



Defined Benefit Risk

Phase 1: Literature Search Report





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Phase 1: Literature Search Report

The Retirement Section of the Society of Actuaries commissioned a research project on the topic of *communicating* pension risk, recognizing the challenges in addressing this complicated topic with stakeholders. The independent research team of David G. Pitts, FSA and Susan Mangiero, PhD were selected to lead this project.

In collaboration with the project oversight group (POG) of the Retirement Section, the researchers are conducting this project in three separate phases:

Phase 1: Literature Search

Phase 2: Interviews

Phase 3: Review and Discussion

Phase 1 of this project entails a literature search, spanning several topics of interest in pension risk. Phase 1 is complete, and its results are presented in this report.

Note that as Phase 1 was underway, the COVID-19 pandemic began, impacting nearly every facet of life. As of this publication date, there is little literature directly related to the topic of defined benefit risks and COVID-19. However, the importance of a robust risk management process is clearly underscored with the emergence of the pandemic, and should reinforce, for example, the use of stress tests which can be tailored to the current environment.

While the longer-term impacts of COVID-19 remain to be seen, the Society of Actuaries has provided relevant current research on COVID-19, including its publication *Defined Benefit Plans and COVID-19: Immediate Challenges for Plan Sponsors*.

Phase 2 of this project will include interviews with individuals representing different aspects of plan governance and operations: plan sponsors, finance professionals, consultants, and providers. Phase 3 of this report will review and integrate the findings from Phases 1 and 2, and recommend areas for further study.

While the primary focus of this project is the effective communication of pension risk, the literature search was purposely broader than communications for two reasons. First, a broad literature search on pension risk had not been performed recently, and the Retirement Section leadership believed the results would be of interest to its members, given the rapid ongoing developments in the subject area. Second, there are idiosyncrasies in pension risk which influence effective communications. For example, a multiemployer plan in the red zone has substantively different risks from a frozen plan contemplating a risk transfer. Our belief is that a broad literature search will help inform effective communications.

A literature search was initially performed by identifying articles on pension risk that were published in peer reviewed journals over the last 15 years, such as the Chartered Financial Analyst's *Journal of Financial Management*, in addition to a broad Google search. The search was later extended to include submissions to the Pension Risk Management eJournal of the Social Sciences Research Network (SSRN), a resource containing more than 3,000 submissions, primarily from academics on risk-related topics relevant to both defined benefit and defined contribution plans. The eJournal on the SSRN is an excellent source of academic papers on pension risk.

The preliminary search results identified a myriad of risk-related topics to explore. The researchers and the POG agreed that the literature search should be limited to articles addressing risk for U.S. defined benefit plans, and should target plan sponsors and their agents as opposed to plan participants, insurers, or regulatory agencies such as the Pension Benefit Guaranty Corporation (PBGC). In addition, articles of a highly technical nature – of which there are many – were excluded from the results of this literature search.

This report presents the findings of the literature search which was conducted largely in 2019.



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Section 1: Introduction

Risk is a topic of intense interest within the pension community, as plan sponsors seek to navigate the challenging landscape of pension finance. Sponsors must satisfy benefit promises that have already been made – a difficult task given volatile capital markets, ongoing improvements in life expectancy, persistently low interest rates, and oftentimes inadequately funded trusts. Many sponsors conclude that a search for increased yield is a must given these circumstances; this search is not without added risk, however. The difficulties in meeting these challenges are exemplified by the increase in plan failures and required capital infusions to meet obligations. Sponsors have rightfully placed an increased emphasis on risk management, and have sought to mitigate ongoing risks through a variety of means ranging from lump sum cash-outs of vested benefits to insured buy-outs, in which a third party insurer retains all or a portion of a plan’s financial risks. Based on recent surveys, one-third of private-plan sponsors plan to derisk most or all of their pension liabilities within the next five years.

