

*Journal of***APPLIED CORPORATE FINANCE**

A MORGAN STANLEY PUBLICATION

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Allocating Shareholder Capital to Pension Plans

A Talk* by Robert C. Merton, Harvard Business School and Integrated Finance Limited

Good evening, it's a pleasure to be here and thank you all for coming. It will not come as news to any of you that adequate provision for retirement through a combination of state, employer, and personal savings is a worldwide concern. It's a major concern in Asia and South America, in the U.S. and continental Europe, and, of course, here in the U.K. For corporations with defined benefit (DB) pension plans, the problem has manifested itself in a funding shortfall between pension assets and pension liabilities. The shortfall is a consequence of the large decline in equities in the first three years of this decade, in combination with drops in interest rates that have raised the value of the liabilities. The falling stock prices during that period also coincided with—and indeed reflected—reductions in the companies' earnings and hence in their ability to fund their shortfalls out of business operations.

The new accounting treatment of pensions in the U.K.—a version of which is now being considered by the FASB in the U.S.—will make these shortfalls more transparent to interested parties, particularly investors, rating agencies, and regulators. And as the new rules come into force, they are likely to have real effects, such as limiting dividends and other distributions to shareholders. Some companies are responding by capping or shutting down their DB plans, and then creating defined contribution (DC) plans.¹

There are of course multiple facets to this very important issue. My remarks this evening will focus primarily on the corporate challenge of providing retirement income to employees while limiting the costs and risks of retirement plans to the firms, and ensuring that investors and rating agencies understand both the risks and corporate efforts to deal with them. My main focus throughout will be on the real economic import and consequences of such issues and not how they are reflected on financial statements. This is not to suggest that accounting issues are unimportant, only that accounting is not my expertise—and because I value the time you are spending with me, I will concentrate on what I know a bit more about.

In the rest of this talk I will address five questions:

- What are the major issues and challenges surrounding pensions? We all know that the shortfall has been the focus of attention. However, I will make a case that while the gap between assets and liabilities is important, of far greater concern for the future is the risk mismatch between pension assets and pension liabilities. Most U.K. and U.S. companies have been funding debt-like liabilities with investments in equity-heavy asset portfolios.²

- To what extent do the equity market and equity prices reflect the shortfall in pension funding and the mismatch in risk? Do the markets see through the smoothing of pension earnings by accounting convention and consider pension shortfalls and mismatch risks in valuing the equity? What does the evidence tell us? Moreover, even if the market appears capable of reflecting pension risk, is it possible that analysts' P/E multiples and management's assessments of cost of capital are distorted by failure to take full account of the risks associated with pension assets?

- How should management analyze and formulate strategic solutions? I will offer no specific solutions tonight because each firm faces somewhat different circumstances and no one prescription fits all. Nevertheless, I do want to lay out a framework for analyzing the problem from a strategic perspective that can be used in formulating a company's pension policy. In particular, I will recommend that companies take an integrated perspective that views pension assets and liabilities as parts of their economic value and risk balance sheets—and one that accordingly treats the pension asset allocation decision as a critical aspect of a corporate-wide enterprise risk management program. Finally, I will offer the concept of a *risk budget*—basically, a list of all of a company's major exposures along with an estimate of the amount of equity capital necessary to support each one. One important use of such a risk budget is to enable management to address the question of how much equity capital must be allocated to the risk positions, or risk mismatches, that are created by asset allocation decisions in DB pension plans.

* This is an edited transcript of a speech delivered in London on October 21, 2004 at a conference on pensions sponsored by BNP Paribas. Some events that have occurred since that time are reflected in the footnotes that have been appended to the talk.

1. IBM's recent announcement of its shift to a DC plan could turn out to be a watershed event that precipitates the unraveling of the DB system. If healthy and employee-centric companies are getting rid of DB plans even for existing employees, what kind of compa-

nies are going to pay ever larger premiums to remain part of the system insured by the Pension Benefit Guaranty Corporation?

2. One notable difference between U.S. and U.K. companies is that the latter provide workers with inflation-indexed benefits, and such benefits can be immunized with inflation-linked "Gilts."

- The fourth question has to do with issues of implementation. If a company chooses to make a major change in its pension policy, such as a partial or complete immunization accomplished by substituting bonds for stocks, how would you communicate the risk implications of the new policy to the rating agencies and investors? How would your approach be affected by whether your plan is fully funded, underfunded, or overfunded? If underfunded, should one borrow to fully fund the plan?

- The fifth and final section discusses the challenges associated with moving from a DB plan to a defined contribution, or DC, plan. What are the major issues to be thinking about when contemplating such a change?

I will confess to you at the outset that most of the examples I will discuss come from the U.S. rather than the U.K. The only defense I offer for such provincialism is to plead my own familiarity with U.S. companies and numbers. But let me suggest that most of the U.S. cases I will present have rough counterparts in the U.K.—and that if you make some effort to translate the numbers and the circumstances into a U.K. context, I think you will find that the main issues that I raise tonight apply, with roughly equal force, to U.K. companies.

The Apparent Issue—Funding Shortfall

The funding shortfall has been the focus of analysts, the rating agencies, (which have treated the shortfall as a form of debt for at least a decade), and regulators. You heard the numbers in my introduction; these are big numbers and the problem needs to be addressed. But I have no magic solution if you are underfunded by \$1 billion; I cannot tell you how to wave a wand or give you a strategy that makes the underfunding disappear in true economic terms. And just to be clear, when I say “underfunded,” I mean that the current marked-to-market value of the pension assets is less than the current marked-to-market value of the pension liabilities.

