higher interest rates on bonds issued by governments that have pension obligations that are less
funded. That is, riskier investment may be a consequence of underfunded pensions, but higher borrowing costs may be a further consequence, potentially exacerbating budgetary pressures. However, the empirical evidence on the extent and size of the relationship is mixed. Pre–Great Recession, Munnell, Aubry, and Quinby (2011) found no statistically significant relationship between borrowing costs, as measured by state or municipal bond spreads, and unfunded pension liabilities. Post-2009, Aubry, Crawford, and Munnell (2017) found a statistically significant relationship between bond spreads and unfunded pension liabilities, yet this relationship was not substantial, and its statistical significance was sensitive to specification. One reason for these inconsistent results is a fundamental empirical difficulty in identifying whether pension underfunding itself is driving increased borrowing costs or whether pension underfunding is a symptom of other factors, such as general fiscal mismanagement or a shrinking tax base.

A more recent state-level analysis addressed this empirical difficulty by leveraging pension reforms for causal identification and found that states’ bond spreads (the difference in yield between a state bond and a U.S. Treasury) increased with underfunding (Boyer, 2020). This study estimated that a one-standard-deviation increase in unfunded pension liability led to an increase of 27 to 32 basis points (16–20 percent) in state bond spread. That is, investors recognize that states with higher unfunded liabilities are riskier borrowers, and the investors accordingly require an additional yield on bonds that they issue. Furthermore, this bond spread rises to 50 to 80 basis points for states with constitutional legal protections for pension obligations, which grants these pension obligations seniority over bond debt.

One option for reducing pension underfunding is seeking higher returns through riskier investing. However, the consequences of this riskiness are borne by future stakeholders in the form of greater risk of loss. They are also borne by governments that are seen in capital markets as riskier borrowers. In the next section, we turn to another option facing pension systems to increase returns: financial leverage through issuing POBs.

Pension Obligation Bonds

If a pension system currently has an unfunded liability, the government responsible for the system may have the option of funding all or a portion of this unfunded liability through issuing POBs. In contrast to general obligation bonds, POBs are taxable bonds issued by localities for the express purpose of addressing pension underfunding. POBs effectively transform the actuarially determined unfunded liability, with the associated range of assumptions underlying this determination, with a more explicit liability based on contractual payments to the POB bondholders. Calabrese and Ely (2013) and Munnell, Aubry, and Cafarelli (2014) reviewed the structure and history of POBs and the two primary justifications for their use: budgetary relief and rate of return arbitrage.

The first POBs in the United States were issued by the city of Oakland, California, and at that time were issued as tax-exempt bonds. The Tax Reform Act of 1986 explicitly ended these
bonds’ tax-exempt status (Pub. L. 99-514, 1986), but between 1986 and 2014, approximately $105 billion of POBs were issued in the United States by more than 500 governing entities (Munnell, Aubry, and Cafarelli, 2014). At least $30 billion of POBs have been issued since then, with nearly $13 billion issued in the United States in 2021 (Rabouin and Gillers, 2022). However, the amount of POBs issued in any given year has never exceeded 1 percent of public pension assets under management (Munnell, Aubry, and Cafarelli, 2014). Critics of POBs note that issuance and management costs can be substantial, with the Government Finance Officers Association (2015) advising states and municipalities against issuing these bonds.

Nevertheless, POBs offer two potentially attractive features for systems with unfunded liabilities. First, ARCs, and the employer or employee contributions that come with addressing UALs, can be substantial for systems with low funded ratios. Issuing POBs can help these systems avoid raising contribution rates to prohibitively high levels. Second, municipal pension funds that participate in statewide systems can face severe penalties for being unfunded. POBs, compared with raising taxes, diverting spending, or missing these payments, may be the “least worst” option available, providing necessary budgetary relief (Munnell, Aubry, and Cafarelli, 2014). However, as Munnell, Aubry, and Cafarelli (2014) noted, self-administered plans are nearly 30 percent more likely to issue POBs, indicating that penalties from missing contributions to multisystem funds are not the only driver of POB issuance.

The other justification for their issuance is rate-of-return arbitrage: If a state or municipality can borrow at a low interest rate and then invest these borrowed funds in equities or other asset classes with higher rates of return, they can effectively reduce their overall liabilities through this arbitrage opportunity. This strategy is not without risk, including rate-of-return risk, market timing risk, and credit risk, resulting in potential defaults on bond payments.

Kilgour (2014) discussed the history of POBs in California and the trade-offs associated with their utilization, warning of risk exposure from rate-of-return arbitrage—that is, the risk of investment returns not exceeding interest rate and issuance costs of POBs. There is idiosyncratic risk in investment returns, but market timing is also a central concern for POB issuances. Traditionally, funds borrowed through POB issuances are immediately invested, creating substantial risk in market timing. Kilgour argued that POB issuance is best suited for the bottom of the cycle or early recovery, while POB issuances are historically more common during market booms (Munnell, Aubry, and Cafarelli, 2014). Even for POB issuances used to avoid penalties associated with underfunding in a multipayer system, the success of POB issuance depends on timing. For example, in California, Piedmont’s 2014 $8 million POB issuance to pay off a 7.5 percent interest rate debt to California Public Employees’ Retirement System (CalPERS) allowed for substantial savings. In contrast, Stockton’s 2007 $125 million POB issuance, with the proceeds transferred to CalPERS to address underfunding, experienced a dramatic loss in the years that followed, contributing to Stockton’s bankruptcy, as discussed further below. Mennis, Connolly, and Mills (2021) and Singh (2021) documented POB issuances in 2020 and 2021 of nearly $20 billion, across 70 issuers, as systems took advantage of low interest rates and high
asset returns to address their underfunded pension obligations without increasing contribution rates.

The consequence of POB issuance is that of leverage: When borrowed capital is used to make risky investments, these returns accrue without having to tie up one's own's capital. However, if investments perform poorly, governments are exposed to these losses and must continue to make bond payments. As discussed in the previous section, pension systems can adopt assumptions that increase or decrease their actuarial liability; furthermore, systems are not always required to make their full ARCs. However, missing POB payments exposes their issuers to potential bankruptcy proceedings and thus may force budgetary relief by other means.

**Tax Policy, Budget Cuts, and Bankruptcy**

Given pressure to adequately fund pension obligations and limited revenues, governments can seek budgetary relief by increasing taxes, reducing spending, or, in the extreme, entering Chapter 9 bankruptcy for municipalities. This last option is unavailable to states, yet, as discussed above, bond spreads indicate that investors demand higher yields on state-issued bonds when these states have underfunded pension obligations, suggesting that these investors require compensation for an increased default likelihood (Boyer, 2020).

Some localities have raised or sought to raise taxes (e.g., Jacksonville, Florida; Memphis, Tennessee; Elmhurst, Illinois), explicitly justifying these tax increases as needed revenue for pension obligations (Bauerlein, 2017; Testino, 2019; Giuliani, 2020). Although there is limited research on the specific effect of pension-obligation-driven changes to localities’ public finance decisions, a large literature in economics focuses on the role of local taxes and amenities in local economic growth (Kline and Moretti, 2014). Higher local taxes may deter potential residents from moving into a jurisdiction or encourage existing residents to move away; cuts to local amenities may have a similar effect.

However, underfunded pension status may lead to these outcomes in anticipation of future tax increases or service cuts. Aubry and Crawford (2016) found that pension underfunding played a small role in workers’ migration decisions but acknowledged a fundamental difficulty in isolating the effect of pension underfunding from factors that influence both pension funding and the funding of other government services.

Anticipatory effects may be particularly strong for those considering employment within underfunded pension systems. However, there is limited evidence that the underfunding status of pension obligations—separate from policies designed to address this underfunding, such as increased employee contributions—is salient to potential public employees. Features of pension

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17 As noted, because of the change in GASB guidance in 2012, the term ARC was replaced with the term ADC. Similarly, systems are not always required to make their full ADCs.

18 Governments can also create one-time or recurring dedicated funding sources, although by dedicating these funds to pension obligations, they cannot be used to provide relief elsewhere in the budget.
benefit design and the degree of employee contributions do affect hiring and retention decisions, as discussed in the next chapter, but underfunding itself does not appear to have a direct effect (Papke, 2021). As supportive evidence, Quinby and Sanzenbacher (2021) found that participation in supplemental defined contribution plans did not vary by the degree of underfunding of the defined benefit plan, indicating that workers did not adjust their retirement savings to account for this underfunding.

The consequences of diverting funds to underfunded pension systems can be substantial. Nation (2017) conducted 14 California-based case studies in which he estimated recent and projected crowding out of other services needed to satisfy funding pension obligations at the state, county, city, and special district levels. Although the case studies were limited to the specific context of California, Nation found substantial reduction in other services as pension contributions increased as a share of local budgets, with parks and recreation, public works, and libraries being the services that municipalities were most likely to reduce spending in—in some municipalities by as much as 75 percent. Peng (2004) provided three case studies—New Jersey, Virginia, and New York City—that explore the feedback mechanisms between operating budgets and pension funding levels. Whereas deferring pension contributions offers a relief valve for localities facing revenue shortfalls, Peng highlighted concerns over inter- or intragenerational inequity arising from the timing of contributions, akin to the risk transfer hypothesis above: Reducing spending on programs with long-term benefits but short-term costs to address pension obligations to current retirees redirects funds from current and future workers to prior workers.

Finally, when localities are unable to raise sufficient taxes or cut spending for services to satisfy their pension obligations, they may enter bankruptcy proceedings to restructure their obligations, as in the cases of Detroit, Michigan, and Stockton, California, with corresponding long-term effects on local government services and fiscal constraints. Although underfunded pension obligations were one factor among many that contributed to their insolvency, defaulting on pension obligation bonds can be a trigger for bankruptcy proceedings, as it was for Stockton (Christie, 2012).

Systematic evidence on the impact of underfunded pensions or pension-induced cuts to public services or increases in taxes is sparse. With some pension systems facing substantial unfunded pension obligations, additional evidence on how governments reallocate their budgets, and how households and workers react, may be forthcoming.

Summary

In this chapter, we highlighted financial options available to governments to address their underfunded pensions and the evidence on the consequences of pursuing these options. First, we discussed the impacts of higher-risk, higher-return investment decisions that funds may pursue, including how underfunded status itself may lead to greater borrowing costs due to a greater perceived likelihood of default. Second, we discussed the issuance of pension obligation bonds,
whereby the funded status of a pension system improves at the cost of increased liability to bondholders. Although funds may use lower borrowing costs to finance higher returns on their investments, these bonds expose funds to market-timing risk, rate-of-return risk, and credit risk, the last of which may potentially trigger bankruptcy proceedings if governments are unable to make bond payments. Finally, we discussed budgetary relief options—namely, raising taxes, cutting other services, or discharging debt through bankruptcy. We reviewed the evidence on the effects of these changes on service provision, as well as effects of individuals’ choice of residing in a given underfunded system’s jurisdiction in anticipation of future tax increases or service cuts. However, systematic research of pension underfunding’s impact on plan sponsors, such as cuts to public services or increases in taxes, is limited and remains an important gap for future research to address.

This chapter focused on the options available to governments facing unfunded pension liabilities short of reform, and the next chapter turns to pension reforms themselves and their consequences.
Chapter 4. Pension Plan Reforms

To reduce pension benefit obligations or increase funding, states and municipalities have considered an array of changes that involve reducing benefits, increasing contributions, and changing the entire structure of the pension plan. In this chapter, we highlight how widespread certain reforms are for employees and whether the reforms apply to current or new employees. The number and size of plans vary dramatically by state. To standardize the comparisons of pension reform across states, we show tabulations that draw on summaries of pension reforms in statewide systems (Brainard and Brown, 2018b; National Association of State Retirement Administrators [NASRA], 2021). To highlight the geographic distribution of reforms, the tabulations treat any reforms of a statewide system from 2009 to 2021 as a state reform. The chapter also discusses how our findings on breadth and type of reforms compare with the findings of other researchers.

Pension Design Changes

The most common design change passed by state legislatures since 2009 has been to require public employees to contribute more to their pension system. Figure 4.1 shows that the required employee contribution rate increased in 41 states between 2009 and 2021, with 22 states increasing contribution rates for current and new employees. The figure does not reflect that some states have multiple plans for different categories of state employees or that municipalities and counties may have their own plans.
By separating out reforms by current and new employees, we find that increases in contribution rates were more common for new employees than current employees, shown in Figure 4.2. Our results are consistent with Aubry and Crawford (2017), which provided tabulations of pension reform changes between 2009 and 2014 for 114 state and local plans, although results are not directly comparable because of the differences in time frame and differences in how multiple reforms within a state are counted. The authors found that 17 percent of state plans and 12 percent of local plans increased employee contribution rates between 2009 and 2014 for current employees, and 33 percent of state plans and 29 percent of local plans increased employee contribution rates for new employees.
Figure 4.2. Percentage of Plans Making Benefit Changes to Current or New Employees, by Type of Reform, 2009–2021

SOURCES: Authors’ compilation of policy reforms reported in Brainard and Brown (2018b) and updated to incorporate reforms from NASRA (2021) and our additional review of statewide system Annual Comprehensive Financial Reports.

NOTE: A state is marked as having increased employee contribution rates or benefit reductions if at least one major statewide system (e.g., public employee retirement systems; teacher retirement systems; school employee retirement systems) has an increase in contribution rates or reduced benefits for a particular employee group. Employee groups are new employees hired in or after 2009 and current employees (e.g., an employee hired before 2009). New employees are reported to have a contribution increase or benefit reduction if their default plan had a higher contribution rate or lower benefits relative to employees hired before 2009. If the default plan changes plan type, we do not treat it as a benefit reduction (e.g., DB to hybrid plan). DC and hybrid plan introductions are treated differently and are classified based on the date of the reform: those who are currently employed and future employees (i.e., new employees). For example, in Arizona’s Public Safety Personnel Retirement System, a 2016 reform required the creation of a DC account that the employee had to opt out of if they wanted to avoid contributing, so we consider that a reform to current employees.

