

# **Retirement System Risk Management**

## **Implications of the New Regulatory Order**

EDITED BY

Olivia S. Mitchell, Raimond Maurer,  
and J. Michael Orszag

**OXFORD**  
UNIVERSITY PRESS

# OXFORD

UNIVERSITY PRESS

Great Clarendon Street, Oxford, OX2 6DP,  
United Kingdom

Oxford University Press is a department of the University of Oxford.  
It furthers the University's objective of excellence in research, scholarship,  
and education by publishing worldwide. Oxford is a registered trade mark of  
Oxford University Press in the UK and in certain other countries

© Pension Research Council, The Wharton School,  
University of Pennsylvania 2016

The moral rights of the authors have been asserted

First Edition published in 2016

Impression: 1

All rights reserved. No part of this publication may be reproduced, stored in  
a retrieval system, or transmitted, in any form or by any means, without the  
prior permission in writing of Oxford University Press, or as expressly permitted  
by law, by licence or under terms agreed with the appropriate reprographics  
rights organization. Enquiries concerning reproduction outside the scope of the  
above should be sent to the Rights Department, Oxford University Press, at the  
address above

You must not circulate this work in any other form  
and you must impose this same condition on any acquirer

Published in the United States of America by Oxford University Press  
198 Madison Avenue, New York, NY 10016, United States of America

British Library Cataloguing in Publication Data

Data available

Library of Congress Control Number: 2016945378

ISBN 978-0-19-878737-2

Printed in Great Britain by  
Clays Ltd, St Ives plc

Links to third party websites are provided by Oxford in good faith and  
for information only. Oxford disclaims any responsibility for the materials  
contained in any third party website referenced in this work.

# Contents

---

<i>List of Figures</i>	ix
<i>List of Tables</i>	xi
<i>Notes on Contributors</i>	xiii

1. Introduction: Implications of the New Regulatory Order for Retirement System Risk Management <i>Olivia S. Mitchell, Raimond Maurer, and J. Michael Orszag</i>	1
---	---

## **Part I. Global Risk Assessment for Pensions and Annuities**

2. The New Insurance Supervisory Landscape: Implications for Insurance and Pensions <i>Peter A. Fisher</i>	13
3. Accounting-Based Asset Return Smoothing in Participating Life Annuities: Implications for Annuitants, Insurers, and Policymakers <i>Raimond Maurer, Olivia S. Mitchell, Ralph Rogalla, and Ivonne Siegelin</i>	40
4. Mark-to-Market Accounting for United States Corporate Pensions: Implementation and Impact <i>Joseph Busillo, Thomas Harvey, and Bryan Hoffman</i>	51
5. Risk Disclosure in the European Insurance Industry: Implications for Occupational Pension Funds <i>Karel Van Hulle</i>	68
6. Pensions, Risk, and Global Systemically Important Financial Institutions <i>Brian Reid and Dan Waters</i>	95

## **Part II. Developments in Retirement Saving and Retirement Products**

7. Determinants of Saving for Old Age around the World <i>Asli Demirgüç-Kunt, Leora Klapper, and Georgios A. Panos</i>	121
---	-----

**viii Contents**

8. Retirement Replacement Rates: What and How <i>Andrew G. Biggs</i>	154
9. Fundamentals of Cost and Risk that Matter to Pension Savers and Life Annuitants <i>Catherine Donnelly, Montserrat Guillén, and Jens Perch Nielsen</i>	171
10. Pension Fund Investment in Infrastructure and Global Financial Regulation <i>Javier Alonso, Alfonso Arellano, and David Tuesta</i>	186
<i>End Pages</i>	213
<i>Index</i>	217

## **Mark-to-Market Accounting for United States Corporate Pensions: Implementation and Impact**

---

*Joseph Busillo, Thomas Harvey, and Bryan Hoffman*

Defined benefit (DB) pensions have been an ongoing management challenge for United States corporate plan sponsors. Among the many issues is how to properly account for the associated assets and liabilities, providing clarity regarding the plan itself while not diluting transparency into the underlying business performance of the corporate plan sponsors. Traditional generally accepted accounting principles (GAAP) for pensions is a somewhat Byzantine mechanism attempting to balance these two often conflicting goals. There is an alternative approach that a small segment of plan sponsors has recently implemented for their pension plans: mark-to-market (MTM) accounting. Shedding to various degrees the smoothing mechanisms provided under GAAP, this method exposes not only the balance sheet but also the income statement to the volatility of annual pension performance (cf. Maurer et al. 2016).

Most plan sponsors have been extremely reluctant to pursue this approach. Concerns over shareholder and market reactions have limited adoption of MTM to a handful of plan sponsors. Our expectation was that the accounting methodology should have a negligible effect on a plan sponsor's share value. In this chapter, we explore a number of aspects of MTM to better understand the following:

- (1) the relative appeal of GAAP and MTM accounting standards to plan sponsors, and why a plan sponsor would or would not adopt MTM;
- (2) the impact of MTM accounting on investors and plan sponsor share price;
- (3) the reaction of MTM adoption on equity analysts, ratings agencies, and management teams; and
- (4) the impact of MTM adoption on investment strategy.