Underfunding has long been a problem, though it was largely hidden in the 1990s. This was partly driven by a mistaken tendency to equate higher *expected* returns with higher *realized* returns. Like most economists, I agree that equity returns in general are expected to be higher than fixed-income returns. However, the concept of higher expected equity returns has been translated, thanks to a misapplication of actuarial science, into the statement, “For companies with a long enough time horizon, higher expected returns can be assumed to imply higher realized returns for certain.” And from there it is a short step to the idea that \$1 invested today in stocks is worth more than

\$1 invested in bonds. This mistaken way of thinking,³ which is effectively embedded in pension accounting and actuarial smoothing of pension returns, has been a major driver of corporate pension allocations. What such thinking ignores, of course, are the very different levels of risk associated with the higher expected returns on equities, a reality that became very clear during the market experience of 2000-2002.

The Real Issue—Risk Mismatch

But, again, I believe that the biggest pension problem facing Corporate America and its investors is not the shortfall, but the risk mismatch between pension assets and liabilities. Suppose you were looking at two companies. For Company A, the ratio of its pension assets and liabilities on a marked-to-market basis is 1.0. For Company B, the ratio of assets to liabilities is 1.05 to 1.0. Which company should we be more worried about? With no other information about the companies or their plans, common sense of course says that the firm that is 5% overfunded is in a better position.

But let me now give you the rest of the story. Company A’s allocation of pension assets is to choose 100% bonds with the same duration as its pension liabilities. Company B has 85% of its pension asset portfolio in equities. Now, which of the two should you watch more closely? The point I’m making with this simple example is that balance sheet numbers, whether marked-to-market or not, are *static* and therefore of limited use. They are a picture of where the firm and its assets and liabilities are right now. They reveal nothing about the risk that those two numbers may change, either by how much or with what likelihood.

In the first case, as long as Company A maintains its policy, even though the plan is just fully funded, that funding will be completely adequate; you do not need to be overfunded if you always hold assets that precisely hedge the risk of the liabilities. In the second case, however, even a funding ratio of 1.05 is probably not sufficient. While it is quite true that the company’s funding ratio could jump from 1.05 to 1.20 in a year’s time, it could just as quickly fall to 0.85. The balance sheet numbers that purport to measure a pension surplus or deficit give no indication of risk.

The risk mismatch is likely to be of greatest concern in cases where the ratio of pension assets to the market capitalization of equity is high. For publicly traded U.S. companies with DB pension plans near the end of 2001, the median ratio of pension assets to the market cap of equity for the top quintile of firms (ranked by that ratio) was 2-to-1.⁴ That underscores the point that pension assets are not small relative to the total

3. The fallacy of treating expected stock returns as risk free has been demonstrated by Paul Samuelson in several of his writings: “Lifetime Portfolio Selection by Dynamic Stochastic Programming,” *Review of Economics and Statistics* 51 (1969); and “The Long-Term Case of Equities and How it Can be Oversold,” *Journal of Portfolio Management* (Fall, 1994); and, more recently, by Zvi Bodie, in “On the Risk of Stocks in the Long Run,” *Financial Analysts Journal* (May-June, 1995). As discussed later, still another way of dem-

onstrating this fallacy is to note that a 40-year return asset return swap in which one receives the cumulative total return on the S&P 500 over 40 years and pays the cumulative return on either UST bills (rolled over) or UST 10-year bonds can be purchased for \$0.

4. For the pension quintile ratios of pension assets to market cap, I am indebted to a presentation by Michael Gilberto of J.P. Morgan Chase at a JPM Investment Management Conference on October 4, 2001.

equity of the firm. Moreover, it is typical to have 60% to 70% of the pension assets in equities. This means that for at least 20% of the companies in this sample, the equities holdings in their pension portfolios are larger than the entire market cap of the firm's equity (60% of 2.0 is 1.2).

Take the case of General Motors, which has the largest corporate pension fund in the U.S., with total assets of approximately \$90 billion. If we assume that 65% of those assets are devoted to equities—which, again, is standard U.S. corporate practice—that means the company has approximately \$60 billion invested in equities. At the moment, GM has a market cap of approximately \$22 billion, which means that it may well have almost three times its own market cap invested in the equities of other companies.⁵ Even for large firms, if you are thinking in terms of the size of the pension investment versus such things as the amount of equity capital, this is quite considerable. We need to be aware of that in our thinking.

Now consider a corporate balance sheet that includes \$60 billion of equity on the asset side and a \$60-billion liability that is perfectly matched in terms of value but not risk. This mismatched combination of assets and liabilities would not show up any differently on accounting statements—even under the new IAS rule—than \$60 billion of debt assets that were perfectly matched in risk to the pension liability. The first of these two combinations is equivalent to making a \$60-billion bet on the stock market and financing it with \$60 billion of fixed-rate, long-term debt. For those of you who are familiar with derivatives, this is equivalent to entering into a \$60-billion asset return swap where you pay a fixed rate of interest in return for receiving the total realized market return on equities.

Recognizing the Risk

As you know, when a swap is first done on standard terms, it has essentially no value; in terms of the balance sheet, it thus has no entry. What about its risk? Would you say there is a fair amount of risk if you bought \$60 billion of equity and financed it with \$60 billion of fixed-rate debt? That is a huge risk position. I am not saying that risk-taking is wrong, but failing to recognize the size of that risk position is a mistake. Imagine a CEO, accompanied by his or her CFO or finance director, announcing to an audience of shareholders, creditors, and other stakeholders, “Our current market capitalization is \$15 billion. Our strategy for the coming year is to buy \$60 billion of equities and finance the purchase with \$60 billion of long-term fixed-rate debt.” I think that recommendation would evoke a considerable amount of discussion.