Another common pension design change is a reduction in DB benefits. Annual DB benefits for retirees are typically computed as a multiplier: benefit factor times final average salary times years of service, where average final salary is defined as the highest annual salary over some number of years. For example, for an employee who retires at age 60 after 30 years of service with an average salary over the highest five years of $50,000 and with a multiplier of 1.5 percent, the annual retirement annuity would be $22,500. One way to reduce DB benefits is to reduce the multiplier, say, from 1.5 to 1.0 percent. Another way is to increase the years over which average final salary is computed, say, from five to eight. Since salaries typically rise with years of tenure, increasing the years over which the average is computed will tend to reduce the average final salary, thereby reducing the DB annual benefit. Yet another way to reduce benefit payouts is to increase the age or tenure required to be eligible for retirement benefits, say, by increasing the...
age to 62 or increasing the required years of service to 32. Increasing these requirements reduces the likelihood that employees will become eligible for full retirement benefits and reduces the number of years that a payout is required over the retiree’s remaining expected lifespan. Figure 4.2 demonstrates that all the approaches to reducing DB benefits have been widely used for new employees, with the most common being increasing age and tenure requirements for benefit eligibility (34 states), increasing years in the final average salary (29 states), and decreasing the benefit multiplier (17 states). Reducing benefits for current workers are less common but are by no means rare.

One type of pension reform is limiting the practice of *salary spiking*: strategic manipulation by an employee approaching retirement to increase their final average salary by taking on additional duties or accruing large amounts of overtime pay. This spike will lock in a permanently higher DB benefit based just on the increased final average salary but is underfunded due to employer and employee contribution rates applied to the systematically lower prior years of earnings. Although anecdotal cases of salary spikes have led to limits in their practice in pension reforms in states such as California and Tennessee, curtailing spiking is likely to have a limited impact on pension solvency (Fitzpatrick, 2017; Goldhaber, Grout, and Holden, 2018).

An additional method of reducing these annuity payments is to reduce or eliminate COLAs for retirees. Post–Great Recession, many states and localities addressed pension funding shortfalls by cutting COLAs for current beneficiaries (Munnell, Aubry, and Cafarelli, 2016; Fitzpatrick and Goda, 2020). Figure 4.2 highlights that current and new employees have seen their COLAs in retirement reduced, with the reform more likely among current workers than other forms of benefit reduction. Although cuts to nominal pension benefits for current workers and retirees are legally difficult (Munnell and Quinby, 2012), courts have generally upheld the ability of states and localities to reduce COLA increases in pensions, presenting one of the few ways to substantially reduce future pension obligations for current retirees within existing legal frameworks.

Figure 4.3 shows that 43 states had a statewide system that reduced pension benefits in one of these ways between 2009 and 2021. As with increases in required employee contributions, in general, benefit reductions are more common among new hires (39 states) than existing current employees (26 states).
The reason why benefit reductions are more common for new employees is that many states have legal protections, including constitutional requirements, that constrain the ability of the legislature to alter benefits for current employees. In contrast, as we discuss in the next chapter in the context of legal protections for state and local pensions, no state protects the benefits of new hires, making it easier to cut benefits for this group. Furthermore, future hires are not a political force, nor are current stakeholders; we discuss these political factors in the next section. The disadvantage of cutting benefits for only new hires, from the standpoint of reducing pension costs, is that it can take 30 to 40 years for the full reduction in costs to be realized as new hires under the less generous pension system fully replace employees who separate under the more generous legacy pension system.

As a means of enabling pension reform without requiring legislation, in recent years some public plans have adopted self-adjusting mechanisms. These mechanisms introduce cost sharing or risk sharing because when costs unexpectedly increase from plan expectations, the mechanism reduces benefits or increases employee contributions to distribute those unexpected increases between employers and employees. For example, according to Brainard and Brown (2018b), plans in Arizona, Iowa, Nevada, and Pennsylvania require employee contributions to fluctuate depending on the plan’s actuarial or financial conditions, and Maine created a similar provision for its local governments, effective fiscal year 2020. Other states automatically alter benefit levels depending on such factors as the plan’s funded ratio, investment performance, the inflation rate, or a combination of these factors. Since 2009, 23 states have introduced one or more risk-sharing design features for broad employee groups (Brainard and Brown, 2018a, 2018b).
Pension Type Changes

Unlike private-sector pension plans, most states continue to retain a traditional DB pension plan. However, some states have chosen to combine a less generous DB plan with a DC plan, in which employees have individual accounts and the value of the account at retirement depends on contributions and investment performance of the account. Figure 4.4 shows that 13 states have established a DC or hybrid plan between 2009 and 2021 for new employees. Rhode Island is the only state to require almost all current and future employees to convert to a new plan, whereas Michigan and Arizona converted early career employees to hybrid plans.

Figure 4.4. States That Introduced Defined Contribution or Hybrid Plans, 2009–2021

SOURCES: Adapted from Brainard and Brown (2018a, Figure 4) to incorporate updates from NASRA (2021) and a review of statewide system Annual Comprehensive Financial Reports.
NOTE: A state is marked as having introduced a DC or hybrid plan if at least one major statewide system (e.g., public employee retirement systems, teacher retirement systems, school employee retirement systems) offered the plan to a particular employee group (required or optional). Reforms are classified as affecting two distinct groups based on the date of the reform: those who are currently employed and future employees (i.e., new employees). To be consistent with Figures 4.1–4.3, the legend includes “current employees only” even though no state introduced DC or hybrid plans over this period for current employees only.

Workforce Effects of Defined Benefit Plans

Research shows that the generosity, design features, and type of public pension can affect the retention and retirement decisions of public employees, as discussed in this section. Consequently, pension reforms aimed at shoring up pension costs can alter the experience mix of the public-sector workforce. In particular, as discussed in Costrell and Podgursky (2009) in the context of teacher pensions in Arkansas, pension wealth in DB plans varies with experience for vested workers and creates pull and push retention incentives. Workers have a sharp incentive in their mid and late careers to work until they are eligible for early or normal retirement—the pull incentive—but have a push incentive to separate after achieving retirement eligibility. The push incentive occurs because retirement-eligible employees who defer retirement forego annuity payments. Knapp, Asch, and Mattock (2021) provided evidence of both effects on retention for South Carolina public teachers. Using parameters estimated from analysis of data on South
Carolina teachers from 2008 to 2020, the study simulated the retention effects of teachers’ careers of an increase in the DB multiplier from 1.82 percent (under the baseline DB teachers’ plan that covers teachers hired after July 1, 2012) to 5 percent. The predicted effect of this change is an overall increase in the average experience of the South Carolina teacher workforce by 7.5 percent. As shown in Figure 4.5, the increase in the DB multiplier creates a pull effect by increasing the retention of teachers (the gray line) until 25 years of service but also creates a push effect by reducing the retention of teachers thereafter.

Figure 4.5. Predicted Retention Effects of Increasing DB Generosity for South Carolina Teachers

Other studies find evidence of the pull and push incentive effects of pensions on retention. Ni, Podgursky, and Wang (2021) used administrative data for St. Louis public school teachers and tracked two cohorts of teachers ages 50–62 for five years and found that an enhancement to the teachers’ pension plan multiplier induced teachers to retire earlier. This is consistent with the results of Furgeson, Strauss, and Vogt (2006), which studied Pennsylvania public school teachers and found that a $1,000 or 0.4 percent increase in the real present value of pension benefits increased the probability of retirement by 0.02 to 0.08 percentage points for female teachers, implying an elasticity of retirement of between 2.0 and 3.5. The positive push effect is also consistent with results of Brown (2013) for California teachers and of Knapp et al. (2016) for Chicago public school teachers over their careers between 1970 and 2012.

Knapp et al. (2016) also found evidence of the pull effect of public pensions for Chicago public schools; the authors found that an increase in the full retirement age led to lower retention of midcareer teachers. Costrell and McGee (2010) similarly found a significant negative impact of accrued pension wealth on the midcareer separation behavior of Arkansas teachers. Quinby and Wettstein (2019) considered the effects of a 2005 reform to the Employees’ Retirement System of Rhode Island that cut DB benefits for state employees and teachers by raising the
normal retirement age, reducing the multiplier, and capping future COLA payments for those with fewer than ten years of service. For state employees, the authors found that these employees were 4 percentage points more likely to separate because of the reform, while teachers were only 1.7 percentage points more likely to separate.

**Workforce Effects of Defined Contribution Plans**

Research shows that public-sector DC plans also create a pull and push effect on employee retention, but these effects are more muted than they are under DB plans. The pull incentive is more muted because the fund accumulations of vested employees are portable, so employees have a weaker incentive to stay until they are eligible for retirement. The push incentive is weaker under a DC plan because working an additional year, once an employee is eligible for retirement, has no opportunity cost in terms of forgone retirement benefits. Ni, Podgursky, and Wang (2021) found that conversion from a DB to a DC plan reduced the retention of midcareer teachers in St. Louis, consistent with a weaker pull effect. Ni and Podgursky (2016) found evidence of a weaker push effect; simulations of alternative DC scenarios shows that Missouri public school teachers who were eligible to retire were more likely to continue teaching than those under the current DB plan. Figure 4.6 shows a simulation of the retention effects over careers of South Carolina public employees of converting from the post-2012 DB plan to a DC plan (Knapp, Asch, and Mattock, 2021); fewer teachers stayed in the midcareer, and fewer stayed once they were eligible for retirement.

Hybrid plans with a DB and DC component tend to exhibit smaller changes than outright shifts to DC plans because the remaining DB component retains some of the push and pull incentives. Asch, Knapp, and Mattock (2022) simulated shifts from DB to hybrid systems for teachers in three state systems and found that changes from DB to hybrid plans typically reduced early-career retention but increased late-career retention. The net change depends on the nature of reforms and local circumstances, meaning that benefit reforms should be tailored to particular systems and workforces.
Effects on Retirement Security

As would be expected, research indicates that pension reforms that reduce elements of the benefit formula have also reduced the amount of retirement benefits new employees can expect from their retirement system compared with that of existing employees. In a 2015 study, NASRA and the Center for State and Local Government Excellence considered changes in 45 state plans for public employees since 2009. The study computed annual benefits for an employee who works 30 consecutive years in the state plan in each state, finding that, in the states considered over the period analyzed, the average annual pension benefit for the 30-year public employee fell by 7.5 percent. The range was –20.0 percent in Alabama to no change in Colorado (NASRA and Center for State and Local Government Excellence, 2015). The study also found that, among the states analyzed, the average new employee would have to work about two years and eight months longer to reach the benefit level available to current employees.

As with long-term assessments of workforce effects, there are no studies that provide a long-term assessment of pension reforms on retirement security. It will be many years before new entrants affected by these reforms reach retirement eligibility and, importantly, before any analyses can be conducted to assess how these reductions in benefits might have affected people’s satisfaction and welfare during their retirement years.

Summary

The most-common reforms are changes to pension design rather than to pension type, including requiring higher rates of employee contributions to their pension plans, increasing the
eligibility requirements for starting benefits, and providing less generous COLA provisions. According to our calculations of statewide systems, from 2009 to 2021, 34 states had a system that altered at least one of these plan design elements for current employees, and 41 states did so for new employees. Less frequently, states changed the type of pensions that cover public employees from the traditional DB plan to a DC plan or a hybrid plan or both. Since 2009, only three states have had systems that have changed pension type for current employees, of which two were optional switches to DC plans, and one state (i.e., Rhode Island) converted all employees with less than 20 service years from a traditional DB plan to a hybrid plan. For new hires, 13 states changed to only a DC plan or a hybrid plan or offered both DC and hybrid plan options.

With respect to effects on the workforce, much of the research has focused on public school teacher retention. Reducing DB benefits lessens the midcareer pull effect of pensions, resulting in reduced midcareer retention while also reducing the push effect of pensions among retirement-eligible personnel; senior personnel have less incentive to retire, so their retention increases (Costrell and Podgursky, 2009). On the other hand, the evidence for the effects of pension reform on workforce quality is mixed, with some studies finding some effect and others finding no effect. Finally, as expected, pension reform has reduced benefits for new employees relative to current ones.
Chapter 5. The Institutional Context and Political Economy of Public Pensions

The institutional context surrounding pensions can affect the extent of the pension crisis and how underfunding and other aspects of the crisis are approached by a state or municipality. The institutional context includes the legal environment that protects employees’ accrued pension benefits, as well as the system’s governance structure and stakeholders that can affect the system’s funding and the success of policies to improve funding status. We begin with a review of the legal protections for state and local pensions. We then discuss governance issues and key stakeholders.

Past studies that seek to understand the performance of public pensions typically take a political economy approach. This approach examines how the interaction between stakeholders and political institutions that determine governance affects economic and societal outcomes, such as pension outcomes (Downs, 1957; Oates, 1988; Hsin and Mitchell, 1994; Norcross and Smith, 2021). Within the political economy literature, many studies rely on economic models of public choice, in which each stakeholder seeks to maximize their utility and act in their own self-interest when dealing with the public sector (Butler, 2012). Further, voters delegate policy decisions to elected officials who may not have an incentive to act in the public’s best interest, and the representative or “median” voter whose preferences lie in the middle of the spectrum of all voters on a given issue may have imperfect knowledge about public-sector activities. Other studies rely more on models that recognize the role of institutions, meaning the organizational structures, regulations, rules, and policies, as well as the role of special interest groups. In the context of public pensions, institutional factors can include personnel practices, pension rules, contribution policies, actuarial methods and assumptions, professional norms, investment markets, political institutions, managerial organizations, and legal constraints (Matkin, Chen, and Khalid, 2019). In models that focus on special interests, it is costly for policymakers to obtain information about voter preferences, and they rely on special interests to provide such information; elected officials may design policies to appeal to these interests in exchange for votes (Stigler, 1971; Kelley, 2014). Although many of the early studies were theoretical, more-recent studies have sought to find evidence and empirical support for hypotheses generated by the different models, as we discuss in this chapter. Our discussion of governance and stakeholders presents hypotheses from these models and discusses available evidence.

Legal Protections for State and Local Pensions

The Employee Retirement Income Security Act (ERISA) of 1974 imposed rules on private-sector retirement plans related to participation, vesting, funding requirements, investments, and
reporting requirements (Pub. L. 93-406, 1974; Schieber, 2011), but public-sector plans were made exempt. Consequently, state and local retirement systems have had far more flexibility with respect to setting rules and standards affecting their pension systems. Many have argued that the diverse legal frameworks across locations and the leniency in setting rules have contributed to the underfunding crisis among these plans (Healy, Hess, and Nicholson, 2012; Norcross and Smith, 2021).

