

## What Determines Funding and Asset Allocation Decisions in Private Pension Funds: Evidence from the United States

Julia Coronado, Watson Wyatt  
J. Nellie Liang, Federal Reserve Board

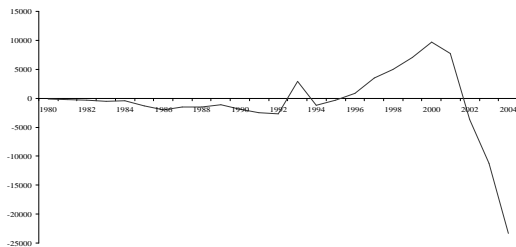
### US Pension Funds and Capital Markets

Equity Holdings (\$trillions)	2004:Q4
Private defined benefit plans	0.9
Public defined benefit plans	1.2
Private defined contribution	1.6
Total	17.2
Defined Benefit Liabilities as a Percent of Total Corporate Debt	18%

### Pension Fund Finances 2004

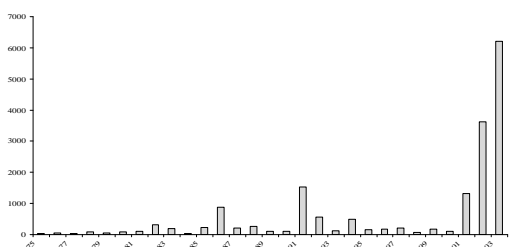
Average Funding Ratio	83%
Aggregate Funding Ratio	90%
<i>Asset Allocation</i>	
Equity	64%
Fixed Income	29%
Other	7%
Median Pension Risk Index	1%

### Net Position of the PBGC Single Employer Program 1980-2004 (\$millions)



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### PBGC Claims for the Single-Employer Program 1975-2003 (\$millions)



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### Influences on Funding Policy: Moral Hazard

- The PBGC assumes the assets and liabilities of a pension fund in the event of the sponsor's bankruptcy. Combined with flexible funding standards this guarantee provides sponsors with a put option the value of which increases with the sponsor's default risk and pension underfunding (William Sharpe 1976).
- Firms want to maximize their value. They will be interested in increasing the value of the put option only when the costs of bankruptcy are low (i.e. value of staying in business is low).
- Controlling for "charter value," the put option gives firms the incentive to fund their pension funds less generously, either through reduced contributions or increased benefit promises, when bankruptcy risk is high.

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## Influences on Funding Policy, cont.

- The tax-exempt status of the pension fund creates a strong incentive for firms to fund their plans. Fisher Black (1980) showed that tax arbitrage is possible if a firm borrows at a bond rate and invests in corresponding bonds within the pension fund.
- The complicating factor is the question of who owns any surplus or shortfall. If the firm is the residual claimant than full funding (or even overfunding) is optimal. Any restrictions on the liquidity of the pension fund may suggest less than full funding.

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## Influences on Asset Allocation

- Controlling for charter value, the put option gives firms greater incentive to take risks with their investments when bankruptcy risk is high. We may observe this risk-taking through higher equity allocations.
- Because bonds are the more highly taxed asset, the tax-exempt status of pension funds implies that the higher the marginal tax rate, the higher the allocation to bonds we should observe in the pension portfolio. This is a controversial finding.

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## Influences on Asset Allocation, cont.

- Risk management considerations suggest immunization generally. One possible implication is that the shorter the duration of liabilities, the higher the fraction of the portfolio allocated to bonds. This generally assumes the risks to pension liabilities are known with certainty. Also assumes the firm is the residual claimant.
- There is an equity bias embedded in FAS 87 accounting standards. Assuming an equity premium unadjusted for risk lowers the reported cost of the pension fund and this will be more valuable the larger is the pension fund relative to the size of the firm.

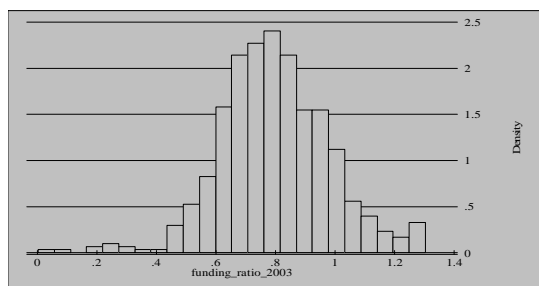
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## What Do the Data Tell Us?