Consultants, insurers, and asset managers each bring different service and product offerings to the pension sector. These participants routinely publish surveys and other forms of intellectual capital as they seek to help sponsors manage their pension risks. Academics have made numerous contributions to the subject of pension risk as well.

A literature search on pension risk resulted in several thousand articles and presentations. A review of the search results suggested most articles fell naturally into one of the following three categories:

- Risk Management;
- Risk Measurement; and
- Risk Mitigation.

Risk Management concerns how pension risks are managed within an organization. Since there are no detailed requirements for managing pension risk in the U.S., sponsors must necessarily look elsewhere for guidance to ensure they are adopting best practices and satisfying fiduciary standards. In this section of the report, we present examples from overseas, other financial sectors, and plan sponsors. We identify sample risk policy statements and assessments. We include a “how-to” guide developed by the UK Pensions Regulator on setting up an integrated risk management process. A consistent theme in the Risk Management reference materials is the need for sponsors to employ holistic views on risk (enterprise risk management), and to adopt governance structures that support short-term decision making and actions.

Risk Measurement addresses the “how?” of risk analysis: What should we measure? How should we perform the analysis? Are there constructs that help frame the issues? In this section of the report, we present examples of useful frameworks for interpreting risk, illustrating the use of Holistic Balance Sheets and Corporate Finance principles. We present meaningful metrics and downside risk measures. Finally, we include reference materials that address calculation methodologies such as Economic Scenario Generators (ESGs) and Stress Tests, and asset return assumptions of particular relevance to pension risk measurement.

Risk Mitigation refers to techniques that mitigate all or a portion of a plan’s financial risks, ranging from Pension Risk Transfer to “DIY Asset Liability Management (ALM)” approaches. This section includes representative articles that address risk mitigation techniques available in the capital markets and via plan design. A number of articles on longevity hedging and mitigation are also presented, given the importance and relatively recent development of the longevity risk mitigation field. The section concludes with a

sample of recent surveys conducted by providers that address ongoing and expected risk mitigation activity.

Section 2: Risk Management

In the context of this report, risk *management* concerns the management of pension risk as an organizational process. How should it be conducted?

In the U.S., the regulatory requirements for defined benefit risk management are principles based vs. supervisory in nature. Since there are no detailed requirements for managing pension risk, sponsors must look elsewhere for guidance to ensure they are adopting best practices and satisfying fiduciary standards. What are the best practices in managing risk? What can we learn from other countries? Other sectors? What are the hallmarks of an integrated risk management process? What are examples of innovative governance structures? Examples of comprehensive risk communications?

As discussed below, we identify several sources addressing topics such as governance, reporting, and communications, and conclude with examples of risk policy statements and innovative governance structures currently in use by plan sponsors. A consistent theme in the literature is a need for plan sponsors to adopt a more active risk management role, considering the financial problems that have resulted from infrequent or lax risk management controls.

2.1 LESSONS FROM OUTSIDE U.S. PENSION SECTOR

2.1.1 OTHER COUNTRIES

Pension risk management as a discipline is well established in certain countries. Thompson (2008) reviews the risk rating methodologies employed by Australian pension regulators. With a robust history of risk-based supervision of retirement plans, the Australian risk rating methodologies may be useful for U.S. plan sponsors looking to adopt risk scorecards for ongoing monitoring. Brunner, Hinz and Rocha (2016) review risk rating methodologies for retirement plans in Australia, Denmark, the Netherlands and Mexico. These countries are each pioneers in risk-based supervisory arrangements for retirement plans. The risk rating methodologies summarized by Brunner, et al. are another useful source for plan sponsors looking to enhance existing risk management processes.