Moreover, we provide alternatives to the most common pension sponsor investment strategies and an evaluation of their efficiency under MTM.

### Overview of MTM Pension Accounting

The implementation of Accounting Standards Codification 715 (ASC 715) in 2006 moved pension economics out of the footnotes and directly onto the financial statements of corporate America. The goal was to incorporate the net assets and liabilities of DB plans onto corporate balance sheets so that a company's investors could gain a more transparent view of the financial impact associated with its pension plan. However, under the current GAAP, plan sponsors can use a variety of techniques to smooth out that impact.

GAAP rules allow for delayed recognition on the income statement of gains or losses on pension plans' assets and liabilities. Plan sponsors can also use an expected return figure that reflects their long-term expected returns on their current portfolios. Annual variances between expected and actual market returns are accrued in 'accumulated other comprehensive income' (AOCI) on the balance sheet. Likewise, deviations from expected liability growth are accrued in AOCI. The AOCI amounts are then amortized over time on the income statement, usually over the expected future working lifetime of plan participants. Plan sponsors are, in effect, shielded from a significant portion of the actual volatility of their DB pension assets and liabilities.

### Appeal of GAAP

GAAP provides a significant cushion to a plan sponsor's income statement, generally accomplishing the goals as intended: to minimize financial statement volatility from noncore operations (i.e., the DB pension). GAAP effectively permits the plan sponsor to decrease the year-to-year volatility of pension expenses on corporate financial statements. This smoothing of real asset returns and delayed recognition spreads immediate gains and losses into the future, bleeding them in over time. Companies are thus shielded from reporting the immediate impact of significant adverse market events.

In addition, as the predominant methodology for accounting for DB plans, the use of GAAP supports comparability between corporations and across time periods. Despite its many inherent weaknesses, GAAP—as it is almost universally applied—enjoys the obvious benefit of widespread acceptance.

The current accounting framework also allows plan sponsors to favor equities over fixed-income assets in DB plan investment allocations. Increased equity allocations raise the expected returns used to determine pension expense, while any losses experienced through such an implementation are

amortized over time. Plan sponsor earnings are thus shielded from the volatility inherent in an aggressive portfolio allocation, while the higher expected returns increase earnings in the near term.

Note that this feature may not always be beneficial. That is, the ultimate investors are not shielded to the extent that there is a settlement event that requires a short-term recognition of the pro-rata portion of the loss that may be outstanding.

## **Weaknesses of GAAP**

In an effort to account for the impact of pension economics without overwhelming the underlying operating company's financial performance, GAAP conventions smooth out the actual DB pension results and amortize these results over a period of time. This approach may work if the actual performance is at variance with the predicted performance within a modest band, and these variances generally offset each other year to year. Unfortunately, a large adverse market event—such as the one experienced in 2008—has a relatively large and long-term effect. For most DB plan sponsors, the financial crisis created a large pool of unamortized losses to be recognized over time. While enjoying the significant shield GAAP provided at the time, most plan sponsors find themselves facing an extended period of amortizing large losses, creating an ongoing earnings drag.

For many with closed or frozen DB plans, these additional 'costs' are related to legacy benefits that bear little relationship to the organization's current operations and cost structure. Plan sponsors are struggling with how to account for these legacy benefits and minimize pension plan expense volatility, while providing clarity to investors regarding the financial performance of their base operations.

## **The United States MTM Alternative**

The typical GAAP mechanisms that a DB pension plan uses in its financial statements result in a smoothing of asset values. This smoothing is such that the expected return on assets is more stable, as well as accruing gains or losses into the AOCI account that are amortized into the income statement over time. The expense can be booked on a prospective basis and any gain or loss will accrue in the AOCI at the end of the year to be amortized in future years.

Alternatively, a sponsor is able to elect to account for its plan without these smoothing mechanisms. This method is known as mark-to-market

## 54 Retirement System Risk Management

TABLE 4.1. Annual pension cost (\$)

	GAAP	MTM	Diff
Service Cost (Benefits Accrued)	10.2	10.2	0.0
Interest Cost	77.0	77.0	0.0
Expected Return on Assets	(95.6)	(95.6)	0.0
Amortization of Actuarial Losses	20.0	0.0	(20.0)
MTM (Gain)/Loss	NA	(12.3)	(12.3)
= Total Pension Cost	11.6	(20.7)	(32.3)

*Notes:* GAAP refers to Generally Accepted Accounting Principle; MTM refers to Mark-to-Market; Diff refers to the difference between GAAP and MTM costs.

*Source:* Authors' calculations.

(MTM) accounting, or a fair value accounting approach. In full MTM accounting, the sponsor can only book its DB plan expense retrospectively. This means that actual gains or losses from assets and liabilities for the current year will be booked as current year expenses. To accomplish this, the sponsor uses the fair market value of assets. The expected return on assets will be replaced with actual return on plan assets and the amortization period for any gains or losses is in essence changed to one year. An example of this is shown in Table 4.1.

### Why MTM is Attractive to Plan Sponsors

The major benefit of implementing MTM accounting for a pension plan is that the company can restate historical financial statements to reflect actual plan losses experienced. The company can also remove 'escrowed' losses—losses incurred in the past but still awaiting future amortization—from its income statement. Through adoption of MTM, the plan sponsor can effectively eliminate the drag on earnings from future pension loss amortizations.