Several studies have provided a review of the legal framework and specifically the legal protections for employees across public pension systems (Monahan, 2010; Healy, Hess, and Nicholson, 2012; Munnell and Quinby, 2012; Aubry and Crawford, 2017; Pew Charitable Trusts, 2019). The “Each State’s Source of Legal Protections for Pension Benefits” box shown below, using categorizations from Pew Charitable Trusts (2019), shows the states that protect pensions under a contract-based approach in which pensions have been deemed by court ruling to be part of the contract between the employer and the employee. The U.S. Constitution’s Contract Clause (Article 1, Section 10, Clause 1) prohibits states from passing laws that hurt existing contracts. Pew found that 26 states rely exclusively on this contract-based approach, eight rely on the state constitution, six rely only on statutes enacted by legislatures, and five use a combination of common-law contractual and state statutes. The remaining five states use other ways. Munnell and Quinby (2012) and Aubry and Crawford (2017) showed that even states that take a similar approach can differ in terms of which accrued benefits are protected. For example, while Alaska, Illinois, and New York constitutionally protect not only benefits accrued in the past by an employee but also future benefits that the employee might accrue, Hawaii, Louisiana, and Michigan constitutionally protect only past accrued benefits. With respect to the contract-based approach, many states have been influenced by the California Rule, which holds that a contract is formed on the first day of employment, implying that future pension benefits that have yet to be accrued are covered by the contract. Twelve states have adopted some form of the California Rule (Pew Charitable Trusts, 2019). This approach, as well as constitutional approaches, sets a high bar for changing future benefits and presents a major obstacle to pension reform (Munnell and Quinby, 2012).

Importantly, future employees are not covered by these protections. No state protects the pension benefits of employees who will be hired after the reform. Further, as explained by Munnell and Quinby (2012), for current employees, it is necessary to separate COLA reforms from core benefits. Court decisions have allowed COLA changes or even suspensions for current employees. Put simply, changing benefits for current employees is extremely difficult but is easier for new employees.
Public Pension Plan Governance and Stakeholders

As described by NASRA (2019b, p. 1), “governance—defined as the systems and processes that comprise the oversight and control of an organization—plays an important role in the performance of the state or local government retirement system.” Unlike private-sector plans, in which governance primarily resides with the employer, the governance of public pensions is dispersed among several key players (NASRA, 2020). First, there is the plan sponsor, typically the legislature or city council, that establishes the retirement system and determines how benefits are funded and administered. Second, the chief executive is also an elected official and is typically the governor, county commission, mayor, or city manager. The chief executive has the authority to approve changes proposed by the legislature, has budget proposal authority (including the authority to propose pension funding), and can appoint members of the retirement system board.

Third, most public pension systems are overseen by a board that has a fiduciary role to ensure that the retirement system is fulfilling its statutory role and that it operates in the sole interest of the members and beneficiaries. The responsibilities of the board and its staff typically include paying benefits, calculating the funding required to pay future benefits, overseeing pension fund assets and investments of the system’s assets, performing administrative functions,
and maintaining records and reports. One of the most important responsibilities of the board is selecting actuarial methods and assumptions, which affect the cost and funding of the pension plan. For example, the board is typically responsible for setting the plan’s investment rate-of-return assumption and the discount rate assumed for discounting future pension liabilities. In some states, the investment function is performed by a state agency that is external to the pension system, and these external agencies are another part of the institutional structure surrounding the governance of public pensions. A fourth player in this institutional structure is the set of external technical experts, including actuaries who provide estimates of pension liabilities and normal cost percentages, as well as oversight boards that audit the pension system for accountability purposes and have oversight responsibility for state or local pension systems (Norcross and Smith, 2021).

These institutional players represent the governance structure relevant to public pensions. The objective of this structure is to achieve the objectives of the pension system within the legal constraints faced by the municipality or state. These objectives include achieving the public good by setting compensation and the terms of employment, such as the setting of public pensions to attract, retain, motivate, and eventually separate a high-quality public-sector workforce. But two critical factors can affect the achievement of these governmental aims, from the standpoint of theories of the political economy of pensions. The first is that two other key stakeholders are involved: the pension plan beneficiaries (including current employees, who are potentially future beneficiaries) and the voters and taxpayers (Norcross and Smith, 2021). Public employees are generally unionized, and in the political economy framework, unions seek to maximize employee compensation, including pension benefits, while taxpayers and voters seek public programs that most benefit them (Hess and Squire, 2010). The stakeholders have incentives that differ from the sponsor of the pension plan—i.e., the government. Second, each of the institutional players in the governance structure may have objectives that differ from the overall government, given their specific incentives and constraints. The net result is that the institutions involved in governance will have misaligned incentives or conflicts of interest with respect to the stakeholders. Next, we describe the incentives and constraints highlighted in the literature and available evidence on their effects on pension outcomes.

**Pension Politics: Stakeholder Incentives and Constraints**

Norcross and Smith (2021) discussed the objectives, incentives, and constraints facing stakeholders and institutional players involved with state and local pension systems and the

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19 Farber et al. (2021) used data on unionism over the 20th century and found that union households had family incomes that were 10–20 percent higher than nonunion households. Using data on California employees, Jacobs and Thomason (2018) found that workers covered by a union contract earn an average of 12.9 percent more than nonunion workers with similar demographic characteristics.
broader topic of the political economy of public pension systems. This subsection draws on that report and the studies it cites and additional relevant studies on this topic.

Considerable evidence indicates that a large swath of the American public is unaware of policy details or demonstrate what is called voter ignorance in the literature (Arnold, 2012; Somin, 2016). Caplan (2007) argued that voters are not only ill-informed about specific policies but that their lack of knowledge leads to biases in how they assess policy, and Arnold (2012) found evidence that voters would make different vote choices when they had more-relevant information. Downs (1957) hypothesized that voters have little incentive to become knowledgeable because individual votes have a small impact on electoral outcomes. In the context of public pensions, this theory takes the form of the hypothesis that the public tends to inaccurately assess the costs and benefits of pensions, as discussed by Norcross and Smith (2021). The reason is that solving the pension crisis in voters’ community is usually a lower priority than other policy issues, especially because pension costs are spread across all taxpayers. In addition, pensions and their funding are highly complex topics, and voters might not be financially literate or have an incentive to learn the complexities. Furthermore, voter ignorance might be intentional, meaning that information about pensions might be intentionally deceptive or that the policymakers involved in the pension governance structure might design the institutions surrounding pensions to be unduly complex to hide or misrepresent pension costs or benefits (Oates, 1988). This phenomenon is called fiscal illusion, whereby voters systematically misperceive costs or benefits because of intentional deception by policymakers (Buchanan, 1966). For example, elements of the tax structure may be intentionally hidden through greater structure complexity, so voters do not perceive the entire cost of public policy.

In the political economy framework, to improve their election or reelection chances, elected officials and candidates have an incentive to focus on the present and promise pension benefits to concentrated constituencies, such as public-sector workers, pension beneficiaries, and employee unions, and to disperse the costs across taxpayers and hide those costs by pushing them into the future (Hess and Squire, 2010). In addition, the theory implies that elected officials have an incentive to underfund pensions or use opportunistic accounting to hide the true cost of pension promises. Bagchi (2021) used data on local pension plans in Pennsylvania covering the period 1985–2017 and found that more politically competitive jurisdictions—meaning that the jurisdiction lacks a systematic electoral advantage by either political party—have lower pension funded ratios. Further, using data on 114 state-administered pension plans, Stalebrink and Donatella (2021) found that the likelihood of opportunistic accounting choices increased when the pension plan was underfunded, organized as a cost-sharing plan, governed by a higher proportion of political appointees on the fiduciary body (e.g., the pension board), and covered a workforce with a higher degree of unionization, as well as when the sponsoring government was more divided in terms of partisan control. The study also found that opportunistic accounting is less likely when the pension plan is subject to an audit by a certified public accountant. Although politicians have an incentive to support policies that lead to underfunded pension systems, a
well-funded system can become a lucrative source of funds, as the title of Hess and Squire’s 2010 article on the political economy of public pensions suggests (“‘But the Pension Fund was Just Sitting There . . .’”). Norcross and Smith (2021) also argued that elected officials, themselves, might not fully understand the complexity of pensions or the pension crisis because they have more pressing or politically prominent policy issues occupying their attention—or they might not be financially literate either.

**Interest Groups**

Interest or lobbying groups represent the concentrated interests of specific voting groups to exert influence on elected officials. Employee unions represent not only voters but also the individuals covered by the pension system. To pursue the objective of serving their constituent members, employee unions aim to maintain or increase pension benefits and to rally other groups to support this objective. For example, teacher unions will rally parents to their cause, arguing that cuts in benefits will hurt education.

Available research suggests that pension generosity is correlated with public employee unionism: States with stronger unions adopt pension funding assumptions, such as a higher discount rate assumption, that result in lower estimates of pension liabilities (Wagner and Elder, 2021; Bonsall, Comprix, and Muller, 2019). Wagner and Elder (2021) used a cross-state database that tracks campaign contributions in every state and found that more politically engaged unions (measured by their campaign contributions) were better at shifting more pension costs to the pension sponsor or employer and estimated a return on investment on campaign contributions of nearly 1,500 percent. Specifically, the authors estimated that a change in campaign contributions of $75,000 had two effects: It increased the normal cost and increased the share of the normal cost borne by the employer, representing a $1.1 million increase in the amount paid by the employer, in present value, or a 1,450 percent return ($1.1 million divided by $75,000). Using 2016 data, Wagner and Elder also found that a teacher’s union was among the top 20 largest donors in 41 states and among the top three largest in five states. On the other hand, using data on public pensions between 1993 and 2008, Munnell et al. (2011) found that unions had no discernable effect on pension plan generosity but had a measurable effect on wage levels. The authors hypothesized that lobbying expertise rather than the percentage of the public workforce that is unionized may be the key factor explaining their result; the Wagner and Elder (2021) findings regarding the returns to campaign contributions are consistent with this hypothesis.

Businesses located in the state or jurisdiction covered by the public pension also have a concentrated interest in the pension system; they want pension investments directed to firms within the jurisdiction. Such firms will lobby for these investments in exchange for campaign contributions (Hochberg and Rauh, 2013; Bradley, Pantzalis, and Yuan, 2016). Hochberg and Rauh (2013) found that public pension funds showed a bias for “home state” private equity by analyzing a sample of private equity fund investments by institutional investors from 1980 to
2009. The authors estimated that public pension funds’ investments in in-state investments resulted in performance that is 2 to 4 percentage points lower than their own out-of-state investments and similar investments in their state by out-of-state investors. Hochberg and Rauh also estimated that this preference for in-state investments together with the underperformance of these local investments reduced pension fund resources by $1.2 billion per year relative to private equity investments in general. Bradley, Pantzalis, and Yuan (2016) found that pension funds overweight local firms by 26 percent relative to the market portfolio, according to a sample of internally managed state pension funds from 1999 to 2009.

Pension Boards and Technical Experts

The institutions involved in the governance of public pensions have extensive knowledge of the pension systems and their complexities, but the evidence indicates that institutional incentives can be misaligned with the public good and those of the stakeholders. As discussed by Tullock (2005) and Rowley (2012) and summarized by Norcross and Smith (2021), institutions’ incentives are those inherent in bureaucracies, including budget maximization, self-promotion, inertia, and groupthink. Tullock argued that bureaucrats are rent seeking and have an incentive to pursue private interests while conducting public business. The available evidence provides some support for this argument in the context of pension boards and experts, as described next.

With respect to pension boards, Bradley, Pantzalis, and Yuan (2016) found that boards with a larger share of politically affiliated trustees invested more in politically connected local firms, while boards that have trustees with more financial expertise invested less in these firms. Andonov, Hochberg, and Rauh (2018) found that public pension boards with a higher representation of politicians and state officials had lower private-equity investment performance driven by poor investment decisions; the authors found that boards with a larger fraction of state officials—what they call political boards—underperform within asset classes and are more likely to invest in assets that may be viewed as beneficial to the local economy. The study also examined campaign contributions and found that “political contributions from the financial industry helped explain part of the negative performance effect of government officials on boards (Andonov, Hochberg, and Rauh, 2018, p. 244). The authors also found that public pensions with boards that have a larger share of trustees representing the rank-and-file plan participants also underperform but to a lesser extent; they argued that this is due to those trustees having less financial experience and therefore lower financial literacy than other trustees.

Anzia and Moe (2019) found similar effects for trustees who were public-sector union representatives. In the authors’ analysis of the decisions of 109 pension boards between 2001 and 2014, they found that elected employee trustees had a large presence on these boards and that boards with a higher share of these trustees were more likely to adopt higher discount rate assumptions for the estimated actuarial cost of pension liabilities. The authors concluded that pension boards with greater “interest groups on the inside” were more likely to adopt policies that understated the cost of pension liabilities. This finding is consistent with the theory that
these trustees also act opportunistically, and their behavior leads to policies that reduce the apparent cost of pensions. If it were unintentional and not opportunistic, we would expect both positive and negative “errors” in terms of policies that lead to underfunding. But the evidence suggests a greater likelihood of policies that lead to underfunding. Similarly, Dove, Collins, and Smith (2018) found that a higher share of elected board members—meaning trustees elected by plan participants, such as retired teachers or union representatives—is associated with lower bond ratings (higher borrowing costs) for a state. Board composition and size are also related to asset allocation. Larger boards are associated with riskier allocations of pension investment assets among asset classes, measured in terms of the share of assets in alternative investments, total equity, international equity, real estate equity, and domestic equity (Dobra and Lubich, 2013). Because pension systems with a greater share of investments in relatively risky classes might not necessarily be riskier, because of diversification, Dobra and Lubich also explored the relationship between board composition and portfolio risk and found results consistent with the hypothesis that board composition also affects portfolio risk.

A common responsibility of the pension board is to hire and supervise the pension manager, who oversees the pension investment decisions, including the allocation and selection of assets. Research reviewed by Norcross and Smith (2021) suggested that the selection of investment managers and their pay may be influenced by political considerations, affecting investment returns. Dyck, Manoel, and Morse (2021) argued that pension boards fear that stakeholders, particularly the public, will be outraged if they compensate investment managers at their (higher) market rate, putting downward pressure on the salaries paid to these managers. The result, the authors argued, is that public pensions are more likely to hire lower-skilled internal managers, thereby reducing pension investment performance. Using data on 176 public pension funds, covering multiple countries, the study found evidence to support these hypotheses: when “outrage” is less binding in terms of creating dissent among stakeholders, manager compensation and fund returns were both higher relative to the benchmark, where outrage is measured as a latent variable in the study’s econometric analysis. Similarly, when outrage was more binding and the conditions were stronger for more dissent, manager compensation was found to be lower. In the latent variable analyses, the researchers extracted the shared variation among a set of variables that they believed measured or were correlated with outrage. The study used such measures as the extent to which an investment manager’s wage exceeds external pay opportunities and the share of trustees in an occupation that is particularly sensitive to the threat of outrage, such as being in a low-paid position relative to investment managers.