Sheedy and Jepsen (2018) review risk management processes in several large Australian superannuation funds and rate the provider's risk "maturity." The Risk Management Maturity model presented in this paper provides a meaningful method for assessing a plan sponsor's risk management effectiveness. The model defines important attributes for assessing maturity: commitment to continuous improvement, broad accountability, risk viewed as an enabler, effective risk communication, right amount of right risks. The model is useful for employers seeking to audit their internal risk management processes. The authors also provide examples of risk taxonomy in a superannuation fund, a suitable proxy for employer-sponsored pension plans.

2.1.2 FINANCIAL SECTOR

In managing the pension risk function, U.S. plan sponsors can also examine processes used more broadly within the financial sector. Stewart (2009) summarizes relevant risk management features from throughout the financial sector. A detailed checklist with questions in each of the main categories (Management Oversight & Culture, Strategy & Risk Assessment, Control Systems and Information/Reporting/Communication) can assist pension funds wishing to perform a self-assessment of the strength of their risk management process.

2.2 DEVELOPING AN INTEGRATED RISK MANAGEMENT PROCESS

The U.K. Pensions Regulator (2015) provides a framework for adopting an integrated risk management process for defined benefit plans. Although the guide is inherently U.K. focused, there are suggestions that are universal. For example, the guide provides detailed step by step instructions covering initial planning, risk identification/assessment, contingency planning, documentation, and monitoring. In addition to the guide, the U.K. Pensions Regulator provides useful checklists and explanatory videos on its website.

More broadly, Kessler (2013) discusses a defined benefit (DB) sustainability model emerging from the best practices of plans that are remaining open:

1. Rigorous risk-budgeting process – determine how much the sponsor can afford to lose
2. Dramatically reduce asset risk in an effort to keep pension losses within risk budget
3. Strategy for managing longevity risk

The paper concludes with case studies for a closed corporate plan in a cyclical industry and an open public plan. Also provides lessons learned from mono-line pension insurers.

Sponsor specific risk management processes can be further informed by the survey results presented by Beath and MacIntosh (2013) in their study of 27 large pension funds. The survey summarizes full-time equivalents by specialty area within the risk management function, specifically: 1) enterprise risk management, 2) investment risk policy development, 3) asset mix policy development, 4) liability risk modeling, 5) investment risk measuring and reporting, 6) risk data collection and vendor interface, and 7) investment risk Information Technology support.

2.3 SAMPLE COMMUNICATIONS

Communicating pension risk is difficult since “mastering the breadth and depth of all of the ALM calculations is a tremendous achievement,” as stated by Vaidya and Wittemann during the 2020 SOA Virtual Annual Meeting. They stress the “importance of a clear narrative,” and that the presentation of ALM results should be “framed for decision-making.” The presenters provide numerous charts and graphs (projected contributions, funded status, risk attribution, efficient frontiers) to help illustrate the current state of communicating pension risk analytics.

Additional examples of relevant communications were provided in both Economou, Haenni and Manola-Bonthond (2013) and Dert and Leegwater (2011).

RiskFirst, a financial technology firm, provides platforms that help users manage asset and liability risk for pensions, endowments, and foundations. The company website includes screenshots of various reports (risk scorecards, decomposition, etc.) that may be of interest to users interested in ongoing reporting tools.

Finally, the guidance in Actuarial Standards of Practice (ASOP) No. 51 Assessment and Disclosure of Risk Associated with Measuring Pension Obligations and Determining Pension Plan Contributions should be carefully considered and integrated by all actuarial practitioners when providing actuarial services.

2.4 SAMPLE RISK POLICY STATEMENTS AND ASSESSMENTS

The literature search identified risk policy statements for several public and quasi-public entities, both domestic and foreign. See, for example, risk policy statements provided by The Strathclyde Pension Fund (2009), The Staffordshire Pension Fund (2019), The United Nations Pension Fund (2016), and The Management Employees Pension Board (2017).

The Maryland State Retirement and Pension System (2020) also provides details of the pension system risk assessment required by House Bill 993 under Maryland statutes.