Furthermore, some plan sponsors feel that the move to an accounting policy without smoothing is more transparent and consistent with the direction in which accounting rules are headed. Since there is no fundamental change in the underlying cash flows or health of the company, the draw may be a cleaner, more transparent policy.

Finally, given the low interest rates experienced over the past five years, plan sponsors have implemented MTM under the belief a rate rise is inevitable. Rising interest rates would reduce the pension liability, likely creating an MTM gain. Rising liability discount rates would potentially become a tailwind to expense reductions, increasing future earnings.

## Why Plan Sponsors have been Reluctant to Adopt

The risk in a transition to MTM accounting arises from the fact that the company's pension expense is likely to be more volatile going forward. Shifting to MTM accounting also carries the potential threat of a negative earnings impact, as happened when the 2012 decline in interest rates overwhelmed the rise in pension asset values and eroded funding levels in most plans.

Many US DB plan sponsors have been reluctant to give up the income-level smoothing mechanisms of traditional GAAP and adopt MTM. In dialogue with management teams, multiple issues drive this reticence, including concerns over the impact of earnings and earnings per share (EPS) volatility on investor, equity analyst, and ratings agency reactions. Management teams are also often incentivized by GAAP earnings and sensitive regarding the impact that MTM accounting could have on annual earnings.

In an effort to evaluate these concerns in the context of shifting to MTM, we analyze each in turn. Our expectation was that, as a noncash item, the accounting for DB pensions should have a negligible impact on a firm's share price, analyst review, or credit rating.

## Investors

The first questions we considered were whether investors view the shift to MTM negatively, and whether companies pay a price in terms of share value for making the move. For each of the 23 companies in our analysis, SEI conducted an event study to evaluate movements in share price over a five-day period surrounding the announcement of the accounting change. In addition, the analysis included each company's Q4/2012 earnings release in order to provide insight into the MTM impact for the full calendar year. We then constructed a capital asset pricing model line for each company, based on actual performance relative to that of the appropriate subset of the S&P 1500, and we used regression analysis to predict an expected change in company return given a change in benchmark return.

Results indicated that the companies studied experienced no statistically significant changes in share price that would reflect a direct, obvious shareholder response to the implementation of MTM accounting. Moreover, the analysis showed no change in share price as a result of the 'noise' inherent in using actual asset and liability returns on financial statements, rather than including those results in the footnotes. Although a few early adopters such as Verizon experienced abnormally large but transitory changes in share price following the initial announcement, those changes did not translate into sustained effects on share value, either positively or negatively. This research confirms what we expected: with no cash implications, changes in accounting measures have no direct impact on share prices.

### **Analyst community**

Next, we looked at whether analysts appreciate the change in accounting for pension expenses and whether they recognize the impact on earnings volatility for comparison purposes. For some time, analysts have frequently employed MTM analysis in evaluating ‘core’ earnings and the cash impact of DB pension plans. For large companies in which the plan is large relative to market capitalization, analysts unwind GAAP treatment of losses and focus on the projected cash impact of the plan going forward. Likewise, in comparing an MTM company’s EPS with traditional GAAP comparables, analysts generally unwind the MTM adjustment, using the company’s smoothed GAAP earnings across time periods to compare performance.

A careful review of the Q4/2012 earnings calls of the 23 companies in our study revealed little to no discussion of the impact of MTM accounting versus GAAP for the organizations’ pensions, nor did company representatives spend time discussing the resulting volatility in their earnings. Analysts appeared to be unsurprised by the earnings drag that MTM companies felt in 2012 due to the decline in interest rates. Across all 23 calls, there were very few questions and no direct criticisms of the new accounting implementation. It is worth noting that, in many analyst reports, pension liabilities were still calculated using GAAP, meaning the MTM impact was adjusted out of the analysts’ annual earnings forecasts for those companies. For an example of our analysis see Table 4.2.

### **Ratings agencies**

We also looked at whether a plan sponsor’s credit rating tended to be affected by a move to MTM accounting. Reviews of the rating practices of Standard & Poor’s, Moody’s, and Fitch, as well as discussions with Moody’s Investor Services, indicate that a shift to MTM by a plan sponsor does not cause a significant disruption to the financial analysis practices of the major ratings agencies. Among several other non-GAAP adjustments that the ratings agencies make to corporate financial statements, applying full MTM treatment for pensions appears to be standard practice.