Other technical experts involved institutionally with public pensions are actuaries who provide the government with estimates of projected benefit obligations and the annual required contributions, accountants who provide financial disclosure documents, and auditors who ensure that financial disclosure accords with established standards. Government officials and pension boards generally hire these technical experts; ideally, to the extent that all parties operate in good faith under enforceable contract provisions and actuarial estimates are reliable, the system will
appear sound (Thornburg and Rosacker, 2018). But conflicts of interest and herding behavior together with the incentives of elected officials to understate pension costs can give the experts an incentive to work contrary to the public interest in the political economy framework. The professional fees paid to experts can create a conflict of interest if elected officials tie those fees to assumptions and actuarial calculations that hide or understate pension costs (Thornburg and Rosacker, 2018). A conflict of interest can arise if continued employment depends on pleasing elected officials or pension board trustees or if recommending changes could result in loss of contracts or increased costs (Norcross and Smith, 2021). Fabo et al. (2021) empirically analyzed the role of internal experts and their incentives to overstate the effectiveness of internal policies relative to the assessment of independent experts. The study found that economic research conducted internally at the Federal Reserve tended to overestimate the effectiveness of central-bank policies and concluded that internal researchers had a conflict of interest. Thornburg and Rosacker (2018) argued that auditors and those who perform pension actuarial calculations may fail to make pension reporting transparent and obfuscate information behind the complexity of the computations, thereby hurting taxpayers’ understanding of pension costs. Herding behavior among pension funds has also been studied (e.g., Broeders et al., 2021; Blake, Sarno, and Zin, 2017). Although different types of herding behavior can occur, in the context of the incentives of pension managers and experts, herding behavior occurs when pension funds and experts intentionally replicate the decisions of other funds and experts, with no economic reason. Experts follow the herd if they are concerned about how others will assess their ability and judgment. An advantage of following the herd is that they avoid embarrassment if they are wrong (Norcross and Smith, 2021). Both Broeders et al. (2021) and Blake, Sarno, and Zin (2017) found strong evidence of herding behavior in pension funds. Specifically, Broeders and coauthors found that pension funds used similar rebalancing strategies, reacted in similar ways to external shocks (such as changes in regulation), and copied changes in the asset allocation of other pension funds of a similar size. Blake, Sarno, and Zin found that pension funds of the same size and type (private versus public) followed each other in and out of the same asset classes and that funds converged toward the performance of the peer-group funds.

Summary

Although private-sector pensions are governed by federal law, state and local pensions are governed by a diverse set of laws and regulations set at the state and local levels, with differences in the legal setting across states also defining which policy options can be pursued. For example, some states include constitutional protections of pension rights.

Unlike private-sector pension plans whose governance primary resides with the employer, the governance of public pensions is dispersed among different stakeholders and decisionmakers, leading to questions about who is responsible for public pensions and to concerns about misaligned incentives or conflicts of interest—not just between stakeholders but with the public
interest. For example, because public-sector plans, unlike private-sector plans, are given much more latitude in terms of setting actuarial assumptions, the potential arises for opportunistic actuarial practices that lead to reported levels of funding that downplay the magnitude of pension liabilities and lead to lower required contributions. As another example, public plans across states and municipalities also have latitude in the selection of investment vehicles for investing public pension funds, allowing public pension fund managers to shift portfolios to higher-return but riskier asset classes.

The available evidence suggests that the size and composition of pension boards matter in terms of plan performance. For example, boards with a larger share of politically affiliated trustees invest more in politically connected local firms, whereas boards with trustees with more financial expertise invest less in these firms. Evidence also suggests that boards perform worse when they have more government officials on the board and, to a lesser extent, more rank-and-file members. In the case of government officials, political contributions from the financial industry helped explain part of the negative performance effect, while lower financial literacy among rank-and-file trustees may explain underperformance in this case.
Chapter 6. Major Themes from Discussions with Subject-Matter Experts

Approach

We conducted eight discussions with current or past pension plan administrators, political leaders, and other experts involved with pension plan systems in a cross-section of state and municipal pension plans throughout the United States. The purpose of the discussions was to learn about each system’s funding and administrative history, as well as about reforms conducted internally or by the state or local government. Because we conducted background research on each system, our interest was in gathering information and context that was not included in easily accessible actuarial reports and other background materials. We reached out to 16 state and local pension systems that exhibited at least two of the following experiences in recent years:

- experienced funding decline and recovery since 2002
- experienced funding decline without a major recovery since 2002
- experienced a major pension system reform or action
- attempted but failed to introduce a major pension reform or action.

To identify the pension systems that met these criteria, we used the Public Pensions Database (undated-a), produced by the Center for Retirement Research at Boston College, described in Chapter 2, as well as data collected by NASRA on pension reforms since 2007. We note that although our approach captured most statewide plans and many nonstatewide plans, the data do not include municipalities that are not part of an agent-based plan and plans that are not in the Boston College data. We then reached out to plans that met the above criteria. The plans that responded to our request for a discussion covered the spectrum of the four criteria. As part of the protocol approved by RAND’s and the University of Southern California’s institutional review boards that oversee interactions with human subjects, we do not identify the specific experts or the specific systems.

Using a semistructured discussion protocol that was tailored to the four criteria, we sought information on the following four topics:

- What were the factors that contributed to underfunding and, if relevant, to later improvement in the funded ratio?
- What motivated the pension reforms or the adopted or pursued changes in required contributions?
- What other policies or actions were made or contemplated to address underfunding?
- What have been the consequences of pension reform or other actions taken?

The semistructured nature of our discussions allowed us to explore the unique experiences and observations of the subject-matter experts, in both their current and past positions. For
example, one expert also had significant experience administering a pension system in another state. Although perspectives and observations differed among the experts, and their input is by no means representative, several themes emerged. We summarize them here.

**Plans Face Persistent Pressure to Increase Benefit Obligations, yet True Costs of Benefits Are Obscured**

Despite the burden of unfunded liabilities on the state or municipality, most systems reported persistent pressure to increase benefits for either active employees or for current beneficiaries. The dimension of generosity varied, from subsidized or free retiree health care, to shorter vesting periods, to more-generous benefit formulas, to a broader scope for what counted as pensionable income. Multiple subject-matter experts indicated that these pressures could be particularly severe when recent investment returns were favorable, when unions were particularly strong, or when elected representatives were politically constrained and were facing short-term budgetary limitations.

As discussed earlier in this report, the true cost of funding additional benefit obligations is complicated to calculate, relying on a range of actuarial assumptions. Given the fundamental asymmetries in timeline—current obligations for current employees versus future obligations affecting a range of stakeholders years or decades into the future, depending on economic and financial performance—many subject-matter experts brought up the challenge of resisting this pressure to increase benefits. Interestingly, representatives from two systems pointed to expanding COLAs as one pension feature that can be more easily resisted, since the cost of providing an ad-hoc COLA is salient and often borne by current employees. If these employees are currently making contributions, especially to pay down unfunded liabilities from obligations to current retirees, there is political pushback in providing these COLAs. As one system administrator said, “we find it difficult to justify a COLA now given the [employee] contribution rate.” Nevertheless, nearly every interviewee reported that union or employee representatives consistently sought additional benefit obligations.

**Actuarial Assumptions Can Hide the Costs of Benefit Obligations, While Realistic Assumptions Can Limit Underfunded Benefit Increases**

Opposing these increased benefits is a recognition of the costs of providing them; however, calculating the expected cost of a particular benefit obligation is complicated and based on a range of assumptions. These assumptions include retirement timing, earnings trajectories, mortality rates, payroll growth, and investment returns, each of which has a degree of uncertainty associated with it. Multiple subject-matter experts pointed to the assumption about investment returns as a key lever in either understating pension underfundedness or in holding policymakers to account in facing the true cost of pension obligations. By assuming a higher rate of return,
systems need to set aside less money for any future pension obligations, decreasing the perceived
cost of providing pension enhancements. But if this assumed return is overly optimistic, or in the
presence of substantial variability in the return from year to year, funded ratios may decline over
time despite meeting ARCs.

In our discussions about systems that saw substantial declines in their funded ratios, a
common theme was that the underlying actuarial assumptions leading to their ARCs
systematically underestimated the contributions necessary to maintain a stable or increasing
funded ratio. The exact nature of the deviation of assumption from reality differed from system
to system, although the accuracy of the payroll growth assumption, the amortization window,
and the investment returns assumptions were crucial. Prior to and just after the Great Recession,
many plans assumed a return of at least 7 or 8 percent; all of the plans we spoke to had decreased
their assumed rate of return by at least 1 percentage point, and these plans expressed greater
comfort with the funded status of their plans accordingly. A reduction in payroll growth
assumption or the amortization schedule were other changes that led to funded ratios that
systems administrators reported as more accurate, resulting in greater levels of actual funding.
According to one system administrator, the assumed rate of return was reduced by over 1
percentage point: “Liability went up . . . but we’re not paying more [benefits]. Instead, we’re
recognizing the reality, the fact that the liability has actually been bigger than we said previously.
That caused the contribution rate . . . to go up 50 percent.”

Political Systems Underlie a Pension System’s Design, Funded Status,
Actuarial Assumptions, and Reform Efforts, but Increased Financial
Sophistication of Stakeholders Lead to Higher Funding Levels

In every discussion, the topic of political pressure, be it from governance boards, voter
accountability, legislative dealmaking, executive power, unions, or elected officials’
participation, came up as a determinative factor in the financial stability of pension systems. We
described above the tension between the pressure to increase benefit obligations and the costs of
immediately and fully funding these obligations, as well as the steps that plans can take to then
obscure these costs; how this tension is resolved in each of the systems we held discussions
about depended crucially on the political environment. Pension systems that reported eras of
particularly poor outcomes, due to either insufficient contributions or underfunded benefit
enhancements, ascribed these outcomes to the political context.

One such context was single-party or single-interest rule, whereby only one “side” of the
tension between benefits and costs was unilaterally making decisions. In the presence of
substantial union pressures, one system administrator spoke of overly generous pension promises
as a driver of a low funded ratio, including, in the context of that system, overly broad
interpretations of what counted as pensionable income without corresponding prefunding of the
resulting pension benefits. Another expert spoke of single-party rule hostile to unions as a source
of dramatic reforms in pension offerings to new and current employees, with detrimental consequences to workforce recruiting or morale. In political environments with low levels of cross-party or cross-interest-group negotiation, pension reforms were reported to fall prey to no-compromise approaches, and, as two administrators mentioned, these no-compromise approaches can be exacerbated in the presence of constitutional protections for public-employee pensions that effectively lock in benefit obligations regardless of how prefunded they are.

Local systems we interviewed reported that the composition of governance boards varied, and who was on these boards, the interests board members represented, and their financial sophistication were pivotal in pension system outcomes. Regardless of the political affiliation, interests, or dynamics of the state or local government, nearly every pension system subject-matter expert we interviewed pointed to the financial or actuarial sophistication of decisionmakers as vital to any kind of reform, given both the importance and the complexity of the actuarial assumptions underlying pension fund planning. One system administrator described the following positive experience: “I talk with other executive directors about how we need to build relationships with the governor and legislature and educate them. One legislator said, ‘I don’t understand pensions, but so-and-so does, so if they vote yes, then I vote yes.’ But so-and-so doesn’t actually understand [them] either! We set out on an effort to educate these folks.”

The Great Recession Exposed Multiple Weaknesses in Pension Funding, and Resulting Underfunding Was One Driver of Substantial Reform

The effect of the Great Recession on pension systems’ balance sheets in 2008 and 2009 was drastic (as illustrated in Chapter 2); there was an immediate decline in wealth across many asset classes. However, multiple experts noted that the actuarial smoothing of investment returns across years and the rapid rebound in financial markets suggested that the direct financial losses from the Great Recession were not the only driver of a decline in funded ratios. In addition, the slow recovery of state and local budgets, some cases because of a decline in the property tax base and the resulting decline in payroll growth relative to actuarial assumptions, led to substantially lower funded ratios due to unrealistically low ARCs.

However, the administrators of the systems that moved from generous DB plans (Tier 1) to less generous plans (Tier 2) or to hybrid plans just before or in the wake of the Great Recession reported that the funding prospects for current workers in these new systems are strong, with legacy costs being the remaining unfunded liability that is most concerning. As one system respondent noted, “After the Great Recession, beginning in 2012, there were dramatic reforms of the plan and movement from Tier 1 to Tier 2, with significant restructuring of benefit formulas.” Another respondent noted, “After the 2008–09 market situation, the city created a financial task force, . . . saying that employees should pay more toward retirement.” Although many of these plans that recognized their systems were not fully funded prior to the Great Recession, the recession did lead to subsequent reforms.
Unfunded Pension Liabilities Disadvantage Governments in Hiring and Retaining Workers and Put Pressure on Other Government Services

The results of reducing benefit generosity were frequently reported to have implications for governments’ ability to hire and retain workers. A general theme across discussions was that pension costs, and employee contributions as a share of them, are salient, both those arising from large normal costs associated with high-value pensions and from legacy costs associated with UAL. One pension system, with the aim of educating stakeholders, created a road show in which representatives toured worksites with participating employers and presented information about pension costs, including unfunded liabilities and the fraction of employer and employee contributions that are earmarked for these liabilities. These presentations included the advantages of the current DB system over alternative structures but noted that any benefit enhancements come with trade-offs. An additional tension that subject-matter experts pointed to was workers who were not expecting to stay long enough to vest in, or receive, a sizable DB pension and hence may be leaving earlier due to high employee contributions.

Indeed, one stakeholder spoke about the advantages of a hybrid system and how the trade-offs between DB and DC may depend on the employment context: “Creating a system with school teachers, half of whom don’t get to five years, but they have a ten-year vesting period—that’s not a good policy. We’ve had people . . . opt out of a more generous DB plan and into the DC plan because, the way it’s set up, they don’t know if they’ll get tenure after ten years.” Sizable employee contributions may lead to opting out of the DB system, but since only participating employees pay into DB systems, opting out places additional financial strain on long-term funding status.