And this brings me to the issues of transparency and framing. I am not suggesting that companies are consciously

attempting to mislead investors about their pension policies. What I am trying to emphasize is the importance of acknowledging the economic reality that the pension assets *are* the shareholders' assets, and then framing the risks accordingly. Pension assets are “encumbered” assets in the sense that there is a lien against them by the pensioners in the plan, but the residual gains and losses from that pension asset portfolio basically flow to the shareholders.

Now, there is one important exception to this rule—namely, companies with pension deficits facing a significant probability of default and bankruptcy. Since the pension losses of such firms are likely to end up being borne by the Pension Benefit Guaranty Corporation in the U.S.—and by the Pension Protection Fund in the U.K.—the value-maximizing strategy may well be to maintain and even enlarge the risk mismatch of their pensions in the hope that large pension gains can help rescue the firm by covering the shortfall and limiting future contributions to the plan. But, for reasonably healthy companies, pension assets are effectively (though not institutionally) assets of the corporation; and pension liabilities are liabilities of the corporation, no matter what happens to the pension assets. It is an obligation of the corporation, much like payments of interest and principal on its debt.

In this sense, then, pension risks *are* corporate risks. And as I discuss in more detail later, how one frames the risks in corporate DB plans will affect corporate decisions to continue or modify such plans as well as the choice of assets to fund them. When you consider the magnitude of the total value changes stemming from the mismatch of risk, it becomes very clear that the mismatch is a bigger problem than the current shortfall in funding. For companies with large DB plans, the impact on corporate values of a recession-induced drop in equities combined with a drop in interest rates—a combination similar to what we saw during the first years of this decade—could end up dwarfing the effects of a downturn on the operating businesses. The risks associated with today's pension asset-liability mismatches are very big risks indeed.

Accounting for Value Mismatch and Risk

My second major point has to do with how the markets seem to take account of both the value mismatch—that is, the size of any pension surplus or shortfall—and the risk mismatch. In terms of value, research done over a decade ago at the National Bureau of Economic Research on U.S. companies—and I have no reason to think it would be materially different for U.K. companies—supports the idea that share prices do in fact reflect the value of pension surpluses or shortfalls. In particular, companies with large pension defi-

5. Although GM recently reported that the 2005 gains in its pension fund have given it a pension surplus of some \$6 billion, the economic reality—again based on the assumption that 60% of the fund is in equities—is that the VaR or equity capital necessary to support

that risk exposure is several times the firm's current (January 24, 2006) equity market cap of \$13 billion.

cits appear to trade at lower P/E multiples and price-to-book ratios than firms with fully or overfunded DB plans.⁶

This finding did not come as a surprise. But I have to confess to some surprise at the findings of some recent work I did with colleagues Zvi Bodie and Li Jin on the value effects of pension risk mismatch.⁷ And let me remind you once more of the proposition we were testing: You could have a pension plan in which pension assets and pension liabilities are roughly equal in value, meaning there is no shortfall or surplus. But if the pension assets were largely in equities and the liability is largely fixed-rate debt, the risk exposure would be huge. And the question we were attempting to answer in our study was: Does the market capture that risk? Given the arcane accounting and institutional separation between the pension plan and the rest of the business, I did not think the market would take it into account.

But our results suggest that, during the period of our study⁸—1993 to 1998—the U.S. stock market did a pretty good job of picking up the differences in risk. More specifically, a company with a larger fraction of equity in its pension portfolio tended, all other things equal, to have a larger “beta”—a widely used measure of risk that reflects, among other things, the “systematic-risk” volatility of the stock price itself. In other words—and this is simplifying things a bit—the greater risk associated with equity-heavy pension plans seemed to show up in more volatile stock prices.

What’s especially interesting to me about these findings is that they apply to a period that preceded the large market decline that started in 2000. It’s relatively easy to see how investors could become sensitized to the possibility of pension losses during a market downturn. But the evidence of our study seems to show that share prices do take account of pension risk, even when most pensions are in surplus—and when the risk shows up nowhere on the accounting balance sheet. And to the extent the marketplace charges firms for bearing that added pension risk, our findings have some important implications for corporate policy and investment decisions that I will discuss later.

To repeat my point, then, our evidence comes not from surveying analysts, but from looking at what actually happens to share prices. And this, of course, is supportive of the idea of an efficient stock market. But we are not out of the woods yet. It is entirely possible that some equity analysts do not pay much attention to pension risk when assessing P/E multiples and comparing companies. It’s also possible that some corporate managers may not be taking account of the contribution of pension risk to overall corporate risk when making major

capital allocations among their different businesses. And, as discussed below, the result could be distortions of both analysts’ valuations and strategic corporate business decisions.

Calculating the Weighted Average Cost of Capital

To illustrate this point, let’s say you are a corporate executive considering a decision to expand into more or less the same business you are in now. In that case, the standard capital budgeting approach is to estimate the expected future cash flows and then discount those flows at the firm’s weighted average cost of capital (WACC). How do you get estimates of your WACC? If you are a publicly traded company, you can typically observe the historical movement of your share prices, and then estimate the beta of the share returns. When you do this, you are really assuming that the historical volatility of the stock is a reliable proxy for its risk—and, in this sense, beta is a wholly *market-based* measure of risk. The market may be completely wrong about this, but this is how investors perceive the risk of your stock.

Now, in valuing a project, unless the firm is financed entirely with equity, you cannot simply take the firm’s beta and come up with a cost of equity capital. You have to take account of the use of debt in the firm’s capital structure. To do that, you “de-leverage” the equity to come up with the WACC, which is an average of your debt and equity rates; you get the equity rates from the riskiness measured historically. Your debt rates are your observed debt rates. That is standard procedure for estimating WACC.