At the same time, pensions and pension volatility have a discrete but limited effect on overall ratings. Compared with a company’s revenue and debt, pension-related factors generally have a modest impact on its credit rating. Significant changes to a plan’s funded status may limit credit rating upgrades, but such changes are unlikely to lead directly to a downgrade if they are not accompanied by other changes in the company’s creditworthiness. Since the major ratings agencies already are, in effect, using MTM in

TABLE 4.2. Pension descriptors

In millions (USD\$)			Pension			Asset Allocation			Pension Metrics			
Company	Ticker	MTM Announcement Date	Assets	Liabilities	Funded Ratio (%)	Equity (%)	FI (%)	Other (%)	Pension Assets/Market Cap (%)	Pension Assets/Adj Corp Assets (%)	Pension Assets/Book Value (%)	Unfunded PBO/EBITDA
Albermarle	ALB	2012	563.3	762.4	74	57.8	27.6	14.6	9.6	16.4	29.1	0.3x
Ashland	ASH	2011	3,320.0	4,877.0	68	51.0	47.0	2.0	48.4	21.5	81.0	2.0x
AT&T	T	2011	45,060.0	58,910.0	76	55.0	34.0	11.0	23.0	25.0	49.0	0.4x
Babcock & Wilcox	BWC	2012	2,127.7	2,780.0	77	6.0	51.0	43.0	62.1	43.6	219.7	1.9x
ConAgra	CAG	2012	3,343.3	3,817.5	88	49.0	23.0	28.0	22.0	14.1	63.5	0.2x
Eastman Chemical	EMN	2012	2,298.0	3,133.0	73	52.0	26.0	22.0	20.0	16.6	76.0	0.6x
FirstEnergy	FE	2011	6,671.0	8,975.0	74	16.0	57.0	27.0	41.9	11.7	51.3	0.8x
Graftech	GTI	2011	163.1	231.8	70	11.8	88.2	0.0	16.1	6.6	12.1	0.3x
Honeywell	HON	2010	18,872.0	22,389.0	84	49.3	37.1	13.6	29.9	31.1	137.0	0.7x
IBM	IBM	2010	91,688.0	106,129.0	86	39.8	52.0	8.3	40.0	43.0	482.0	0.5x
HIS	IHS	2011	161.0	180.7	89	28.3	67.4	4.2	2.2	4.3	10.0	0.1x
Johnson Controls	JCI	2012	4,642.0	5,761.0	81	49.2	40.2	10.6	18.0	13.0	39.0	0.4x
Kellogg	K	2012	4,374.0	5,238.0	84	66.2	24.4	9.4	18.0	22.3	157.0	0.4x
LS Starrett	SCX	2011	107.4	145.5	74	27.0	12.0	61.0	153.6	31.3	86.3	4.5x
PerkinElmer	PKI	2012	336.3	580.5	58	55.0	39.0	6.0	8.8	8.1	18.3	0.8x
PolyOne	POL	2011	410.4	597.2	69	70.6	21.3	8.1	16.0	16.0	65.0	0.8x
Rexnord	RXN	2011	577.7	720.6	80	30.0	67.0	3.0	31.3	15.0	130.8	0.4x
Reynolds American	RAI	2011	5,422.0	6,293.0	86	29.0	59.0	12.0	20.0	25.0	100.0	0.3x
SAIC	SAI	2011	86.0	94.0	91	43.0	57.0	0.0	1.6	1.4	3.3	0.0x
Teradyne	TER	2012	302.9	376.5	80	13.0	85.8	1.2	9.6	10.8	16.2	0.2x
United Parcel Post	UPS	2012	25,742.0	32,957.0	78	44.4	33.4	22.2	31.0	40.0	637.0	2.3x
Verizon	VZ	2011	18,282.0	26,773.0	68	43.7	35.4	20.9	12.0	7.5	21.4	0.6x
Windstream	WN	2012	999.0	1,400.1	71	44.2	51.4	4.4	20.2	6.8	90.0	0.2x
Median MTM Cos					76.5	44.2	33.4	22.2	20.0	16.0	65.0	0.4x
US Public Medians					74	53.0	37.1	9.9	10.9	9.5	20.9	0.2x

Source: Authors' calculations.

## **58 Retirement System Risk Management**

their analyses, a shift to MTM accounting should have a negligible impact on a particular plan sponsor's credit rating.

### **Internal management**

Finally, we evaluated how management incentives were affected by the change in EPS that results from the increased volatility in pension gains and losses. It is not unusual for some portion of a management team's incentive compensation to be tied to annual GAAP earnings performance. Since pension expenses average approximately 10 percent of a corporate EPS, the additional volatility associated with an MTM implementation has the potential to have a material impact on earnings. In response, based on available proxy statements, all companies adopting MTM accounting have appeared to revise their compensation plans to exclude the MTM adjustment, effectively shielding management bonuses from the volatility of actual pension performance.

Interestingly, many of the companies that SEI surveyed did not de-risk their pension plans to reduce volatility prior to implementing MTM accounting. Instead, they chose to maintain more aggressive investment portfolios. The net effect of combining the higher expected return in accounting for pension expense, eliminating the amortization associated with historical losses, and adjusting out the MTM impact, is that management ultimately gets the benefits of a more favorable EPS without the penalty of past poor performance. In many respects, this is an ideal outcome for management.

### **Pension Allocation Not Generally Changed by Accounting Method**

Looking at the companies that have adopted MTM, we did find it surprising that those companies did not generally change their DB plan asset allocation in response to the switch. Most sponsors stick to a traditional mix of 60/40 equities/fixed-income strategies, similar to the investment strategy followed by a large majority of corporate pension plans using traditional GAAP pension accounting. Rather than address the impact of pension plan volatility through a better asset/liability match, most plans simply use non-GAAP adjustments to address those results, rather than reduce the actual economic volatility.