Multiple subject-matter experts pointed to the outsourcing of jobs as a way in which agencies avoid the pension costs of active employees—if per-worker costs are excessive, agencies may outsource tasks instead of internalizing these costs by hiring active employees. Even if benefits stay broadly competitive despite high employer or employee contributions, governments may not be competitive in every occupation; for example, one system respondent reported, “There’s no organized outcry from agencies saying they can’t recruit, but we know some areas, like accounting and IT, where they have difficulty.”

Another system respondent explicitly voiced concerns over pension obligations crowding out other public services. If pension obligations increase and systems are committed to prefund these benefits, these funds must come from some other part of the budget or new taxes. As one policymaker reported, “That’s the kind of discussion with push and pull with unions. They were looking out for employees. But at the end of the day, could I afford it? I could go along but might need to cut back on supplies, services, and other things in the budget.”
Automatic or Ratcheting Mechanisms Can Keep Obligations in Check or Exacerbate Underfunding

Given that actuarial assumptions are unlikely to hold in every year, many systems adopt automatic mechanisms to account for deviations of realized returns or funded status from prior assumptions. One type of mechanism that was discussed across multiple systems was a relationship between ARCs from employers and investment returns; in some systems, if investment returns exceed the assumed return, employers could contribute less. However, there was not a symmetric requirement of increasing contributions if returns fall below assumed rates of returns. This leads to a systematic bias downward in the rate necessary to maintain funded status, since higher rates of return crowded out employer contributions. A subject-matter expert reported exactly this pattern: “So, the downside risk was great, with little upside apart from the assumed return.”

One system respondent reported success from a ratcheting mechanism working in the opposite direction: Returns that exceeded the assumed rate of return allow for buying down this assumed rate of return, essentially increasing the overall assumed liability and preventing ARCs from declining, as well as increasing the required funding for any future benefit enhancements. Positive rates of return thus crowd in employer contributions, leading to a virtuous cycle of increasing funded ratios.

One automatic feature was reported to lead to systematically lower funding status: constitutional protection of benefits. In these systems, constitutional protections of promised benefits led worker negotiators to push for the largest possible benefit obligations, since, once obliged, they will certainly be paid out. One administrator reported an experience in which short-term political incentives were not kept in check by future beneficiaries due to constitutional protection of benefits, and a government “took money meant for pensions and spent it on other popular things right before an election. Unions were more hands-off because they figured they would get the increases anyway.”

The opposite dynamic was reported in a system that prohibited benefit enhancements unless the plan was fully funded; this restriction kept in check repeated pressures to increase pension obligations and led to a shared mission to bring the plan back to fully funded status.

Summary

In this chapter we highlighted the common themes that arose from discussion with eight state or municipal plan administrators. These themes included that pension plans face persistent pressure to enhance benefits, yet the true cost of these benefit increases can be obscured in present budgets. Actuarial assumptions, including assumptions over fund rates of return, system payroll growth, and amortization windows, play a vital role in recognizing the degree of underfunding. A consistent theme was that political systems underlie systems’ design, actuarial
assumptions, funded status, and reform efforts and that the financial sophistication of key policymakers can lead to greater recognition of the importance of funding pension obligations. The Great Recession exposed multiple weaknesses in pension funding across the systems we contacted, and the underfunding that resulted was one driver of reform efforts. Multiple system administrators reported that underfunded pensions disadvantage governments in hiring and retaining workers and put pressure on other government services. Finally, automatic or ratcheting policies can play a vital role in either keeping pension obligations in check or exacerbating underfunding, suggesting that well-designed policies can help control underfunding over the long term but that poorly designed policies can make underfunding worse.
Chapter 7. Publicly Available Tools and Resources on Pensions

Many existing publicly available tools, data, models, and resources can inform stakeholders about the extent of the issue in their communities and comparisons to other systems or can more generally support those interested in considering approaches to ensure that their pension systems are on sound footing for the future.\footnote{One challenge we identified was that not all tools and databases are updated and kept current.} We collectively refer to tools, data, models, and other resources as \textit{resources}.

The available resources we identified were primarily distinguished by their target audience and their theme. The two primary audiences were (1) decisionmakers and (2) researchers and policy audiences. The two general themes were (1) pension finance and funding and (2) reform alternatives. Table 7.1 summarizes the resources we identified. In this chapter, we provide a brief overview the resources and then provide more detail in Appendix B.

\begin{table}[h]
\centering
\caption{Resources by Theme and Primary Audience}
\begin{tabular}{lll}
\hline
\textbf{Primary Audience} & \textbf{Theme} & \\ 
\hline
\multicolumn{1}{c}{\textbf{Reforms}} & \textit{Making Informed Changes to Public Sector Pension Plans} & \textit{“Foundation for Public Pensions Risk Reporting”} \\
& Pension and Retirement Legislation Information by State database & \textit{“Public Pension Stress Testing in the States”} \\
& (National Conference of State Legislatures, 2021) & (Follett, Harrison, and Petrini, 2021) \\
\multicolumn{1}{c}{\textbf{Finances}} & \textit{“Modeling How Public Pension Investments May Perform over the Next 30 Years”} & \\
& (Campbell and Bui, 2022) & \\
\multicolumn{1}{c}{\textbf{Researchers and policy audiences}} & \textit{Spotlight on Significant Reforms to State Retirement Systems} & \textit{“Annual Survey of Public Pensions (ASPP)”} \\
& (Brainard and Brown, 2018b) & (U.S. Census Bureau, 2022b) \\
& \textit{“Selected Approved Changes to Selected Local Public Pensions, 2019”} & \textit{“Quarterly Survey of Public Pensions (QSPP)”} \\
& (NASRA, 2019a) & (U.S. Census Bureau, 2022a) \\
& \textit{“Selected Approved Changes to State Public Pensions, 2019–Present”} & Public Plans Data database for 2002–2020 and 2022 \\
& (NASRA, 2021) & (Public Plans Data, undated-a) \\
\hline
\end{tabular}
\end{table}
Resources on Reforms

For Decisionmakers

These resources are focused on state and local legislators and their staff. They are aimed at facilitating reform but provide little information about the consequences of reforms. National League of Cities (2017) provides a few case studies and a worksheet to jumpstart pension reform, while National Conference of State Legislatures (2021) provides a search capability of proposed and enacted state legislation relating to pension and retirement plans (powered by LexisNexis).

For Researchers and Policy Audiences

NASRA provides the most comprehensive list of reforms in the past two decades, and this list is regularly updated. As highlighted in Chapter 3, Brainard and Brown (2018b) and NASRA (2021) provide broad coverage of policy reforms in major statewide systems. NASRA (2019a) updated information for select local plans. More recently, NASRA released a few background papers on pension design, including state hybrid retirement plans, COLAs, and risk sharing (Brainard and Brown, 2018a; NASRA, 2022c, 2022d).

Summary and Gaps

Resources on reforms provide a notion of the possible options but are generally not designed to convey the consequences (e.g., funding impact), the comparative magnitude (e.g., whether one policy is more effective than another), the conditions that led to reform (e.g., insufficient payments), or the broader picture beyond the pension system’s funding (e.g., the role of the pension plan in retaining a skilled workforce).

Resources on Funding

For Decisionmakers

A few organizations provide stress-tests or outlines of how to approach stress-testing of pension funds (Pew Charitable Trusts, 2021a; Follett, Harrison, and Petrini, 2021; Campbell and Bui, 2022). Stress testing typically involves simulating the impact of alternative economic and investment return scenarios on a pension system’s funding and required contributions (Pew Charitable Trusts, 2021a). These tests demonstrate the robustness of portfolio allocations to the range of economic environments considered and can help communicate and guide pension systems and their sponsors in making decisions to manage the identified risks. Aside from stress tests, we suspect that most decisionmakers rely on their system’s actuaries for funding analyses specific to their system.
For Researchers and Policy Audiences

The U.S. Census Bureau conducts surveys that collect information from U.S. pension systems on revenues, expenditures, financial assets, and membership (U.S. Census Bureau, 2022a, 2022b). The quarterly version of the survey collects higher frequency data on larger plans and consequently covers a smaller sample. The annual survey is perhaps the most comprehensive collection of financial information on pension systems.

The Public Plans Data database (undated-a) provides details information collected from each system’s comprehensive annual financial report, including reporting details and actuarial valuation approaches. The information is updated regularly and served as the basis for the historical analyses of pension funding in Chapter 2. The database does not provide details on pension plan design.

Additionally, recent reports by NASRA discuss state variation in pension funding assumptions, such as investment return assumptions (NASRA, 2022a) and amortization policies (NASRA, 2022b).

Summary and Gaps

Several resources address a pension system’s current funding status and support cross-plan comparisons. More recently, different groups have provided stress-testing support. The resources we identified do not seem to inform trade-offs (e.g., how different accounting approaches might make a system more susceptible to market volatility).
Substantial and persistent underfunding of a pension system defines a pension crisis because it places the cost of prior obligations on today’s and tomorrow’s workers, employers, and taxpayers. There is not a single national pension crisis: There are many small crises, reflecting local circumstance, history, and constraints, including legacy pension costs. Although some pensions are well positioned to pay future benefits for their current members and beneficiaries, the majority cannot cover a quarter or more of the benefit earned by current workers and retirees that they are obligated to pay in the future (Figure 2.1). Although the Great Recession led to a broad decrease in funding (Figure 2.2), the period since 2012 has revealed that half of pension systems have continued to see their ability to cover their obligations decline (Figure 2.3) despite a decade of sustained economic and stock market growth preceding the COVID-19 pandemic. Those obligations are measured using arguably optimistic assumptions about future growth in investments and the employers’ workforces, as well as the expectation that the pension system sponsors will make the required contributions—none of which is certain. Pension obligations are built on a long work history, which means that they can take a long time to build up and a long time to unwind. The realization that pensions are consistently and substantially underfunded after more than a decade of reforms is telling. It is a cautionary sign to stakeholders—including policymakers, workers, retirees, employers, and taxpayers—about the piecemeal and unsystematic approaches of past reforms.

To compensate for their underfunding, pension systems nationwide have sharply increased their contribution requirements from current employers and employees (Figures 2.4 and 4.1), with most of those contributions going to pay for legacy pension costs (Figure 2.5). Most states have systems that have reduced their benefits for new employees, and 42 percent of states have reduced future benefit adjustments for inflation (Figure 4.2). The period since the Great Recession has also coincided with a shift from safer investments (e.g., fixed income) and market-traded risky assets (e.g., public equity) toward alternative investment classes, such as private equity and hedge funds in which valuation does not occur in public markets (Figure 2.7), making risk hard to measure. Of pension systems that regularly paid their required contribution per actuarial standards from 2015 to 2020, the amount of legacy pension costs continued to rise for the substantial majority—a concept known as negative amortization (Figure 2.6). Paying greater contributions, reducing benefits, and taking on greater risk yet still seeing unfunded liabilities grow raise doubts about whether the last decade of reforms since the Great Recession will break the existing pension crises or just morph them into additional challenges related to public-sector staffing and the provision of public goods and services.

In this report, we have taken a comprehensive approach to understanding the origins of state and local pension crises, their consequences, efforts for reform, and the effects of those reforms.
We identified four dimensions of pension crises: (1) pension finance and funding history, (2) the consequences of underfunding, (3) pension plan reforms, and (4) the institutional context and political economy. In Chapters 2 to 5, we reviewed and synthesized what is known about those dimensions. Chapter 6 highlighted themes we developed based on discussions with subject-matter experts from their experiences with pension crises and reforms. Chapter 7 described tools available for stakeholders and researchers interested in state and local pension reform. In this chapter, we blend the ideas we learned from research and experience into a set of key insights for informing a tailored road map for reform that can reflect a pension system’s local circumstance, history, constraints, and the objectives of its stakeholders. Because we did not conduct additional analyses to fill the gaps in the literature, the insights we developed provide a holistic view of the key issues surrounding the crises as informed by our approach instead of analyses of the trade-offs of specific policy options tailored to state and local systems. A companion document provides a prototype road map (Asch and Knapp, 2023).

Key Insights

*Insight 1. Pension Crises Are Multifaceted*

Pension systems are complex, and substantial knowledge and expertise are required to understand the financial aspects of the system, as well as the entire ecosystem of regulations, policies, constituencies, governance structure, past reform efforts, and downstream consequences of poor funding that affect the funding and sustainability of these systems. Because of the different elements of this ecosystem, our review of the literature and the insights from the subject-matter experts indicate that the pension crises manifest themselves in multiple forms. In particular, we find that systems that exhibit substantial and persistent underfunding, or the threat of underfunding, often exhibit an array of budget, workforce, and public service issues that complicate addressing the funding crisis. As we highlighted in Chapter 3, making additional pension contributions can lead to other budgetary challenges. The most-direct observed consequences tend to be reduced spending on other government services and higher taxes. How the effects are manifested varies by how the additional contributions or benefit reductions are spread between employers and employees.

For employees, greater contributions for the same benefits mean lower take-home pay without a compensatory factor. Similarly, lower benefits for the same contributions mean lower deferred pay and weaker incentives to continue working at state or local government employers. Economic models suggest that this will lead to a decline in employee retention (Knapp, Asch, and Mattock, 2021). It may also lead to challenges in hiring or hiring quality candidates. Anecdotal reports from stakeholders suggest that this is a concern among public-sector employers.
For employers, the consequences of greater contributions may differ by employer type. For example, school districts, which are typically part of cost-sharing pension systems, can be required to pay additional contributions or face significant penalties from pension funds. This leaves little leeway other than to cut services, increase taxes, or borrow. As a result, districts may increase class sizes, delay property renovations, or raise property taxes. For state government agencies, where the legislature is both responsible for oversight of the pension fund and agency budgets, there may be more leeway to shelter agencies, or, alternatively, some agencies may face outsized cuts if they are considered lower priority by the legislative majority.

Finally, for some governments, substantial pension underfunding coincides with broader fiscal or management problems that cannot be easily separated. A common thread echoed by a few of our subject-matter experts was an inability of past or current leaders to consider long-term effects. Pension obligations may represent one substantial obligation among many, and politicians are focused on their own priorities—not paying for the debts of their predecessors. Despite the inability of leaders to be forward-looking, pensions are typically treated as one of the most senior forms of debt (Monahan, 2010) and are consequently more insulated from being discharged or reduced in bankruptcy.

The key insight from these seemingly worst-case scenarios is that consequences of pension crises spread through government operations.