2.5 ANECDOTAL RISK GOVERNANCE STRUCTURES

Economou, Haenni and Manola-Bonthond (2013) describe changes enacted to the CERN pension governance structure following the 2008 financial crisis. CERN moved away from a static approach for setting asset allocation (for its mature pension plan), to a dynamic, risk-driven approach. The authors explain the rationale for the change: The implicit assumptions supporting the static investment philosophy were no longer true for their plan – namely a shorter investment horizon, changing inflows/outflows, and diminished appetite for taking a long-term bet on achieving risk premia given its exposure to short-term risks. Adopting the new approach presented two significant challenges: providing maximum control at the Board Level, while permitting staff with flexibility to react quickly to everchanging market conditions. This article provides an overview of how CERN managed these challenges, including the adoption of a new governance structure and daily risk-control metrics.

Dert and Leegwater (2011) explain the template ABN-AMRO adopted for Strategic Asset Allocation (SAA) decision making that other boards may find of interest in setting investment policy. The ABN-AMRO decision-making process helps the board to balance competing stakeholder interests by bifurcating the investment policy decisions from the risk/reward tradeoff decisions.

Both the CERN and ABN-AMRO examples illustrate a shift in strategic asset allocations for pension plans from a static to a dynamic process, consistent with changes underway in the sector.

Section 3: Risk Measurement

Risk measurement addresses the nuts and bolts of risk analysis: Exactly how do we measure risk? Which metrics should we consider? What is the best way to perform the analysis? Are there constructs that help frame the issues? Important modelling assumptions or methods to consider?

The literature search produced numerous articles that address risk measurement, many of them highly technical. The representative articles in this section span the array of articles that address measurement issues. Readers interested in more in-depth analysis are encouraged to search the SSRN directly for topics of interest.

3.1 FRAMEWORK

There are many articles that seek to expand the discussion of pension risk beyond pension assets and liabilities walled off in a trust – what can be described more accurately as an Enterprise Risk Management approach. The U.K. in particular has advanced the discussion significantly with the introduction of Holistic Balance Sheets (HBS), in which a pension plan’s call on future cashflow is quantified (the employer “covenant”) and integrated into the balance sheet. Additional articles are available in which pension transactions are viewed within a corporate finance framework, using analytic tools common in corporate finance. Representative articles on the HBS and corporate finance are included here. The researchers did not find meaningful articles on Enterprise Risk Management for public pension systems.

3.1.1 HOLISTIC BALANCE SHEET

Pelsser and Ponds (2013) review U.K. and Dutch defined benefit plans by using an HBS approach. The HBS integrates contingent assets and liabilities beyond those in the trust – for example, guarantees provided by the Pension Protection Fund, employer covenants, conditional indexing, and other steering/adjustment mechanisms. While the specifics of the U.K. and Dutch systems may not be of interest to U.S. sponsors, the techniques employed in this paper for valuing such embedded options is relevant to plan sponsors seeking to incorporate Enterprise Risk Management factors into their governance oversight.

3.1.2 CORPORATE FINANCE

Pension risk management traditionally focuses on balancing risks between the liabilities and the expected return on assets. Bauer, Halfon and Scapino (2013) consider an enterprise approach to risk management, recognizing that running a DB plan is part of running an overall business, and must compete for capital against alternative investments the corporation can make. The paper examines plan funding relative to potential corporate actions within the same net present value (NPV), internal rate of return (IRR) or similar analytical framework. In this fashion, companies can optimize the use of available cash resources and balance alternative strategies against each other. The authors provide real-world examples of companies adopting these strategies and the impact on pension finance and risk management.

3.2 METRICS

There are no required risk metrics for U.S. pension plan sponsors. The articles presented here are meaningful for plan sponsors, however, as they present useful risk metrics for sponsors to consider.