We continue to believe that many corporate plan sponsors' reticence to adopt MTM is based on the concerns outlined, and that annual volatility will have an undesirable impact on earnings. This concern over earnings

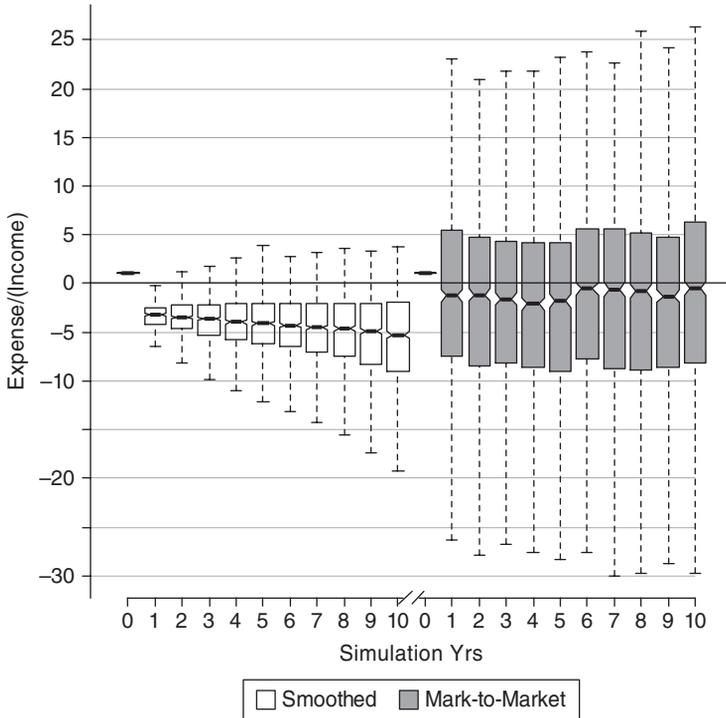


Figure 4.1 Volatility comparison 60/40

Source: Authors' calculations.

volatility is a reasonable one. We ran a simple Monte Carlo simulation using SEI's proprietary capital market assumptions to show the inherent risks to GAAP EPS of maintaining a traditional asset allocation when adopting an MTM accounting policy. We use a three-factor, short-rate model to determine the near-term interest rate. The three factors are inflation, real rates, and an option-adjusted spread. These factors are projected using an autoregressive (AR) model [AR(1) process] with drift. After the short rate is determined, we can determine the long rate on the yield curve using standard methods in stochastic calculus. The return is then determined on the long bond associated with that rate and all other asset classes are correlated to this return. The ultimate output is 1,000 simulations over 10 years for all asset classes and full-yield curves. Figure 4.1 shows the increased volatility that can be expected when an MTM policy is adopted (note that this does not show the one-time effect of switching from smoothed accounting to MTM). Clearly, switching to an MTM accounting method without some shift in asset allocation could cause undesired volatility and stress.

## **60 Retirement System Risk Management**

Perhaps more critically, the economic exposures associated with this strategy can be significant. A poorly matched asset–liability investment strategy poses several challenges to the plan sponsor, including increasing the value at risk through limiting the natural liability hedge associated with investments in long-duration fixed income; increasing potential required contributions in adverse scenarios, including poor capital markets and declining discount rates; and creating significant uncertainty around projected contribution levels.

Despite these challenges, most plan sponsors continue to pursue a heavily equity-oriented strategy within their DB pensions, in an effort to benefit from the higher expected long-term returns on equities to reduce the ‘costs’ associated with the pension liability. Given the increased transparency associated with MTM accounting and the immediate impact of pension portfolio returns on corporate earnings under the MTM framework, sponsors switching to MTM might also consider a change in investment strategy.

Two alternatives to the typical equity-centric allocation paradigm are of interest. The first, liability-driven investment (LDI), focuses on closely matching liability exposures and seeks to minimize funded status volatility. The second, risk parity, pursues a more balanced approach to risk without sacrificing expected return, giving management the opportunity to reduce funded status volatility without reducing expected incentive-based compensation, which typically remains based on expected return on pension assets even after the switch to MTM accounting.

### **Method 1: liability-driven investment**

Given the nature and timing of promised benefit payments, a full liability matching strategy with high-quality fixed-income assets is a natural default position for a DB plan. Since the purpose of the plan is to provide employees with income during retirement (a form of deferred wages), it is not clear why the associated expense should be treated differently than any other corporate liability. A full LDI method (at 100 percent funded) will allow the plan to maintain the current funded ratio with the smallest possible tracking error.

### **Method 2: risk parity**

The second approach can be thought of as a more diversified substitute for the traditional 60/40 portfolio. In this context, rather than generating optical diversification by focusing on capital allocations, risk parity seeks genuine diversification by balancing risk allocations across asset classes. Details of this strategy will now be discussed.