**Insight 2. Causes of Pension Crises Are Complex**

As pension underfunding grows worse, understanding the causes of the problem becomes important for ensuring systematic reform that pays down unfunded liabilities and contains the negative consequences of the additional required costs. Furthermore, understanding a system’s particular history can be helpful for justifying actions aimed at addressing the underfunding. As noted in Chapter 6, one of the common themes from our stakeholder discussions was that meaningful pension reforms typically required the building of substantial community partnerships.

Our research and discussions with subject-matter experts led us to identify six common contributors to pension crises: assumptions, institutional setting, governance, lack of expertise, political culture, and conflicting incentives and interests.

**Assumptions**

Assumptions can be split into economic, demographic, and amortization categories. Economic assumptions consist of the discount rate on future benefit payments, inflation rates, compensation growth, and payroll growth (ASB, 2020b). Demographic and other assumptions consist of retirement rates, employee turnover, mortality rates, and household composition (ASB, 2020a). Additionally, as unfunded liabilities are rolled into the calculation of required contributions, assumptions surrounding the amortization of unfunded liabilities can determine whether required contributions are sufficient to cover any new liabilities (if not, this is known as
negative amortization). There are three main assumptions pertaining to amortization: (1) amortization period, (2) whether the amortization is closed (i.e., set against a fixed date) or open (i.e., set against a fixed period), and (3) how costs are allocated over time (i.e., as a level dollar amount or as a level percentage of payroll). All of these assumptions carry the risk of being overly optimistic or being leveraged to defer pension payments, which could lead to negative amortization and, consequently, a further decline in pension system funding. Recent efforts have aimed to lower discount rates based on lower long-term investment returns. Other optimistic assumptions pertaining to compensation and payroll growth can produce similar effects but have received less research.

Institutional Setting

Public pensions are not subject to the reporting and transparency rules under ERISA that governs private-sector plans (Schieber, 2011). State law, not federal law, is primarily responsible for public employee retirement benefits (Monahan, 2010). This has led to a myriad of protections (see Figure 4.1) ranging from treatment of past pension benefit accrual as a gift rather than an obligation with limited protections against reductions to contractual or constitutional guarantees that can include past, present, and, in some cases, future benefit accruals (Munnell and Quinby, 2012; Pew Charitable Trusts, 2019). Pension benefits for new employees are rarely protected, leading benefit reforms to disproportionately target this group (see Figure 4.2).

Governance

A pension system’s governance structure and stakeholders can affect the system’s funding and the success of policies to improve funding status. Most systems have four main actors (NASRA, 2020):

- **plan sponsor** (i.e., the state legislature or city council): determines how benefits are funded and administered
- **chief executive** (i.e., governor or mayor): has budget proposal authority (including the authority to propose pension funding) and appoints board members
- **pension board**: oversees pension fund assets, including investments; is responsible for the administration of the fund, which is usually delegated to a professional staff headed by an executive director; and sets the assumptions used by the system’s actuary
- **pension system actuary**: provide estimates of pension liabilities and costs for funding liabilities incurred based on the design of the system’s pension plans.

As highlighted in Miller and Funston (2014) and raised by some of the subject-matter experts, good governance involves several key attributes:

- clearly defined fiduciary duties
- requisite expertise
- clear lines of authority
- accountability and transparency
- minimized problems with agency due to misaligned incentives and conflicts of interest
• operational effectiveness and efficiency
• strong and balanced controls.

Norcross and Smith (2021) highlighted that each of the institutional players in the governance structure may have differing objectives, given specific incentives and constraints; for example, the pension board may be composed of appointees by political leaders with their own goals or current retirees who favor ensuring existing benefit levels rather than funding future benefits. Additionally, other stakeholders, such as employees and taxpayers, may also have incentives that differ from the fiduciary responsibilities of the plan. Competing stakeholder goals in such diffuse systems, particularly if stakeholders lack expertise in how pensions are administered and financed, may slow or prevent reforms to the long-term detriment of the plans and its members.

Lack of Expertise

A recurring discussion point in our conversations with subject-matter experts was the necessity of educating the community and, notably, the pension board, chief executive, and plan sponsor about the operational, technical, and investment aspects of pension system management. In a few cases, it was noted that members of pension boards, when pressed, did not understand the consequences of the actuarial assumptions they had previously approved. Although rigorously testing technical knowledge is difficult for these groups, prior studies have presented evidence that choices of pension boards might not necessarily conform with what is best for the fund’s finances. For example, boards with a larger fraction of state officials underperform within asset classes and are more likely to invest in assets beneficial to the local economy (Andonov, Hochberg, and Rauh, 2018). Also, boards with a higher share of union trustees were more likely to adopt higher discount-rate assumptions for the estimated actuarial cost of pension liabilities (Anzia and Moe, 2019). These decisions could reflect either lack of expertise or conflicts of interest. Although prior research has focused on the relationship of pension board membership and funding outcomes, some of our subject-matter experts indicated that lack of expertise was a common issue with the chief executive, the legislature, and key interest groups, such as unions and plan members.

Political Culture

Existing research indicates that political culture is related to funding outcomes. By political culture, we mean the degree of cooperation and openness among stakeholders as they find solutions to the pension crisis. Bagchi (2021) found that politically competitive jurisdictions have lower pension funded ratios. Stalebrink and Donatella (2021) found that the likelihood of opportunistic accounting choices increases when the sponsoring government is divided in terms of partisan control.

We noted a similar contrast in our discussions with subject-matter experts, suggesting that this may be a pivotal mechanism influencing the likelihood and type of reforms. Some subject-
manner experts presented stakeholder interactions as broadly collegial, regardless of political differences, with a broad understanding that reforms to support the pension system’s funding were necessary (e.g., “we are all in this together”). In these cases, subject-matter experts implied that the pension board and administrative leadership played a role in making reforms. Alternatively, some subject-matter experts noted that local policy cultures were more combative. In these cases, our understanding was that the chief executive or legislature often took actions independent of consulting with the pension board or the system’s administrative leadership. Instances of more-combative policy cultures existed regardless of the majority political party that sponsored the systems we discussed with our subject-matter experts.

Conflicting Incentives and Interests

Public pension systems are overseen by state and local governments led by political leaders who serve as plan sponsors and the chief executive. Pension boards, by policy, are often composed of political leaders, plan members, and union leaders. These groups can have incentives (e.g., reelection) that conflict with making policy changes necessary to ensure that there are sufficient contributions to the pension fund for it to be fully funded.

Conflicting incentives may be stronger in pension crises in which reforms usually necessitate hard trade-offs, leading to actions that delay increasing contributions. For example, the adoption of actuarial assumptions that reduce the appearance of underfunding (e.g., higher discount rates) is related to a higher proportion of political appointees on the pension board and systems in which the workforce is more unionized (Stalebrink and Donatella, 2021; Wagner and Elder, 2021).

Conflicting incentives and interests may also lead to poorer or riskier investment choices. For example, state and local pension systems overweight in-state investments, and these investments result in performance that is 2 to 4 percentage points lower than systems’ own out-of-state investments and similar investments in their state by out-of-state investors (Hochberg and Rauh, 2013; Bradly, Pantzalis, and Yuan, 2016).

Ideally, conflicting incentives would be addressed by pressure from groups responsible for their oversight (e.g., for politicians, voters; for pension systems, the participating employers; for unions, employees who are their members). However, research suggests that the public tends to inaccurately assess the costs and benefits of pensions (Norcross and Smith, 2021). Pensions and their funding are highly complex topics. With pension costs spread across all taxpayers and employers (in cost-sharing systems), solving a pension system’s funding crisis may be a less salient concern relative to other competing issues.

Insight 3. Goals of Pension Reform Include Both Short- and Long-Term Objectives

When considering pension reform aimed at addressing pension funding crises, the goals of the reform typically involve ensuring one or more of the following:
• sufficient funds for new and legacy benefit obligations
• quality public services and a quality workforce
• employee retirement security
• effective governance structure
• accurate and reasonable actuarial assumptions.

Some of these reforms will manifest immediately (e.g., in the case of POBs, the contribution to the pension system funding), and others may materialize over a long period (e.g., workforce experience mix).

According to our review of the literature and the inputs of the subject-matter experts, the majority of reforms in the past decade have prioritized funding obligations over public consideration of the other goals. Part of the difference may be that the other goals can be judged only over a longer period and do not have as many immediate manifestations of the reform. Unfortunately, all of these goals have limited research on how to effectively achieve them.

Funding New and Legacy Benefit Obligations

Improvements in pension funding typically come at the cost of other government services, higher taxes, increased borrowing, or reduced pension benefits. As highlighted in Chapter 3, most pension reforms have included contribution increases from employees and employers and benefit reductions for new employees, while fewer systems have reduced benefits for current employees or changed pension plan type (e.g., from a DB to a DC system). Some of the subject-matter experts appeared to assume that full (i.e., 100 percent) funding is the goal, while most accepted that less-than-full funding could be acceptable. Less-than-full funding means that current workers and employers are paying prior obligations. If their benefits are less generous, this leads to intergenerational inequity. As we note in the following section, on research gaps, what is missing is a quantitative analysis of what reforms are effective at improving the system’s funding in the short and long terms.

A corollary to ensuring funding for benefit obligations may be a goal to limit investment risk and volatility. As noted in Chapter 2 and Figure 2.7, there has been a shift in the past two decades toward riskier assets.

Amount, Type, and Quality of Public Services and the Workforce for Providing Those Services

Public services are affected when an underfunded pension plan leads to changes in a public employer’s expenses or changes to workers’ pay or pensions that alter incentives to continue to work in the public sector. A goal of pension reform may be to limit or strategically target these consequences.

Pension reforms that increase employer pension fund contributions require trade-offs that employers must make to the services they provide or require them to increase revenues, such as increasing taxes or raising user fees. These changes may also alter public employers’ incentives for how to allocate their limited resources. For example, an increase in employer contributions as
a percentage of employee pay may discourage employers from hiring permanent employees and lead to increased use of contractors or nonlabor alternatives. Although it is generally understood that public service provision is affected by policy responses to pension underfunding, there is limited research available on outcomes of past reforms.

Reforms that increase employee contributions will lead to greater turnover and have the potential to decrease the experience mix of the workforce (Knapp, Asch, and Mattock, 2021). Changes to employee benefit design or type can increase or decrease employee retention depending on the workforce and the type of change. For example, shifts from DB to hybrid systems typically reduce early-career retention but increase late-career retention (Asch, Knapp, and Mattock, 2022). Whether this change increases or decreases retention varies by state and workforce type (Knapp, Asch, and Mattock, 2021; Asch, Knapp, and Mattock, 2022). Greater turnover or a workforce experience mix that has fewer midcareer workers may alter the quality of public services provided or require that additional resources be devoted to training or other measures needed to offset the workforce consequences of pension reform. Here again research is limited.

Employee Retirement Security

One of the primary goals of a retirement savings plan is to provide income in retirement for its owner (U.S. Department of Labor, undated). Our understanding of how pension reforms affect income security in retirement is limited. NASRA and the Center for State and Local Government Excellence (2015) found in the systems they analyzed that the average annual pension benefit for the 30-year public employee fell by 7.5 percent, with a range of –20.0 percent in Alabama to no change in Colorado. The study also found that among the states analyzed, the average new employee would have to work about two years and eight months longer to reach the benefit level available to current employees. However, there are no studies that provide a long-term assessment of pension reforms on retirement security because it will be many years before new entrants affected by these reforms reach retirement eligibility.

Effective Governance Structure

We noted that governance and conflicting incentives are likely to play a role in causing pension crises. A goal of reform may be to prevent future poor decisions that lead to underfunding. Preventing future poor decisions may require reforming the governance structure to ensure that its main actors have fewer conflicting incentives that could affect investment or funding decisions. Research has highlighted that systems that have a higher proportion of political appointees on the pension board and systems whose workforce is more unionized are more likely to adopt optimistic actuarial assumptions and overweight in-state investments. Additional research is required to understand whether governance reforms are effective at preventing pension crises in the long run.
Accurate and Reasonable Actuarial Assumptions

As highlighted in Chapter 2, the definition of *appropriate actuarial assumptions* has been evolving over the past three decades, and our second insight highlighted those incorrect actuarial assumptions that remain a recurring factor in pension underfunding. A goal of reform may be to ensure accurate and reasonable actuarial assumptions. More-accurate actuarial assumptions would better inform pension sponsors and boards of their long-term benefit obligations and the likely short-term changes to the required contributions for their pension systems.

Although the reforms to GASB standards in 2012 reduced flexibility in actuarial assumptions and methods, there remains significant flexibility in how assessments of unfunded liabilities can discount future payments of accrued pension obligations and other demographic and economic assumptions. Further, there is also significant flexibility in the assumptions used to spread that cost (i.e., amortize) over time. Potential reform goals may include (1) placing further constraints on how pension boards may choose their assumptions or amortize unfunded pension obligations or (2) adding requirements for more-expansive experience tests.

**Insight 4. Reforms Can Take Multiple Paths**

Chapters 2 and 3 illustrated that states vary substantially in how they address pension crises. Nearly all systems increased their pension system contributions. In Figure 4.2, we identified that 56 percent of states had at least one statewide system that increased current employee contribution rates, 70 percent increased contribution rates for new employees, and 44 percent increased contribution rates for both.

In terms of benefit reforms, between 2009 and 2021, 78 percent of states had a statewide system that reduced pension benefits for new hires, and 52 percent of states reduced benefits for current members. Twenty-one percent reduced benefits for both current members and new hires. More rarely, states introduced an alternative pension system for new hires, such as hybrid DB-DC plans or DC-only plans. Additional research is required to understand whether reforming benefit design is effective at reducing pension underfunding in the long run.

Beyond contribution and benefit reform, achieving the goals of pension reform may involve changes to the governance structure to improve accountability, operational effectiveness, and knowledge and expertise, as well as involve addressing conflicts of interests and other barriers to achieving the fiduciary responsibilities of the board, executives, legislators, and pension sponsor. Reform may also involve improvements in actuarial practices to establish more-realistic assumptions. Past research provides insight into the role of governance and actuarial practices in defining the pension crisis. For example, the composition of the pension board can affect pension performance (Aubry and Crawford, 2019), with larger boards being correlated with riskier

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21 Benefit reforms include increasing age and service requirements for benefit eligibility, decreasing the benefit multiplier, basing the final average salary on more work years, and decreasing annual COLA for benefits. Benefit reductions for current members are to COLAs. See Figure 4.2 and associated text in Chapter 4 for additional detail.
investment portfolios (Dobra and Lubich, 2013). However, research is lacking on how reforms on these dimensions affect the different goals of reform, including sustainable funding, retirement security, and ensuring a quality public-sector workforce.