But the use of WACC to evaluate this project is based on a couple of important premises. First, as mentioned, the project in question should have roughly the same operating risk and be able to support the same leverage ratio as the rest of the firm’s assets. Second, the calculation of the firm’s leverage ratio should reflect all senior corporate obligations, not just on balance-sheet debt.⁹

Incorporating Pension Risk Into WACC

Given our focus on pension assets and liabilities, this suggests there may be a problem with this standard procedure for estimating WACC: its failure to take account of the risk of other important assets that are not reflected on GAAP balance sheets. As we have already seen, pension assets can be a significant fraction of total corporate assets. And for companies with large DB plans, an equity-heavy asset portfolio can be one of the main sources of total volatility on the left side of the balance sheet—in some cases as large as the operating business itself.

6. See, for example, Martin Feldstein and Stephanie Seligman, “Pension Funding, Share Prices, and National Savings,” *Journal of Finance*, Vol. 4 No. 36 (1981).

7. See Li Jin, Robert C. Merton, and Zvi Bodie, “Do a Firm’s Equity Returns Reflect the Risk of Its Pension Plan?” forthcoming *Journal of Financial Economics*.

8. In 1993, companies were required for the first time to report ERISA form 5500, which provides a list of the firm’s pension holdings as of year end.

9. For illustrative purposes, all the calculations of the effect of the pension plan on beta estimates for WACC are based on the assumption that corporations do not pay income taxes. In practice, companies need to incorporate into their WACC analysis an estimate of the company’s marginal corporate tax rate. If the company is and expects to be fully taxable at all times, a portion of the value of the pension assets and the pension liabilities are “owned” by the government and so therefore are their risks. But that computation is very firm-specific and not required for the level of demonstration here.

Table 1 **Errors in Estimates of Weighted Average Cost of Capital: Examples**

	Pension Assets (\$bn)	Pension Liabilities (\$bn)	Pension Surplus/Deficit (\$bn)	Market Cap (\$bn)	Book Value of Debt (\$bn)	Standard WACC*	WACC Adjusted for Pension Risks*
Boeing	33.8	32.7	1.1	30.9	12.3	8.80%	6.09%
DuPont	17.9	18.8	(0.9)	42.6	6.8	9.44%	8.15%
Eastman Kodak	7.9	7.4	0.5	8.6	3.2	9.75%	7.47%
Textron	4.5	3.9	0.6	5.9	7.1	7.98%	6.81%

* WACC numbers are based on a risk-free rate of 5% and a market-risk premium of 7%. Taken from "The Real Problem with Pensions," *Harvard Business Review*, December 2004.

On the other side of the balance sheet, pension liabilities are missing from the standard procedure as well. Pension liabilities are debt. Though collateralized by the pension assets, they are an obligation of the firm and thus part of the leverage or gearing of the firm.

By failing to take account of their pension assets and pension liabilities when estimating their cost of capital, companies are probably distorting their measures of operating, or project, risk in two ways. First, they are effectively assigning the firm's total risk to its business operations, when a potentially significant part of that risk could in fact come from the pension fund assets. Second, because the standard analysis does not take account of the pension liabilities, it understates the firm's leverage ratio.

The typical effect of these two distortions is to overstate WACC for an operating project. If our analysis instead used a pension-adjusted leverage ratio and included the pension assets on the left-hand side of the balance sheet, the resulting estimates of "unleveraged" operating beta for most companies with large DB plans would fall.

To sum up, then, if management estimates WACC by the standard method, it can lead to a major distortion of the capital allocation decision. It means applying too high a hurdle rate to projects, which means the firm may not undertake all the projects that are expected to increase its value. Taken by itself, it does not imply anything about the optimal asset allocation in the pension fund plan; but it is one possible consequence of not taking account of it.

Illustrations

To give you an idea of how big that distortion could be for some real companies, let's look at four examples: Boeing, DuPont, Eastman Kodak, and Textron.¹⁰ As shown in Table 1, all but DuPont have pension surpluses. And DuPont's pension shortfall is tiny compared to both its total liabilities and assets, and to its market cap. These are financially healthy companies; they are surely not high on anyone's list of the type of pension issues that normally concern us.

Calculating a standard WACC, which fails to take

account of the risk of the pension assets and the gearing of the pension liabilities, leads to an estimated cost of capital for Boeing of 8.8%. But when we make an adjustment for the company's pension risk that reflects the extent of its asset-liability mismatch—and take account of the size of the pension liabilities, which changes the firm's leverage ratio—Boeing's estimated WACC drops to about 6%, implying an overstatement of almost 300 basis points by the standard methods. That is the extreme case in the sample, but estimates of the overstatements for all four firms exceed 100 basis points.

This is not to say that the managements of these four companies are actually making this mistake; I have not worked with any of these companies and have no knowledge of their capital budgeting process. What I am saying is that if they follow the standard textbook procedure for estimating WACC, without adjusting for the risk and size of the pension fund, they could be materially overstating their cost of capital. And since we know that stock-price multiples are roughly inversely related to required returns or cost of capital, analysts who are overstating the estimates of cost of capital are also likely to be underestimating the multiples of the companies they cover.

In sum, pension decisions in terms of both asset size and allocation have the potential to affect the management of the entire firm at the most fundamental level. Strategic investment and risk-management decisions can be affected by the allocation of pension assets. And for reasons I've just illustrated, the failure of corporate managements to view pension assets and liabilities as part of the firm may well be leading to underinvestment in the operating part of the business.