*A primer on risk parity*

Risk parity investing emphasizes risk exposure diversification, not simply dollar allocations. This distinction can be illustrated quite powerfully by considering the traditional 60/40 equity/fixed-income DB plan portfolio. While this portfolio initially appears quite balanced, with nearly equal dollar (capital) allocations to both stocks and bonds, a risk decomposition paints an entirely different picture. Because equities are so much more volatile than intermediate-term fixed income, the 60/40 dollar split derives over 90 percent of its risk from equities. Thus, when volatility is taken into consideration, the apparent diversification of the 60/40 portfolio disappears.<sup>1</sup> Risk parity investing seeks to restore balance to the portfolio by allocating equal amounts of risk to each asset class, seeking genuine diversification by risk instead of optical diversification by capital.

In order to achieve such balanced risk allocations, risk parity portfolios must invest higher dollar amounts into less volatile asset classes and vice versa. Naturally, the initial act of reducing the size of equity investments and allocating more to fixed income would be expected to reduce the expected return (and risk) of the resulting portfolio. Depending on the risk tolerance and return requirements of the investor, this outcome might not be desirable. In such instances, a risk parity portfolio typically employs a modest amount of leverage (generally obtained via derivative contracts) to restore the portfolio's expected return and volatility to the desired levels. Hence risk parity portfolios need not be 'conservative,' low-risk investments; they can be geared to target the same level of expected volatility as the 60/40 portfolio, the equity market as a whole, or any other level deemed appropriate. The crucial distinction is that, by achieving this level of volatility in a more diversified fashion, risk parity offers the potential for higher returns for any given level of volatility when compared to more concentrated alternatives such as the 60/40 portfolio.

The benefits of risk parity in an asset-only context have been addressed at length in the financial literature. Interestingly, these advantages become even more powerful in a liability-relative setting. As mentioned earlier, LDI constitutes an intuitive and sensible default option for pension asset portfolios as it allows for the lowest volatility of funded status. Nevertheless, it cannot be ignored that many sponsors are reluctant to adopt a full LDI strategy for a variety of reasons. While risk parity is no substitute for true LDI, it could potentially offer a significantly more efficient alternative to equity-heavy allocations, such as the 60/40 portfolio, in an asset-liability framework.

Put simply, risk parity offers a more efficient asset portfolio in a DB plan setting because the assets it holds bear at least some resemblance to a typical

## 62 Retirement System Risk Management

DB plan's liability stream. Most liability structures closely resemble a 'short' position in long-duration fixed income; this is the default position of a DB plan prior to the formation of any asset portfolio. Plans that invest their assets in equity-heavy portfolios, such as the 60/40 portfolio, thereby do little to hedge their liabilities. Given the 60/40 portfolio's more than 90 percent concentration in equity risk, the performance of such an asset portfolio has little to do with the change in the value of the plan's liabilities. This mismatch creates extreme volatility in terms of the true economic exposures underlying the plan's surplus or deficit.

By contrast, a risk parity approach allocates a meaningful amount of its risk budget to nominal, investment-grade fixed income. Consequently, it can reasonably be expected to correlate more closely with a plan's liabilities, potentially reducing the 'tracking error' of the asset portfolio relative to the liability stream, thereby reducing the volatility of a plan's surplus or deficit. Again, because the risk parity portfolio can be geared to target any desired level of risk or return, this reduction in surplus risk need not come with a decline in expected return. Rather, sponsors who are willing to accept a certain level of risk (such as those currently following a 60/40 allocation) can still accept that amount of risk, but with potentially higher returns and improved surplus efficiency, by allocating to a risk parity portfolio.

Risk parity's potentially improved efficiency can be demonstrated both historically and prospectively. First, it is useful to conduct a historical analysis comparing the performance of the 60/40 portfolio and a naive risk parity portfolio relative to the Citigroup Intermediate Pension Liability Index (CPLI), with emphasis on both return and risk relative to the liability proxy. The analysis here is based on the 20-year period, 1995–2014, with the sample limited by data availability for the CPLI. In this example, the 60/40 portfolio is constructed using the S&P 500 for equity exposure and the Barclays US Aggregate for fixed income. The static weights for the naive risk parity portfolio are calculated by balancing risk contributions from the S&P 500, Barclays US Aggregate, and Bloomberg Commodity Index over the full 20-year period. Once these weights are determined, the portfolio is levered to match the full sample volatility of the 60/40 portfolio so that each portfolio exhibits the same level of risk over the sample period.

Figure 4.2 highlights the intuitive argument that a risk parity asset portfolio should offer less tracking error than a 60/40 asset portfolio with the same level of volatility. This exhibit plots the rolling three-year annualized tracking error of each asset portfolio relative to the CPLI over the sample period. Clearly, both asset allocation paradigms produce large amounts of liability-relative risk, and risk parity is far from a perfect hedge to the CPLI. Nevertheless, it seems clear that risk parity should offer 'less' tracking error relative to liabilities. The 60/40 portfolio consistently experiences larger deviations from the liability benchmark compared to the risk parity portfolio.