**Insight 5. Implementation Is an Ongoing Process and Requires a Knowledgeable Navigator**

A common theme from the subject-matter experts was that reform came after a particular person or group of persons in the legislative or executive branches of government adopted the issue, became informed, and went out to communicate the challenges brought on by underfunding to other constituencies and stakeholders. Although not verifiable in the research literature, the independent and repeated nature of this concept in our stakeholder discussions suggests that it is a critical component for effective reform.

**Gaps**

Our research has highlighted that there are a few important knowledge gaps that are critical to informing would-be reformers. Additionally, we identify questions for future research that would support informed pension reform but are less critical for determining reform pathways for a pension system.

**Gap 1. Effectiveness of Pension Reforms for Reducing Unfunded Obligations**

Despite the substantial reform efforts since 2009 (see Chapter 4), the funded ratio has remained largely flat since 2015 (Figure 2.1). It is possible that the relatively unchanged nature of pension liabilities reflects a shift toward more-conservative assumptions that would otherwise conceal broad improvements. Alternatively, the shift could be toward other approaches of delaying payment for unfunded liabilities or could be due to local challenges that affect unfunded pension liabilities or the sponsor’s ability to ensure sufficient funds are contributed (e.g., changes in the plan sponsor’s budget, changes in the sponsor’s labor needs).

**Gap 2. Impact of Pension Underfunding on Plan Sponsors**

Although there is some evidence that municipalities with underfunded pension systems have higher borrowing cost, evidence is more limited on the relationship with recruiting for positions covered by the pension system or people’s willingness to stay in or move to these localities.

**Gap 3. Impact of Pension Reforms on Retirement Security**

Although not discussed in this report, a motivation for the creation of pensions in the late 1800s and early 1900s was to encourage older employees to exit work by eliminating the necessity to work to ensure income (Sass, 2009). As pensions are reformed toward systems with lower or no lifetime income benefits in retirement, workers may face greater risk of financial
insecurity in retirement. These risks and their potential impact on employers or plan sponsors are not well understood.

Questions for Future Research

Our research and discussions with subject-matter experts on the origins of state and local pension crises left several open research questions:

- Are actuarial reporting standard reforms effective at altering the contribution behavior of pension systems?
- Are particular actuarial assumptions more symptomatic of troubled systems?
- Are there certain political environments or circumstances that make action on pension underfunding more likely?
- Are nonfinancial factors, such as system governance or engaged policymakers, pivotal to pension reform?

Concluding Thoughts and Future Direction

In this report, we have taken a comprehensive approach to understanding the origins of state and local pension crises. We have identified the dimensions of pension crises, synthesized what is known about those dimensions, and supplemented that knowledge with input from subject-matter experts. We then blended the ideas we learned from research and experience into five key insights:

1. Pension crises are multifaceted.
2. Causes of pension crises are complex.
3. Goals of pension reform include both short- and long-term objectives.
4. Reforms can take multiple paths.
5. Implementation is an ongoing process and requires a knowledgeable navigator.

A recurring feature across our insights and throughout the research has been that there is no single national pension crisis: There are many small crises, reflecting local circumstance, history, and constraints. Leveraging the insights in this report requires tailoring the development of reform pathways to reflect a pension system’s local circumstance, history, constraints, and the objectives of its stakeholders. In a companion brief, we develop a prototype road map for reform; we hope to eventually extend that road map to accommodate a broad range of pension crises and to be capable of providing a tailored menu of plausible reform options (Asch and Knapp, 2023).
Appendix A. Illustrative Application of Actuarial Concepts

This illustrative application provides a simplified representation of a pension system and gives concrete examples of key actuarial concepts defined in the main text, summarized in the tables below. This example abstracts from most types of uncertainty (e.g., changes in longevity, employment duration, earnings growth) and attributes the entire unfunded liability to a mismatch between investment expectations and realizations. Actual unfunded liabilities are likely to arise from the mismatch between expectations and realizations from several sources, not just investment returns.

Suppose a pension system consists of one worker per period. That worker earns $600,000 every 20 years (one period), works 40 years (two periods), and will be paid 50 percent of their earnings for the rest of their life (20 years or one period). A new worker replaces a retiring worker with the same compensation plan every other period (e.g., periods 3, 5, and so on).

Suppose the annual rate of return is 3.5 percent, so that every 20 years any given dollar amount doubles in value—an expected return of 100 percent. Then, the following would be true:

- Future benefits would be 50 percent of $600,000 ($300,000) at retirement.
- Present value of future benefits at entry (APV) would be $150,000, assuming a 3.5 percent discount rate or half the future benefits at retirement age, because values double every period.

The normal cost is a constant amount paid in each period that will allow the present value of future benefits at entry to equal the cost of future benefits at retirement. Mathematically, the normal cost ($NC$) is defined as

$$NC = \frac{APV}{\sum_{t=ea}^{ra} (1+r)^{ea-t}}$$

where $ea$ is the entry period, $ra$ is the retirement period, and $r$ is the discount rate. Since our expected rate of return is 100 percent, $NC = \frac{$150,000}{(2^0 + 2^{-1})} = \frac{$150,000}{1.5} = $100,000.$

With no UAL, the ARC is the normal cost, shown in the first rows of the tables below, representing period 1. We assume that the employer contributes the normal cost every period to cover the cost of the employee’s retirement benefit that will be paid out when they are eligible to retire.

The AAL is the sum of normal cost payments adjusted for the expected rate of return. After the first period, the AAL($t = 2$) = $100,000, as show in the first row of Table A.1, and after the second period, the accrued liability would be the expected return applied to the previous period’s return—i.e., $(1 + r) \times AAL(t = 2) = 2 \times $100,000 = $200,000$—plus the new contributions of $100,000, for a combined AAL($t = 3$) = $300,000. That is enough to pay for the worker’s retirement in the third period.
On the asset side, in the first period, the employer contributes $100,000, resulting in $100,000 in assets at the start of the second period, as shown in the second row of each appendix table. If the realized investment return is the same as the expected investment return of 100 percent, then the system has a total of $200,000 in assets. After adding the second-period contributions of $100,000, total assets at the start of the third period are $300,000. Table A.1 illustrates the planned funding over the first five periods.

Table A.1. Funding History of Example Plan If Realized Return Matches Expected Return

<table>
<thead>
<tr>
<th>Period (t)</th>
<th>Assets at Period Start</th>
<th>AAL at Period Start</th>
<th>UAL at Period Start</th>
<th>ARC</th>
<th>Realized Investment Return</th>
<th>Payments</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>100,000</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>2</td>
<td>100,000</td>
<td>100,000</td>
<td>0</td>
<td>100,000</td>
<td>100%</td>
<td>0</td>
</tr>
<tr>
<td>3</td>
<td>300,000</td>
<td>300,000</td>
<td>0</td>
<td>100,000</td>
<td>100%</td>
<td>300,000</td>
</tr>
<tr>
<td>4</td>
<td>100,000</td>
<td>100,000</td>
<td>0</td>
<td>100,000</td>
<td>100%</td>
<td>0</td>
</tr>
<tr>
<td>5</td>
<td>300,000</td>
<td>300,000</td>
<td>0</td>
<td>100,000</td>
<td>100%</td>
<td>300,000</td>
</tr>
</tbody>
</table>

Although the employer pays the ARC and the realized investment returns always match expected returns, assets and liabilities grow in balance, and there is no UAL (i.e., the difference between AAL and assets).

A UAL occurs when realizations differ from the expectations. Suppose there was no return, counter to the expectation of a 100 percent return; then, the UAL at the end of the second period (or the beginning of the third period in Table A.2) would be $100,000—the difference between the accrued liability ($300,000) and the assets ($200,000). Table A.2 summarizes what the dynamics would be like if the pension system continued to assume a return of 100 percent for each period, it never realized a return in the first three periods but achieved its expected return from the fourth period, and the UAL was reamortized every two periods.

Table A.2. Funding History of Example Plan If Realized Return Misses Expected Return Before Fourth Period

<table>
<thead>
<tr>
<th>Period (t)</th>
<th>Assets at Period Start</th>
<th>AAL</th>
<th>UAL</th>
<th>ARC</th>
<th>Realized Investment Return</th>
<th>Payments</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>100,000</td>
<td>0%</td>
<td>0</td>
</tr>
<tr>
<td>2</td>
<td>100,000</td>
<td>100,000</td>
<td>0</td>
<td>100,000</td>
<td>0%</td>
<td>0</td>
</tr>
<tr>
<td>3</td>
<td>200,000</td>
<td>300,000</td>
<td>100,000</td>
<td>166,666a</td>
<td>0%</td>
<td>300,000</td>
</tr>
<tr>
<td>4</td>
<td>66,666</td>
<td>100,000</td>
<td>33,333</td>
<td>166,666</td>
<td>100%</td>
<td>0</td>
</tr>
<tr>
<td>5</td>
<td>300,000</td>
<td>300,000</td>
<td>0</td>
<td>100,000a</td>
<td>100%</td>
<td>300,000</td>
</tr>
</tbody>
</table>

*a New two-year contribution schedules are based on a two-year amortization of the UAL and the normal cost, assuming that assets will double every period.
Suppose the pension system chose to amortize the UAL over two periods to avoid having to pay it all at once. The additional amount per period to cover the UAL at the third period would be $100,000/1.5 = $66,666 (rounding for simplicity). Consequently, in the third and fourth periods, the ARC would be the normal cost ($100,000) plus that additional amount to cover the UAL ($66,666), a total of $166,666. In the third period, the worker retires and is due their pension benefit of $300,000. A new worker is hired with the same compensation plan as the retiring worker. Assuming that the employer pays the ARC, the net assets at the start of the fourth period are $200,000 (the assets at the start of the third period) + $166,000 – $300,000 = $66,666, as shown in the Tables A.2–A.4 for period 4. The new worker would have an accrued liability of $100,000, so the unfunded liability would be lower: UAL($t = 4$) = $100,000 – $66,666 = $33,333.

If investments perform as expected, then the fourth period will end with \((1 + r) \times \text{Assets}(t = 4) = 2 \times \$66,666 = \$133,333\) in assets and with contributions of $166,666, for a total of $300,000, shown in Table A.1–A.3 for $t = 5$. The total amount is sufficient to cover the costs for the new worker (total assets will meet the actuarial liability) by the start of the fifth period, when the second worker will retire.

If investments did not have any return again, then the fourth period would end with $66,666 in assets. The unfunded liability would again increase in the fifth period to $66,666: UAL($t = 5$) = $300,000 – (66,666 + 166,666) = 66,666$. What happens beginning in the fourth period depends on whether the amortization period is closed (i.e., fixed date in the future) or open (i.e., the additional payment to cover the UAL is regularly recalculated over a fixed period). Table A.3 summarizes what the dynamics would be like if the pension system continued to assume a return of 100 percent for each period, never realized a return, and had a closed amortization window of two periods.

Table A.3. Funding History of Example Plan If Realized Return Never Matches Expected Return and Amortization Window Is Closed

<table>
<thead>
<tr>
<th>Period ($t$)</th>
<th>Assets at Period Start</th>
<th>AAL</th>
<th>UAL</th>
<th>ARC</th>
<th>Realized Investment Return</th>
<th>Payments</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>100,000</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>100,000</td>
<td>100,000</td>
<td>0</td>
<td>100,000</td>
<td>0%</td>
<td>300,000</td>
</tr>
<tr>
<td>3</td>
<td>200,000</td>
<td>300,000</td>
<td>100,000</td>
<td>166,666a</td>
<td>0%</td>
<td>300,000</td>
</tr>
<tr>
<td>4</td>
<td>66,666</td>
<td>100,000</td>
<td>33,333</td>
<td>233,333</td>
<td>0%</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>300,000</td>
<td>300,000</td>
<td>0</td>
<td>100,000a</td>
<td>0%</td>
<td>300,000</td>
</tr>
<tr>
<td>6</td>
<td>100,000</td>
<td>100,000</td>
<td>0</td>
<td>100,000</td>
<td>0%</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>200,000</td>
<td>300,000</td>
<td>100,000</td>
<td>166,666a</td>
<td>0%</td>
<td>300,000</td>
</tr>
</tbody>
</table>

*a New two-year contribution schedules are based on a two-year amortization of the UAL and the normal cost, assuming that assets will double every period.
In a closed amortization period, the contributions would have to be increased to pay the UAL within the two-period window, meaning that the UAL of $66,666 would also have to be paid, resulting in a combined payment of $166,666 + $66,666 = $233,333 in the fourth period. As highlighted in Table A.3, this would effectively eliminate the UAL in the fifth period. In this case, the ARC would return to being the normal cost. The experience of periods 1–4 would be repeated over the next few periods (e.g., periods 2 and 3 are the same as periods 6 and 7).

In this case, the additional payment would be $66,666/1.5 = $44,444. This is a smaller supplemental payment, albeit still substantively large. Table A.4 summarizes what the dynamics would be like if the pension system continued to assume a return of 100 percent for each period, it never realized a return, and the UAL was reamortized every two years.

Table A.4. Funding History of Example Plan If Realized Return Never Matches Expected Return and Amortization Window Is Open

<table>
<thead>
<tr>
<th>Period (f)</th>
<th>Assets at Period Start</th>
<th>AAL</th>
<th>UAL</th>
<th>ARC</th>
<th>Realized Investment Return</th>
<th>Payments</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>100,000</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>100,000</td>
<td>100,000</td>
<td>0</td>
<td>100,000</td>
<td>0%</td>
<td>300,000</td>
</tr>
<tr>
<td>3</td>
<td>200,000</td>
<td>300,000</td>
<td>100,000</td>
<td>166,666*</td>
<td>0%</td>
<td>300,000</td>
</tr>
<tr>
<td>4</td>
<td>66,666</td>
<td>100,000</td>
<td>33,333</td>
<td>166,666</td>
<td>0%</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>233,333</td>
<td>300,000</td>
<td>66,666</td>
<td>144,444*</td>
<td>0%</td>
<td>300,000</td>
</tr>
<tr>
<td>6</td>
<td>77,777</td>
<td>100,000</td>
<td>22,222</td>
<td>144,444</td>
<td>0%</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>222,222</td>
<td>300,000</td>
<td>77,777</td>
<td>151,851*</td>
<td>0%</td>
<td>300,000</td>
</tr>
</tbody>
</table>

*a New two-year contribution schedules are based on a two-year amortization of the UAL and the normal cost, assuming that assets will double every period.