Strategic Analysis and Policy Development

My third major point is about strategic analysis and working toward developing a pension plan policy. I hope the preceding remarks have demonstrated the need for an integrated enterprise-wide approach, one that views pension assets and liabilities as parts of the firm's comprehensive economic and risk balance sheets. To evaluate their sources and impact

10. These examples appear in Lin, Merton, and Bodie, forthcoming *JFE*, cited above.

Table 2 **Effect of Pension Asset Risk Mismatch on Equity Risk and Cost of Capital: LT Corporation (with Fully-Funded Pension Plan)**

Standard Balance Sheet Estimates					
	Value (\$bn)	Risk (Beta)		Value (\$bn)	Risk (Beta)
Operating Assets	\$40	1.05	Debt	\$19	0.00
			Equity	\$21	2.00
Total Assets	\$40	1.05	Total L&E	\$40	1.05
Estimated WACC Operating Assets = 12.35%					

at the strategic level, pension risks should be evaluated not only in terms of implementation of the pension plan, but within the context of the firm's other objectives, risks, and strategic plans, including effects on credit ratings.

Or to turn this thought upside down, all of a company's major business and financing decisions should be informed by a well-structured analysis that views capital allocation, capital structure, *and* pension plan decisions as parts of an integrated strategy. Much of my emphasis to this point has been on the potential effects of pension asset allocation on corporate capital allocation and capital structure choices. It is precisely because of these effects—of this linkage between the pension and the operating business—that pension asset allocation should be considered a strategic issue, one that is overseen at the highest level of corporate decision-making.

But if we continue to view the pension fund as an off-balance sheet entity with no ties to the firm, our decision making will likely also continue to be distorted by the higher expected returns on equities, even if the new accounting rules force us to report actual rather than expected returns in our financial statements. After all, shifting pension assets from equities to bonds will lower the expected returns on our asset portfolio and raise the contributions needed, at least in the near-term, to meet plan obligations. And that sounds like a bad thing, a value-reducing proposition—until one begins to consider the effect on risk. When you look at the whole picture, lowering the expected returns on the assets also lowers the risk of the entire firm. And by lowering risk, you create the capacity for the firm to take other risks—core operating risks, if you will, that are likely to add more value than passive equity investments in other companies.

That brings me to the concept of a “risk budget” I mentioned earlier. I find it useful to think of companies as having risk budgets that are very much analogous to their capital budgets. Reducing risk in one place releases capacity to increase risk elsewhere without having to add more equity capital to the firm. And this means that the total opportunity created by reducing risks in the pension fund is to enable the firm to take more risk in its operating businesses, which is presumably where it is most likely to find positive

net present value opportunities. The expected net effect of such changes is an increase in firm value. Although you reduce the expected return on your pension assets, you gain more from the new operating assets that you are now able to hold without additional equity capital—all of which is made possible by the reduction of risk in the pension fund.

Having said this, let me also hasten to add that 100% bonds will not be the optimal pension portfolio for all DB plans. But the possibility for such gains from reducing pension risk is a good reason to view your pension assets and liabilities as part of an enterprise-wide risk framework. As with any other decision that affects corporate balance sheets or income statements, changes in pension strategy and risk are bound to show up somewhere else. And, as I said a moment ago, it is because of their effects on the rest of the firm that pension decisions must be overseen by decision makers at high levels in the corporate organization, people entrusted with managing the risks and maximizing the value of the entire enterprise.

An Illustration

As a hypothetical illustration of how to evaluate the risk of a company's operating assets *and* its pension plan, let's take the case of a company called LT. Table 2 provides standard balance sheet estimates of operating asset risk and WACC, without considering the pension plan. All numbers are market values, not book values. We arrived at the value of the operating assets by taking the market value of equity and the market value of debt—\$21 billion and \$19 billion, respectively—and adding those up to arrive at \$40 billion, which is equal to the value of total assets.

To do a conventional calculation of WACC for LT, we began by estimating its beta from historical market returns—and our estimate turned out to be 2.0. Then, taking account of the firm's debt and its level of risk, we determined that the weighted risk of debt and equity results in an “unleveraged” or “asset” beta of 1.05. If LT's management team were using this method to evaluate a project similar to the company's other operations, the project would be valued using a WACC based on a risk factor of 1.05.

Table 3 **Effect of Pension Asset Risk Mismatch on Equity Risk and Cost of Capital: LT Corporation (with Fully-Funded Pension Plan)**

Full Economic Balance Sheet Estimates					
	Value (\$bn)	Risk (Beta)		Value (\$bn)	Risk (Beta)
Operating Assets	\$40	0.36	Debt	\$19	0.00
Pension Assets	\$46	0.60	Pension Liabilities	\$46	0.00
			Equity	\$21	2.00
Total Assets	\$86	0.49	Total L&E	\$86	0.49
Estimated WACC Operating Assets = 7.52%					

Using a risk-free rate of 5% and a market-risk premium of 7%, we would come up with a WACC of around 12%.

In Table 3, we show what happens when you adjust the conventional analysis to incorporate a full economic balance sheet—one that takes account of risk as well as value and so includes the pension assets and pension liabilities. The pension plan is fully funded—\$46 billion of assets and \$46 billion of liabilities—and since there is no surplus or shortfall, there is no entry on the traditional balance sheet. Since 60% of the pension assets are invested in equities, LT does have a significant risk exposure to equities; but, again, that exposure is not recorded on its GAAP balance sheet. When we expand the balance sheet to include the pension assets and liabilities, we have a much larger company—\$86 billion of total assets instead of \$40 billion, and \$65 billion of total debt instead of \$19 billion. We can easily estimate the risk of the pension asset portfolio—a well-diversified portfolio of equities and debt—just by looking at its composition: If we assume that the stocks have a beta of 1.0 and the bonds have a beta of 0, a portfolio with 60% equities can be assumed, pretty much by definition, to have a beta of 0.60.