3.2.1 ECONOMIC CAPITAL

Ai, Brockett and Jacobson (2015) present a straightforward methodology for calculating one measure of a pension plan’s risk, by borrowing an analytical framework from the life insurance and annuity industry. In

these industries, risk is framed in terms of the total assets required to remain solvent over a one-year period with a high level of confidence; i.e., the economic capital approach. Two factor-based approaches are presented to perform this calculation. The first develops pension specific factors as if the plan were a group annuity. The second approach directly simulates the risk factors of the pension plan and develops a framework for obtaining factors and calculating the pension risk given a desired confidence level. The authors claim the approach is easy to implement and monitor in practice.

3.2.2 DOWNSIDE RISK

Downside risk measurements are essential for many applications; for example, risk management, asset-liability management, and strategic asset allocation development. Munenzon (2010) argues and demonstrates that conditional value-at-risk (CVAR) is the best metric for these purposes. The article provides several examples of how the use of CVAR vs. other downside measures results in very different portfolio selection.

3.2.3 CREDIT

In each of the 2018 and 2019 Cross-Sector Ratings Methodology releases, Moody's Investor Services explains how reported pension financials under the Financial Accounting Standards Board/Governmental Accounting Standards Board (FASB/GASB) are adjusted for credit rating purposes. Additional guidance illustrates how grid-implied credit ratings are determined, a key component of an entity's reported credit rating. Using this guidance, risk analysis can be performed by examining the impact of different pension financial outcomes on an entity's credit rating, a meaningful enterprise risk metric.

Pitts (2013) illustrates the impact of downside pension risk on Moody's "grid-implied" credit ratings, a metric suitable for estimating enterprise risk. The author also presents the impact of a stress test (akin to those used in the banking industry) on key pension variables such as the Pension Protection Act (PPA) yield curve, equity returns, and short/long fixed income returns. The presentation provides a template for practitioners seeking to develop robust enterprise risk metrics, and to employ stress testing techniques routinely used in the banking sector.

3.3 METHODS

3.3.1 SIMULATIONS

The Society of Actuaries released a primer on Economic Scenario Generators (ESGs) in 2016. ESGs simulate the joint behavior of financial market values and economic variables and are used in a wide array of financial modeling applications. While simulation methods that use analytical approaches (e.g., mean-variance statistical distributions) were once common, there were limitations, such as for multi-period applications. ESGs have emerged as the superior modeling approach for complex actuarial applications. The SOA primer provides an excellent overview of ESGs, which are ideal for use in risk management analysis. Additional pension applications include Liability-Driven Investing (LDI) investment strategies, risk transfer transactions, and one-time events such as large cash contributions to pension trusts.

Finn, Pedersen and Piesowicz (2020) provide insights on important ESG considerations for Life, Pension and P&C applications during the SOA 2020 Virtual Annual Meeting. They discuss the simulation of interest rates, as well as model extensions for additional economic variables such as bond and equity returns. Their presentation concludes with a detailed discussion on ESG Applications by Pension ALM Practitioners.

3.3.2 STRESS TESTS

Impavido (2011) released a primer on pension stress testing, a useful overview for practitioners looking to incorporate asset and liability stress testing into their risk measurement process. The paper summarizes the international regulatory backdrop and provides examples of how to perform stress tests, while identifying areas for future enhancement. The article provides a useful overview of various risk measurement techniques, including: (1) sensitivity testing with different actuarial factors, (2) analysis of sources of earnings, (3) roll forward calculations, (4) maturity gap analysis, (5) duration and convexity analysis, (6) key rate duration and convexity analysis, (7) value at risk and (8) stress testing.

3.4 ASSUMPTIONS

3.4.1 STOCK VOLATILITY

Bodie (1995) argues that the conventional wisdom that investing in stocks is less risky the longer an investor holds them is incorrect. As evidence, he cites that the cost of insuring against earning less than the risk-free rate increases as the length of the investment horizon increases. Bodie observes that for guarantors of money-fixed annuities, the proposition that stocks in their portfolio are a better hedge the longer the maturity of their obligations is unambiguously wrong.