- Data on pension finances come from Watson Wyatt's database on Fortune 1000 DB sponsors for FY 2003. Data on firm-specific expected default probabilities are from Moody's KMV.
- After eliminating firms who were already in Chapter 11 at the beginning of 2003, we have 560 firms or 90 percent of Fortune 1000 DB sponsors managing roughly two thirds of all DB assets.

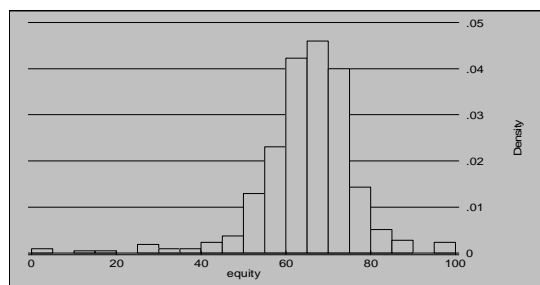
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## Distribution of Funding Ratios FY 2003



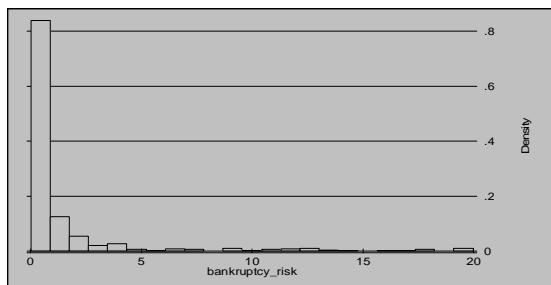
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## Distribution of Equity Allocations FY 2003



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### Estimated Default Probability for FY2002



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### Statistical Analysis

- We use regression analysis to sort through the various influences on asset allocation:
  - Measure of funding or asset allocation (dependent variable) =  $F(\text{potential influences (independent variables)})$
- Dependent variables of interest:
  - Employer cash contributions as a fraction of prior year's underfunding.
  - Funding ratios 2003 - market value of assets over projected benefit obligation.
  - Fraction of portfolio allocated to equity.

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### Explanatory Variables of Interest and Their Expected Sign in Regression

	<i>Funding</i>	<i>Equity</i>
Trailing probability of default/ Expected Loss	-	+
Firm has high marginal tax rate	+	-
Measure of the "charter value" of firm	+	NA
Measure of duration of liabilities	NA	+
Size of pension relative to firm	NA	+

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### Results: Regression on Employer Contributions as a Share of Prior Year Underfunding

<u>Independent Variable</u>	<u>Coefficient</u>	
Trailing default probability	-0.02 (3.16)	
Expected loss		-0.05 (2.74)
High marginal tax indicator	0.13 (1.67)	0.13 (1.70)
Charter value	0.07 (1.75)	0.07 (1.77)
R-squared	0.07	0.07

T-statistics in parentheses. Industry indicators included in regression

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### Results: Regression on Funding Ratio 2003

<u>Independent Variable</u>	<u>Coefficient</u>	
Trailing default probability	-0.01 (2.78)	
Expected loss		-0.05 (6.99)
High marginal tax indicator	0.04 (1.92)	0.03 (1.34)
Charter value	0.02 (2.40)	0.02 (2.18)
R-squared	0.11	0.16

T-statistics in parentheses. Industry indicators included in regression

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### Results: Regression on Share of Portfolio in Equity

<u>Independent Variable</u>	<u>Coefficient</u>	
Trailing default probability	-0.17 (1.18)	
Expected loss		-0.62 (2.11)
High marginal tax indicator	3.26 (2.82)	3.21 (2.83)
Charter value	-0.22 (0.56)	-0.26 (0.68)
Duration	14.86 (2.49)	15.33 (2.57)
Size of pension relative to firm	8.58 (1.97)	8.34 (1.92)
R-squared	0.10	0.10

T-statistics in parentheses. Industry indicators included in regression

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## Conclusions

- Our results suggest that the current system of private pension insurance in the United States does induce moral hazard and this occurs through less generous funding as the plan sponsor nears bankruptcy.
- It does not appear that plan sponsors shift their portfolios toward equity in response to increased risk of insolvency.
- Firms understand the value of the tax shelter and fund their plans more generously when they face a high marginal tax rate. High tax rates do not lead to higher bond allocations.

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## Conclusions, cont.

- Firms with longer durations invest a greater fraction of their portfolios in equity, and this finding is both economically and statistically meaningful.
- The bias toward equity investments built into the accounting standards has a significant impact on investment choices implying that a more market based standard might induce firms to hold less equity.
- There appears to be a herd mentality in asset allocation decisions, perhaps owing to the prudent person legal standard.

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