The next step, then, using the firm's equity beta of 2.0, is to use LT's leverage ratio and its pension assets and liabilities to "back out" the firm's operating asset risk, which turns out to be 0.36. In this particular case, then—perhaps an extreme one, but useful in making my point—the operating assets actually have a materially lower systematic risk than the pension fund assets!¹¹ Moreover, when we evaluate the total asset risk, which includes the risk of both the operating assets and the pension assets, we get 0.49, which is less than half the estimate we came up with—1.05—doing the analysis the conventional way.

But for purposes of project valuation and capital budgeting, the relevant comparison for LT's management in this case is not between 1.05 and 0.49, but between 1.05 and 0.36. If we were to do a capital budgeting analysis of

contemplated projects for LT's core business, we would use 0.36 in calculating WACC; and if we did so, the cost of capital would fall from over 12% to 7.5% ($5\% + \{0.36 \times 7.0\}$). For projects with an expected life of ten years, the effect of overestimating the discount rate by some 450 basis points can be an underestimation of project values on the order of 30-40%. And as this example is meant to suggest, neglecting the risk of the pension plan can lead to major distortions of the capital budgeting process.

Besides improving capital allocation decisions, use of this expanded balance sheet approach provides a better picture of your firm in terms of its value and risk allocations between your operating businesses and other activities such as pension asset investments, which are largely passive investments. Your pension plan may make use of active fund managers; but unless you are a financial firm, managing financial assets is probably not part of your core business. Use of an expanded risk balance sheet can give top management a better picture of the composition and risk character of the firm.

Considering Alternative Pension Policies

Now I will try to show how the economic and risk balance sheets from Table 3 can be used to explore alternative pension asset allocation policies and their implications for capital structure and firm risk. Before I go any further, let me warn you that I'm not offering a specific policy recommendation for LT or any other firm. What I'm presenting is a framework for thinking about the effects of different asset allocation on the risk of the enterprise.

The conventional analysis of a change in pension asset allocation—say, a major shift from stocks to bonds—focuses mainly on the effects of the change in expected return on corporate balance sheets and income statements. At least from the vantage point of GAAP—though less so with the new U.K. standard—the primary effect of such a change is to reduce reported earnings.¹² In addition to such account-

11. This is in fact not uncommon for the kind of companies that have DB plans—in many cases, basic industrial companies with relatively low betas.

12. But if the firm also maintains its total risk posture by simultaneously issuing new debt and using the proceeds to buy back stock, the effect on EPS is not clear; EPS could increase.

Table 4 **Effect of Pension Fund Asset Allocation on Asset and Equity Risk: LT Corporation**

Fraction of Pension Assets in Equities	Pension Asset Beta	Total Asset Beta	Firm Equity Beta
0.00	0.00	0.17	0.70
0.25	0.25	0.30	1.23
0.60	0.60	0.49	2.00
0.75	0.75	0.57	2.34
1.00	1.00	0.70	2.88

ing effects, conventional analysis also takes account of any effects on the stand-alone risk of the pension fund.

The main focus of economic analysis, however, begins with the changes in risk. When a company alters the mix of its pension assets between fixed-income and equities, it changes its equity risk and the risk of the overall firm. For example, as can be seen in Table 4, if LT were to raise its pension allocation of equities from 60% to 100%, our analysis suggests that the firm's total asset risk factor would increase from 0.49 to 0.70—a significant increase in the risk of the total company. And the beta of the firm's equity is estimated to jump from 2.0 to 2.88—though, again, I ask you not to take the precision of these numbers seriously. In this case, you see nearly a 50% increase in the risk of the firm's equity. Investors require a higher expected return for this kind of increase in risk.

Now, let me also say that such an increase in risk is not inherently bad. What is important, however, is to understand the change and any possible firm-wide effects.

A decision to go to 100% equities, though not necessarily a bad idea for all companies, does mean a higher return requirement by your equity holders. When you think of the higher expected return on the equities in your pension fund, the good news is that you can indeed expect them to produce higher returns, at least over a sufficiently long time horizon. The bad news, however, is that because of the risk associated with your pension assets, your own shareholders will demand a higher return than they did before and lower the P/E multiple on your stock. So, even if your future pension contributions turn out to be lower and your reported earnings higher as a consequence of an all-equity pension, the reduction in your multiple may leave your stock price unaffected or even lower than otherwise.

But, again, I am not offering a specific prediction or recommendation here. My purpose is simply to show how overall firm risk and its equity risk are influenced by pension asset allocation, and to note that such changes could end up increasing the firm's cost of capital and lowering its multiple. Neither of these effects is necessarily bad, but you should prepare yourself for the probable changes.

Effects of Pension Change on Optimal Capital Structure

As we change the pension asset allocation, what are the implications for the capital structure or the amount of equity

capital required to keep the risk of our equity unchanged? Let's return to the case of LT, and assume that the company's management and shareholders are comfortable with their current equity risk factor of 2.0. Let's further assume that one of the firm's key risk management objectives is to maintain the beta risk of its equity at that level.

As we saw in Table 4, an increase in the allocation of pension asset to equities increases the risk of the total assets. And if we increase the risk on the left-hand side of the balance sheet, in order to keep the risk of our equity unchanged we have to reduce leverage or gearing. If you increase asset risk and leave the capital structure unchanged, equity risk goes up. Another way of saying this is that, for your creditors and equityholders to be as comfortable as they were before the pension change, any increase in asset risk will have to be offset by taking less risk with your capital structure. There is no free lunch in that sense.