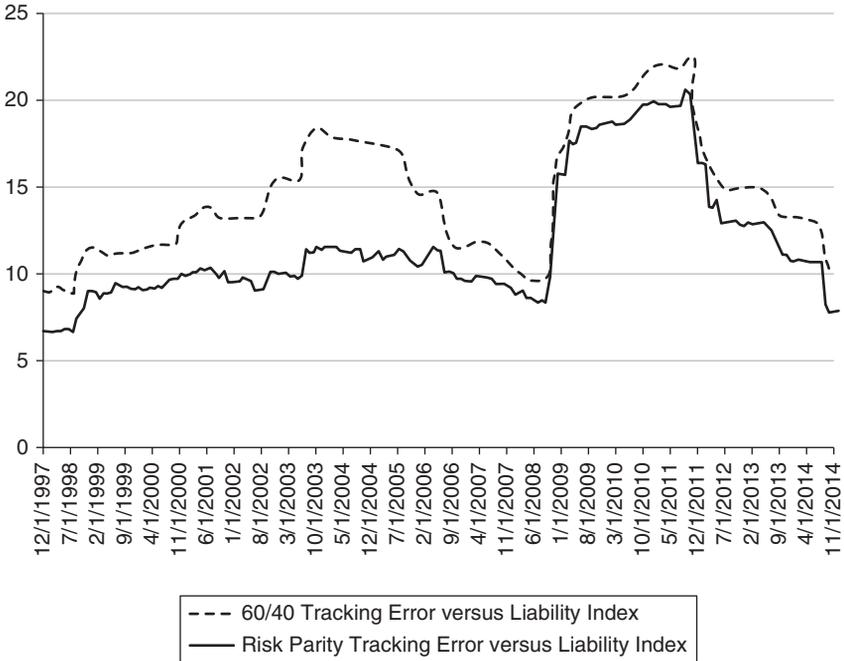


Figure 4.2 Rolling three-year tracking errors versus Citigroup Pension Liability Index (CPLI)

Source: Authors' calculations.

Even risk-averse plan sponsors need to know whether risk parity's reduction in surplus volatility comes at the cost of lower returns. Given its improved diversification profile and the ability to target any desired level of portfolio volatility, there are compelling ex ante reasons to expect that risk parity should be able to outperform its more concentrated counterparts, on average. If the asset portfolio can be constructed so that it is fully compensated for every unit of risk that it assumes (regardless of how much total risk that involves), the expected return on that portfolio ought to be higher than that on a more concentrated, and less efficient, portfolio. The 20-year sample period results in Figures 4.3 and 4.4 support this intuition and demonstrate that, over this historical sample, a volatility-matched risk parity portfolio outperformed a 60/40 implementation in both absolute and risk-adjusted terms. Given the higher historical return and the lower tracking error relative to liabilities, risk parity offered a considerable improvement in terms of surplus efficiency over this period.

It is both natural and valid to question the time-period-specific nature of these outcomes. Without question, the secular decline in bond yields has

## 64 Retirement System Risk Management



Figure 4.3 Rolling three-year returns

Source: Authors' calculations.

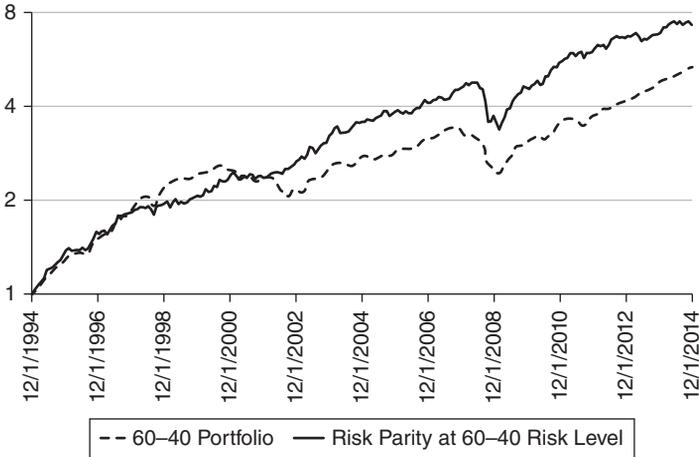


Figure 4.4 Cumulative growth of \$1 investment

Source: Authors' calculations.

provided a tailwind for any strategy that allocated meaningfully to fixed income over the past 20 years compared to more equity-centric alternatives. With interest rates considerably lower now than at the beginning of the sample period, forward-looking expectations for risk parity's outperformance versus the 60/40 portfolio should be more modest. While the volatility-reducing properties of risk parity in the DB context remain equally compelling on a forward-looking basis, it is clear that this sample period is a relatively favorable one for the performance of risk parity compared to less balanced alternatives.

Fortunately, forward-looking prospects for risk parity returns remain quite strong, both absolute and relative to the 60/40. Central to this expectation is the more diversified nature of risk parity compared to its more popular and concentrated counterpart. Because the 60/40 derives over 90 percent of its risk from stocks, it is inherently betting that stocks will offer far higher risk-adjusted returns than bonds over the investment horizon. In fact, for such extreme risk concentration to be defensible from a mean-variance optimization perspective, stocks would have to offer over *three times* the Sharpe Ratio (risk-adjusted return) of bonds. With less extreme assumptions for the relative performance of stocks and bonds, the diversification offered by a risk parity allocation is rewarded with higher expected risk-adjusted returns compared to more concentrated alternatives, such as the 60/40. The introduction of liabilities and the tracking error-reducing potential of risk parity make this tradeoff even more compelling than in an asset-only context.