Like the Bodie paper (2015), the Pastor & Stambaugh paper (2009) demonstrates that long-horizon stock investors face more variance than short-horizon investors, in contrast to previous research. This key assumption about future equity returns has significant implications for asset-liability modeling and SAA development. In practice, SAA optimization models with long-time horizons can result in maximum allocations toward risky asset classes. Practitioners should therefore use caution in overstating the reliability of long-term projections, especially if the plan being modeled is mature.

3.4.2 LIQUIDITY

Schlumpf and Martinez (2014) propose a model for helping investors address liquidity questions in strategic asset allocation decisions. The model can be used to measure liquidity risk capacity for investors seeking to unlock liquidity premiums in a transparent and robust way – investors such as pension funds and insurance companies that have a comparative advantage in being able to invest in less liquid funds. The authors address liquidity in terms of market illiquidity (harder to sell), funding illiquidity (harder to raise funding), and also address limitations in data asymmetries resulting from lack of observable transaction data.

3.4.3 CURRENCY

EnnisKnupp (2009) addresses the topic of currency risk management, a concern as non-domestic security holdings increase. The article provides a background on the subject, presents a decision-making framework, and offers two case studies. The article concludes that there are no easy answers, and the benefits of currency overlays may be small or not guaranteed.

Section 4: Risk Mitigation

Pension risk mitigation is accomplished in various ways. These approaches range from buy-outs, in which all or a portion of a plan's liability is transferred in its entirety to an outside insurer, to a "DIY" approach, in which risk is mitigated by a combination of ALM tools and investment products, including longevity hedging.

There are numerous articles that address different aspects of risk mitigation, reflecting the rapid increase of de-risking activity witnessed in the market. This section includes representative articles that address risk mitigation techniques available in the capital markets, via plan design, including longevity hedging and mitigation. The section concludes with a sample of recent surveys conducted by providers that address ongoing and expected risk mitigation activity.

4.1 CAPITAL MARKET SOLUTIONS

Biffis and Kosowski (2013) provide a detailed overview of solutions available to manage capital market risk. They begin with a review of the evolution of LDI and continue with a discussion of the most popular de-risking tools in use: interest rate and inflation-linked derivatives (interest-rate swaps, forward-starting swaps, swaptions, inflation swaps, inflation caps/floors). They continue with reviewing the basics of pension buy-outs, buy-ins and longevity swaps. They also discuss tail risk mitigation tools such as cross-asset correlation hybrid products, and the growth in counterparty risk mitigation tools such as collateralization. They conclude with an outline of challenges ahead including risk taking incentives in delegated asset management. This is a well-researched article, citing many additional sources.

4.2 PLAN DESIGN TECHNIQUES

Fuerst (2014) outlines a proposed Retirement Shares Plan (RSP), in which longevity risk is allocated to the plan sponsor, while investment risk is borne by the plan participant. The participant retains sufficient control over investment risk to tailor the risk to his or her specific circumstances. The risk allocation provides the sponsor with predictable and stable costs with little chance of unfunded liabilities. The retiree receives lifetime income and potential inflation protection. Fuerst provides details on how the plan would work in operation: a variable annuity plan, with benefits indexed to investment results, plan specific hurdle rate, asset bifurcation between a Diversified Account and a Stable Account. He also provides suggested administrative techniques to simplify operations.

4.3 LONGEVITY RISK HEDGING AND MITIGATION

Cox, et al. (2012) summarize existing asset/liability optimization papers and extend the analysis to include random mortality evolutions. In the paper, they also compare a ground-up hedging strategy with an excess-risk-hedging strategy and conclude the excess-risk-hedging strategy is superior due to its lower cost and more attractive structure. The authors present the analysis as a new way for sponsors to think about pension longevity risk management within an optimization context.