Table 5 provides an indication of how much equity capital the firm would need to maintain an equity risk of 2.0 for a range of pension asset allocation choices. We begin with the assumption that LT's management and shareholders are comfortable with the status quo, at least in the sense that the combination of a 60% pension equity allocation with \$21 billion of shareholders' equity meets the firm's risk management criterion of maintaining an equity beta of 2.0. But, according to Table 5, if management took the extreme step of increasing the pension allocation to 100% equities, the firm would have to issue \$9 billion of new equity in order to maintain the same risk for LT's equity holders. In other words, to keep its equity risk the same, the firm would have to deleverage or reduce the gearing by \$9 billion; and, as shown in Table 5, its debt-to-equity ratio would drop from 0.9 to 0.33. At the other extreme, if the firm were to shift the entire pension into bonds that perfectly match the pension liabilities, the amount of equity capital needed to keep the equity risk at 2.0 would fall to \$7 billion from \$21 billion—and the debt-to-equity ratio would rise above 4.0.

Cushioning your Risks with Capital

Tables 4 and 5 provide just two illustrations of how, once you have set the analysis up correctly, you can begin to discuss pension asset allocation in an integrated way, taking into account the impact you are having on the capital struc-

Table 5 Tradeoff Between Pension Asset Allocation and Firm Capital Structure

Fraction of Pension Assets in Equities	Total Asset Beta	Firm Equity Beta	Equity Capital (\$bn)	Debt/Equity Ratio
0.00	0.17	2.00	7.3	4.48
0.25	0.30	2.00	12.9	2.10
0.60	0.49	2.00	21.0	0.90
0.75	0.57	2.00	24.5	0.63
1.00	0.70	2.00	30.1	0.33

ture and risk of the business. You can use this tool to ask how much capital you are holding in the firm to cushion the risk mismatch of the pension fund versus the amount needed to support the risk of the operating businesses.

You are not going to trade on the precision of these numbers, but the magnitudes and implications here are essentially valid and will stand up to more sophisticated applications. In fact, my firm IFL has done this kind of analysis for clients who were surprised to discover how much of their total risk, and therefore the total amount of capital allocation, had to do with the risk mismatch in their pension fund.

Does this say that all companies should immunize their pension liabilities and thus avoid a risk mismatch in your pension fund? The answer is no.¹³ Our analysis says only that you should understand how much risk your shareholders are bearing as a result of the mismatch, how much capital you are using to support it, and how your cost of capital is affected by it. An integrated approach requires you to look at all of these factors and consider all the choices that can be made. And when you do that, you are in a position to make an informed strategic decision.

Implementation

When you have done this analysis and decided on a pension policy, you then have to decide how to communicate that policy to the rating agencies, to your shareholders, to analysts, and to others. We believe that a good way to do that is to provide a full reasoned analysis in support of your new policy, one that includes a demonstration of how much risk-reduction credit you expect to get from changing a 60% equity allocation to, say, one of 25%. If you accept the numbers in the LT example, for example, you could eliminate almost \$8 billion in equity.

But that estimate would simply provide a starting point for your discussion. You would then have to see how much

the rating agencies would actually allow you to reduce equity without affecting the rating when you show them how much risk you are taking out on a permanent basis. This is an unsettled question, and the answer to it can be expected to change over time as the rating agencies and credit markets develop greater understanding of pension risk and its effect on overall firm risk. But to repeat my point: effective communication is an important element of the implementation.

Underfunding. The LT case is an example of a fully funded plan with no surplus or deficit. If the firm were underfunded, what might you want to consider? One possibility is to issue debt to fund the plan if you can. I'm not going to comment on whether that's the best strategy; the only answer I can give is that it depends on the firm and its circumstances. In making such a decision, some of the big issues will include taxes, whether you are a profitable firm, and how your communication with the rating agencies goes. Funding the plan may well be the optimal decision—or you may choose to fund the plan while making a change in the asset mix of the pension. And, of course, debt and equity are not the only possibilities for pension assets; there are other assets, including all variety of derivatives.

Overfunding. If you have a surplus, what do you do? Even if you want to match-fund the risk of what you owe, do you take risk with the surplus and, if so, what kinds of risk? Those are all part of the equation of what you need to analyze when thinking about and implementing a policy. There is no single answer for all cases.

Moving from a DB to a DC Plan

To those of you who decide that the answer is to end your DB plan and start a DC plan, I offer some observations. Suppose that an employee, upon retirement, would like to receive a stream of income comparable to the one earned in

13. Immunization of the pension liabilities, although the value-maximizing approach in many cases, will not always be the optimal solution. The problem with current immunization practices, or those that now go under the name "LDI," is that they apply ALM only with respect to the pension assets and pension liabilities alone instead of considering ALM with respect to the assets and liabilities of the entire corporation.

When determining an optimal policy, one must define the objectives and conditions under which you are assessing alternative pension fund policies. If you frame the problem as: What provides the maximum assurance to plan participants of the benefits that they have accrued in a plan that is currently fully funded (to the level of the ABO at true marked-to-market valuations) and that will continue to be fully funded as future benefits accrue *pari passu* with the existing benefits of the plan, the answer is indeed immunization. This particular framing takes as given the amount and terms of the promised benefits and assumes that the firm

cannot in the future "dilute" the security of the current beneficiaries' claims by either promising additional benefits in the future without immediately fully funding them or by changing the investment policy of the fund. To my knowledge, neither of these future financing and investment conditions is set either by employee contract or by ERISA law for typical U.S. DB plans.

From a general equilibrium perspective, pension asset optimization should consider the perspective of the firm and its shareholders as well as the beneficiaries of the plan in terms of the "bargain" between the two since the equilibrium level of promised pension benefits the firm will agree to is determined in part by the cost of providing those benefits, which in turn depends on the terms of the arrangement between the firm and its beneficiaries. I believe that over the past two decades, firms did not recognize how costly the benefits they offered were at the time they agreed to them, but they do now; and as we see »

the latter part of his or her working life in order to maintain more or less the same standard of living. Although some plans are more generous than others, the basic idea of a DB plan is that it provides something near to one's final income, perhaps scaled down somewhat. When this arrangement works, it's wonderful because the employees do not need to know anything; they simply have to believe it will happen, and the benefits have to materialize at the appointed time.