This example has assumed that the additional payments are allocated over time as a fixed amount (i.e., level-dollar amount). If the payroll were expected to increase, either by increasing worker salaries or hiring more workers, the additional payment following the amortization of the UAL would be lower under a level-percentage-of-payroll approach.
Appendix B. Pension Resources and Tools

In this appendix, we expand on the resources highlighted in Chapter 7 and Table 7.1.

Resources on Reforms

For Decisionmakers

Making Informed Changes to Public Sector Pension Plans (National League of Cities, 2017)

According to the introduction to this resource from the National League of Cities,

Since the Great Recession, most cities have instituted some type of reform to their pension plans. The purpose of this municipal action guide is to examine the types of reforms that cities have made between 2009 and 2016 and the impact of these reforms. This guide concludes with a city action worksheet and ways local leaders can become more active and informed decision makers, regardless of whether their city or state runs their employees’ pension plan. (National League of Cities, 2017, p. 3)

In the context of the Great Recession’s aftermath, this resource discusses the most-common types of reforms to local pension plans among the 277 responding cities to the annual National League of Cities City Fiscal Conditions Survey in 2016, including changing plan design to direct contribution or hybrid forms, increasing employee contribution rates, reducing benefits, reducing COLAs, increasing vesting periods, and increasing eligibility requirements. The resource also summarizes case examples of reforms in Baltimore, Maryland, and Providence, Rhode Island. Finally, for local officials to better understand their current pension systems’ status, this resource contains a worksheet covering key factors, including COLAs, benefit calculations, investment returns, employee contributions, plan design or benefit reduction, and vesting. The worksheet provides only a starting point for local officials. Further financial or actuarial information, and further action overall, would need to result from the information and conclusions derived from the worksheet.

Pension and Retirement Legislation Information by State Database (National Conference of State Legislatures, 2021)

This is a central source, powered by LexisNexis State Net, to search proposed and enacted state legislation relating to pension and retirement plans. A user may filter a search by legislative topic relating to retirement, state or territory, bill status, and year. One can also search by keyword, bill number, or bill author. The results will show bill number (hyperlinked to the bill text), year, bill name, bill status, date of last action, author name, topics, summary, and bill history.
This tool searches through primary-source documents—legislation—and does not contain summaries of proposed or enacted changes, except any summaries prepared by the legislative staff of different state legislatures to accompany the bill text. Therefore, this tool might be most useful to a policymaker who is looking for specific ideas that have been considered or enacted in other states. Furthermore, because this tool allows sorting by bill status, including bills that have been proposed but not enacted, one can research which ideas in a given state gained traction toward enactment and which ideas did not.

For Researchers and Policy Audiences

Spotlight on Significant Reforms to State Retirement Systems (Brainard and Brown, 2018b)

According to the authors, this NASRA report illustrates that retirement plans for public employees have been altered in many ways since 2009. The state-by-state listing in the appendix presents detailed descriptions of changes affecting various combinations of contributions, benefits, and eligibility for retirement plans that were affected by pension reform legislation. The descriptions are intended to portray the pension reforms as passed by the legislature in each state. (Brainard and Brown, 2018b, p. 6)

In this report, NASRA first discusses the overall state of common reforms to public pension and retirement systems since the Great Recession and provides an overview of general trends in these reforms, from changes, to plan aspects (reducing benefits, increasing contributions, etc.), to legal challenges, to self-adjusting features. Next, NASRA summarizes major reforms to all state systems since 2009, sorted by system (with page breaks). As a PDF file, the data are not as easy to sort or examine as they might be if they were in a spreadsheet. Furthermore, the data in this file are summarized by the NASRA authors; for primary-source information, one should consult the relevant legislation and statutes (see, for example, National Conference of State Legislatures, 2021).

“Selected Approved Changes to Local Public Pensions, 2019” (NASRA, 2019a)

In this resource, NASRA provides a summary of major changes and reforms to selected local public-employee retirement systems between 2011 and 2019. Information is sorted in a table by system. Similar to the Brainard and Brown (2018b) report, this is a PDF file, so the data are not as easy to sort or examine as they might be if they were in a spreadsheet. Furthermore, the data in this file are summarized by NASRA authors; for primary-source information, one should consult the relevant local policies.

“Selected Approved Changes to State Public Pensions, 2019–Present” (NASRA, 2021)

In this resource, NASRA updates Brainard and Brown (2018b) and provides a summary of major changes and reforms to selected state-level public-employee retirement systems between 2019 and 2021. As with NASRA’s other resources, information is sorted in a table by system;
because of the PDF format, the data are not as easy to sort or examine as they might be if they were in a spreadsheet. Furthermore, as with Brainard and Brown (2018b), the data in this file are summarized by NASRA authors; for primary-source information, one should consult the relevant legislation and statutes (see, for example, National Conference of State Legislatures, 2021).

Resources on Finances

For Decisionmakers

Foundation for Public Pensions Risk Reporting (Pew Charitable Trusts, 2021a, 2021b)

According to the introduction of Pew Charitable Trusts (2021b, p. 2),

Given the risks to government revenues and pension fund investments, policymakers should consider the potential impact of the pandemic on pension balance sheets. One way to determine those impacts is through an analysis called stress testing, which 12 states have already adopted. Stress testing involves the simulation of a range of scenarios for the economy and investment returns to give policymakers a better sense of potential liabilities and costs. That information, then, can help guide retirement system investments and state budgets. Pew offers a framework for pension system stress testing called “The Foundation for Public Pensions Risk Reporting” that shows how states can use stress testing to navigate economic and investment risks created by the pandemic.

This brief provides an overview of how economic conditions during the COVID-19 pandemic have affected public pension systems and contextualizes the update to Pew’s stress test framework. Furthermore, these economic data can help inform state and local decisionmakers’ assumptions for their plans. The actual stress test framework is referenced and linked as a separate document (Pew Charitable Trusts, 2021a). This framework is meant to be a starting point, so each system will need to adjust and adapt according to its unique contexts.

“Public Pension Stress Testing in the States” (Follett, Harrison, and Petrini, 2021)

This NCSL resource is introduced as follows:

Fundamentally, stress testing is about risk assessment. It aims to supply information about key risk factors in order to improve the planning and decisionmaking of pension plan fiduciaries, policymakers and budget officials. . . . The results of these stress tests help determine how much capital these institutions must maintain, in hopes of achieving greater financial stability during future downturns. Though recent years have seen several changes to the Fed’s stress testing regime for big banks, the same rationale informs public pension stress testing in the states—stress testing can help policymakers understand risk and guide institutions through economic shocks.” (Follett, Harrison, and Petrini, 2021)

The brief contains information on how different states have incorporated stress testing of their pension plans into state law. In addition, the brief contains summaries of 12 states’
legislation and links to the specific statutes mandating stress testing in these states. For additional details for how the states actually conduct their stress testing, one would need to read further into those states’ specific statutes and policies or contact the pertinent state officials for more information (see, for example, National Conference of State Legislatures, 2021).

“Modeling How Public Pension Investments May Perform over the Next 30 Years”
   (Campbell and Bui, 2022)

The Reason Foundation introduces its model as follows: “To get a better sense of the investment outlook for state pension plans, we created a tool that runs a simulation of the investment performance of a hypothetical public pension portfolio over 30 years. It displays the growth of $1 in assets; a distribution of the compound annual growth rate for those 30 years; and the simulation estimated probability of hitting several return assumptions” (Campbell and Bui, 2022).

The Reason Foundation includes additional background details describing how the model works:

   The tool utilizes assumptions on asset returns, volatilities, and correlations pulled from BlackRock, BNY Mellon, Horizon Actuarial Services, JPMorgan, and Research Affiliates to simulate portfolio returns. Specifically, the model uses a Monte Carlo simulation with 10,000 simulations of the portfolio over 30 years. Users can select which capital market assumptions they want to run the model with. Additionally, users can select between the national average pension asset allocation, a 60/40 stock-bond portfolio, or a custom portfolio. (Campbell and Bui, 2022)

For the custom option, a user can determine percentages of different investment options: four types of equities (large cap, medium or small cap, foreign developed, and foreign emerging), five types of fixed income (core, high yield, foreign developed, foreign emerging, and cash), and five alternatives (real estate, hedge funds, commodities, private equity, and other).

In addition, the Reason Foundation notes several caveats to this tool:

   It is important to note that while this tool uses the latest assumptions from reputable financial advisors, they are still mere speculations on market performance. Additionally, while this approach for portfolio simulation is commonly used in the financial industry, it does not account for the time-variant nature of asset correlations. In times of financial stress, for example, assets can be more tightly correlated than they are in normal market conditions—aggravating portfolio losses. This was true during the Great Recession from December 2007 to June 2009 and could be true in a future crisis as well. (Campbell and Bui, 2022)
For Researchers and Policy Audiences

“Annual Survey of Public Pensions (ASPP)” (U.S. Census Bureau, 2022b)

According to the U.S. Census Bureau (2022b), “The Annual Survey of Public Pensions: State- and Locally-Administered Defined Benefit Data provides revenues, expenditures, financial assets, and membership information for the defined benefit public pension systems.” This survey has been conducted since 1957. Since 2015, the survey has included data from all 299 state government pension systems and data from 1,774 local government pension systems (sampled from 6,000 total local systems). The Census Bureau includes pension systems that meet the following criteria: “(1) they are sponsored by a recognized unit of government as defined by the Census Bureau; and (2) their membership must be comprised of public employees compensated with public funds.”

In this resource, under Data, the user can select Annual Survey of Public Pensions Datasets and download an ASCII (American Standard Code for Information Interchange) text file with raw data for each pension plan in the survey, along with an item code list and documentation for interpreting each line of text for each system. In addition, under Data, users can select Annual Survey of Public Pensions Tables and download an Excel file with summary data by state, along with survey methodology.

This resource does not include information about changes to plan type or design. Furthermore, this resource requires use of software to read ASCII text into other usable forms for data analysis. The Excel file with summary data by state sorts each observation (state, local, etc.) by column and each variable (question asked) by row; although this layout might be helpful for some purposes, it is not tidy for other data-analysis purposes.

“Quarterly Survey of Public Pensions (QSPP)” (U.S. Census Bureau, 2022a)

According to the U.S. Census Bureau (2022a),

The Quarterly Survey of Public Pensions is a quarterly survey that provides national summary data on the revenues, expenditures, and composition of assets of the largest defined benefit public employee pension systems for state and local governments. This survey currently consists of a panel of 100 pension systems, which comprise 88.4 percent of financial activity [total cash and security holdings] among such entities, based on the 2012 Census of Governments.

This survey has been conducted since 1968.

In this resource, under Tables, users can select Quarterly Survey of Public Pensions Current Release and download an ASCII text file with data from each pension plan in the survey, documentation for interpreting each line, and summary data for all these plans.

As with the Annual Survey of Public Pensions, this resource does not include information about changes to plan type or design. In addition, this resource requires use of software to read ASCII text into other usable forms for data analysis.
Public Plans Data (undated-a)

The Public Plans Data resource is introduced as follows: “The Public Plans Data (PPD) contains detailed annual data on the largest state/local pension in the US. The sample spans fiscal years 2001 to 2020 and includes 210 plans (119 state-run and 91 locally-run) which account for 95 percent of state/local pension assets and members in the U.S.”

From the homepage, a user can download the entire dataset, subsets based on specific financial or related topics, and documentation. There is also an interactive data browser with basic functionality to compare data by variables over specified years. The use of data will depend on the analysis of interest, as the unit of analysis for different datasets varies by topic area. In addition, given the amount of data, one might need to devote additional time to data cleaning to make the relevant data useful for further analysis.
# Abbreviations

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Description</th>
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<tbody>
<tr>
<td>AAL</td>
<td>actuarial accrued liability</td>
</tr>
<tr>
<td>ADC</td>
<td>actuarially determined contribution</td>
</tr>
<tr>
<td>APV</td>
<td>actuarial present value</td>
</tr>
<tr>
<td>ARC</td>
<td>annual required contribution</td>
</tr>
<tr>
<td>ASB</td>
<td>Actuarial Standards Board</td>
</tr>
<tr>
<td>COLA</td>
<td>cost-of-living adjustment</td>
</tr>
<tr>
<td>DB</td>
<td>defined benefit</td>
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<tr>
<td>DC</td>
<td>defined contribution</td>
</tr>
<tr>
<td>ERISA</td>
<td>Employee Retirement Income Security Act</td>
</tr>
<tr>
<td>GASB</td>
<td>Government Accounting Standards Board</td>
</tr>
<tr>
<td>NASRA</td>
<td>National Association of State Retirement Administrators</td>
</tr>
<tr>
<td>POB</td>
<td>pension obligation bond</td>
</tr>
<tr>
<td>UAL</td>
<td>unfunded accrued liability</td>
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</tbody>
</table>
References

Actuarial Standards Board, “Entry Age Normal Actuarial Cost Method,” webpage, undated. As of March 28, 2022:
http://www.actuarialstandardsboard.org/glossary/entry-age-normal-actuarial-cost-method/


ASB—See Actuarial Standards Board.

https://www.rand.org/pubs/research_briefs/RBA2307-1.html

https://www.rand.org/pubs/working_papers/WRA816-2.html


GASB—See Government Accounting Standards Board.


Miller, Randy, and Rick Funston, Public Pension Governance That Works, Funston Advisory Services, March 2014.


NASRA—See National Association of State Retirement Administrators.


https://www.nasra.org/governanceoverview


National Conference of State Legislatures, Pension and Retirement Legislation Information by State, database, December 10, 2021. As of August 12, 2022:


U.S. Census Bureau, “Quarterly Survey of Public Pensions (QSPP),” webpage, last updated July 1, 2022a. As of August 11, 2022:
https://www.census.gov/programs-surveys qspp.html

U.S. Census Bureau, “Annual Survey of Public Pensions (ASPP),” webpage, last updated July 5, 2022b. As of August 11, 2022:
https://www.census.gov/programs-surveys/aspp.html

U.S. Department of Labor, “Retirement Plans Benefits and Savings,” webpage, undated. As of August 1, 2022:
https://www.dol.gov/general/topic/retirement