Cairns, Dowd, Blake and Coughlin (2011) analyze longevity hedge effectiveness as a contribution to the current tradeoff decision sponsors face when managing frozen plans: should the sponsor adopt a full buy-out/complete indemnification solution (at higher cost) or a "DIY ALM" strategy, which has lower cost but higher basis risk. The authors present a case study in which the effectiveness of a customized longevity hedge is compared to an index hedge. Key conclusions are that an index hedge, in combination with ALM techniques, is an effective and lower cost alternative to both a full buy-out and a customized longevity hedging program.

Cairns (2013) reviews the stochastic models in use for the measurement and management of longevity risk. The paper examines model robustness relative to a variety of inputs, highlighting that robustness is a key modeling feature whose importance should not be ignored. Key conclusions are that more work needs to be done on multipopulation mortality models, and on the risk management front, more needs to be done on understanding which key pension objectives need to be optimized.

4.4 RECENT SURVEYS ON PLANNED RISK MITIGATION

Consultants and insurers regularly release surveys on defined benefit risk management – drilling down into expected future mitigation activity whether it involves pension risk transfer or “DIY” approaches. Below are a sample of recent surveys, which all underscore the increased focus on risk management and significant interest in risk mitigation in the short to medium term timeframe.

Survey	Key Findings
MetLife 2019 Pension Risk Transfer Poll	<ul style="list-style-type: none"> • 76% of sponsors plan to completely divest themselves of pension liability in the future ... 1/3 in next 5 years • Includes expected type of derisking: lump sums, buy-ins/buy-outs, population to be settled • Uptick in buy-out activity
Aon Global Pension Risk Survey 2017	<ul style="list-style-type: none"> • Opportunistically shrinking liability via lump sums and annuity buy-outs • Increased liability matching investments • Shift to dynamic policies; e.g., hedge paths and credit paths • Greater visibility and control over pension risk than ever before
Cerulli 2019 Derisking DB Plans in Flux	<ul style="list-style-type: none"> • Survey of mid-sized plans, CIO’s and other investment related professionals • Third party investment management fees of most importance on the investment front • Risk analytics and SAA advice most important on the non-investment related front • Includes average LDI allocations

Section 5: Conclusion

There are few specific regulatory requirements in the U.S. that address pension risk, other than the fiduciary requirements set forth in ERISA. There are no statutory requirements for determining a pension's maximum permissible risk exposure, and no required minimum levels of economic capital to support risks that are borne. Similarly, there are no required risk disclosures other than those set forth in ASOP 51. Unlike other countries or financial sectors, there are no mandated methods or assumptions sponsors must use in measuring and managing their pension risks. Sponsors are on their own to develop governance structures and risk management processes. Ongoing plan failures and increased capital infusions indicate several plans have failed at this critical task.

Yet there are clear examples of best and aspirational practices in both risk management and risk measurement. Risk mitigation activity is robust and increasing, as indicated consistently in employer surveys released by service and product providers. There are numerous "how to" articles related to the various capital market techniques for mitigating risk, including longevity risk, a relatively recent development. Whether a plan is closed or ongoing, derisking or employing a DIY approach, the literature search has produced a number of reference sources that can help a sponsor strengthen and monitor its pension risk management function. Additional reference materials help sponsors focus on appropriate risk metrics and ensure its risk analysis is performed using optimal methodologies in this highly technical subject area.

Pension risk is highly specific to the circumstances of the sponsoring organization. There are no "one-size-fits-all" examples of risk disclosures to assist the service provider in communicating pension risks to their clients. However, the literature search produced numerous examples that will help the advisor tailor the risk message, thereby helping the sponsor effectively manage its pension risk. The practitioner needs to be well versed in all aspects of risk management to effectively help his client manage its risk exposures.

As a final note, the examples of best practices in risk management/measurement/mitigation identified in the literature search related to private and quasi-public entities, which suggests public and union sectors may have further to go in strengthening their risk management expertise and processes.



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