With a DC plan, life becomes simpler for the corporation in some ways. The moment it pays its fraction of income into the plan, it has seemingly carried out all of its obligations. The problem, however, is that in making this change, you are now putting your employees in the position of having to make some quite complex investment decisions. Imagine if you were approached by a 42-year-old who told you he wanted to retire at 67, and to have an income during retirement that was roughly equal to 70% of his average earnings between the ages of 62 and 67. What would you tell him he had to invest in and how much he should be contributing in order to hit that target? We do not even know today what that person will be making in 20 years' time, so this is quite a complex problem.

We do not ask people to do their own medical surgery, or other kinds of important activities which require a great deal of specialization. Yet, when addressing one of the most important challenges in their lives, funding their retirements, employees in DC plans are essentially forced to obtain advice that is typically based in large part on the assumption that history will simply repeat itself. However, a reasonable question for any of us as consumers to ask is, "What happens if history does not repeat itself?"

What other major product do consumers buy where they allow someone to hand them the product, tell them this is an important part of their lives, and then warn them that "If it does not work, it is your problem"? I am not just pointing fingers, because I am also in this business. I do not know the optimal solution, but I know that we can do better than simply leave individuals to make these complex decisions about risks.

That does not mean that DC plans are bad. What it does suggest, however, is that DC plans as they are commonly

carried out today, particularly in the U.S., are not the long-run answer. We have to design a product that works institutionally from a DC plan, but has an output that looks more like a DB plan. This kind of product is on the drawing board.

Conclusion

Corporations today face huge challenges in managing DB plans, and, if we go to the DC plans, there are huge challenges there as well. When I worked at a large investment bank, we had a focus group that aimed to design a great financial product for retired people. Focus groups were held all over the U.S., and participants included non-profit institutions as well as private corporations. The most common response from participants when asked what they thought of our product proposals was that "the products are too good to be true; we do not believe it can happen." But once we suggested that such products might be made available through their employers, their response was quite different: "Anything offered through the employer plan has been scrubbed; it has been studied by financial experts and lawyers. We trust our employers."

I cannot imagine that the response would be much different here in the UK. Consumers everywhere are looking for solutions they can trust—and, by and large, they seem to trust their employers. It is important to recognize that, with a DC plan, the firm may eliminate—at least on paper—a lot of risks and future obligations, but keep in mind that once you change the plan to a DC, your employees will expect you to have done a great job for them. If lots of people do not receive in the future what they were promised, companies may find themselves making good, either voluntarily or otherwise, on what prove to be the implicit obligations associated with being a long-lived institution.

ROBERT C. MERTON is a co-founder and Chief Science Officer of Integrated Finance Limited (IFL), a strategic advisory and pension-solutions firm, as well as John and Natty McArthur University Professor at the Harvard Business School. He was awarded the 1997 Nobel Prize in Economics for his contributions to modern finance, particularly in the area of option pricing.

everywhere, they are rapidly closing their DB plans for new members and freezing them for existing members.

No insurance company offers full-faith and credit of the U.S. government for its retirement annuity liabilities, even though very large AAA companies can be downgraded (AIG). In principle, the market could provide full faith and credit annuities with individual segregated accounts for each of its annuity participants. But it doesn't, and I suspect that few customers would be so risk averse as to be willing to pay the high incremental cost to move from AA-rated commingled funds of regulated insurers to segregated full-faith and credit asset accounts. That is, for the bulk of retirees, the competitive market equilibrium is probably not at that "corner solution" of extreme risk aversion.

To return to my original point, when one views the pension allocation decision in the context of *all* the firm's assets and *all* its liabilities—that is, when one practices ALM for the *entire firm*—one can surely imagine a solution in which the optimal asset risk position in the pension fund is not complete immunization and thus zero correlation with the exposure of the firm's net operating assets. In some cases, the optimal asset exposure could turn out to be one that is *negatively correlated* with the operating assets of the firm, which in turn would reduce the entire risk of the corporate asset base and improve the (implied) credit rat-

ing of the pension liabilities more effectively than simply holding debt securities with match duration to the pension liabilities.

The limitation of immunization, then, is not that matching pension assets and liabilities will fail to add value, but that it may not be the value-maximizing strategy. Since returns on equities, in the vast majority of cases, will be positively correlated with a firm's operating assets, holding equities in the pension fund is not likely to be an outcome of the firm-wide analysis recommended here. Immunization-like positions in bonds or long-dated fixed rate swaps will be an important part of the portfolio composition. However, when optimal tax, liquidity considerations, and hedge accounting rules are taken into account, it is entirely possible that the optimal pension asset mix could include significant holdings of alternatives like true "zero-beta" hedge funds (which are often highly taxed if held on the corporate balance sheet) and long-dated, illiquid equity put warrants on selected industries as well as interest rate, currency, credit default swaps to offset "passive" exposures of the operating businesses. (See my article, "You Have More Capital than You Think," *Harvard Business Review* 83, no. 11 (November 2005): 84-94.)

In sum, I do not believe that in 2006 the optimal pension asset allocation decision should be reduced to the "one size fits all" prescription of complete immunization.

Journal of Applied Corporate Finance (ISSN 1078-1196 [print], ISSN 1745-6622 [online]) is published quarterly, on behalf of Morgan Stanley by Blackwell Publishing, with offices at 350 Main Street, Malden, MA 02148, USA, and PO Box 1354, 9600 Garsington Road, Oxford OX4 2XG, UK. Call US: (800) 835-6770, UK: +44 1865 778315; fax US: (781) 388-8232, UK: +44 1865 471775.

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