This advantage can be illustrated on a forward-looking basis using SEI's proprietary equilibrium capital market assumptions for expected returns, risks, and correlations among asset classes. Using our assumptions for the 60/40 portfolio, under each asset allocation paradigm, the risk parity portfolio, an LDI portfolio, and a generic liability stream, expected DB pension expenses are simulated for the next decade. The choice of asset portfolio construction mechanism produces the expected effects on both the level and volatility of pension expense. While risk parity dominates the traditional 60/40 paradigm in terms of surplus efficiency, neither methodology can match the liability-hedging properties of full LDI.

The fundamental tradeoffs of these strategies appear in Figure 4.5. The traditional 60/40 approach has far more volatility than the LDI or risk parity strategy. The LDI strategy has minimal expense over the projection period with the lowest amount of volatility. While the 60/40 and risk parity portfolios might be expected to produce positive net income on average, this expectation comes at the expense of significantly higher volatility. Given that the purpose of a DB pension plan is not to generate accounting income, LDI seems to be a much more sensible 'starting point' for plan sponsors, who can then deviate from a full hedging policy in a thoughtful and measured fashion if they view the risk/return tradeoff as favorable.

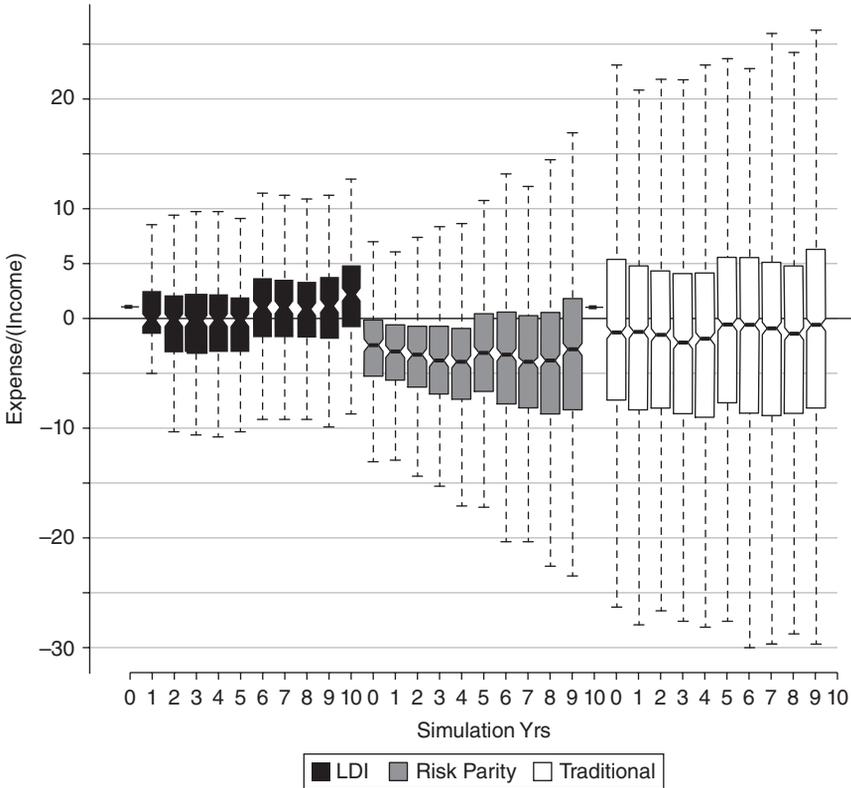


Figure 4.5 Asset allocation under mark-to-market

Note: LDI refers to liability-driven investment.

Source: Authors' calculations.

## Conclusion

Despite problems with traditional GAAP for US corporate pensions, plan sponsors have been reluctant to adopt full MTM accounting. Concerns over the resulting additional earnings volatility and the reaction to this likely volatility from investors, equity analysts, and ratings agencies have played key roles. Additional concerns regarding the impact of earnings volatility on compensation plans, as well as the general level of additional earnings 'noise' from actual pension performance, has caused management teams to be wary of adopting this approach. Based on our analysis, however, we believe these concerns are overstated, and that as a noncash accounting change, none of these concerns are material enough to warrant preferring one method over the other.

To the extent that the adoption of MTM accounting has been made in conjunction with the standard investment portfolio implementation, plan sponsors will likely experience a level of expense volatility that can be reduced by alternative investment strategies. When measured in relation to the plan expenses and liabilities, both an LDI strategy and a risk parity strategy reduce surplus volatility versus traditional optimized 60/40 implementations. Plan sponsors evaluating a shift to MTM and sensitized to earnings volatility may find that an alternative asset implementation better aligns both their accounting and financial goals.

## **Endnotes**

1. S&P Capital IQ, based on monthly data from 1995 to 2004, with the S&P 500 representing equities and the Barclays US Aggregate representing fixed income.

## **References**

Maurer, R., O. S. Mitchell, R. Rogalla, and I. Siegelin (2016). 'Accounting-based Asset Return Smoothing in Participating Life Annuities: Implications for Annuitants, Insurers, and Policymakers,' in O. S. Mitchell, R. Maurer, and J. M. Orszag, eds, *Retirement System Risk Management: The New Regulatory Order*. Oxford: Oxford University Press, pp. 40–60.