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What determines corporate pension fund risk-taking strategy?

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ABSTRACT

Corporate sponsors of defined benefit pension plans generally assume low investment risk when they have low funding ratios and high default risk, consistent with the risk management hypothesis. However, for financially distressed sponsors and sponsors that freeze, terminate, or convert defined benefit to defined contribution plans, the risk-shifting incentive (moral hazard) dominates. Pension fund risk-taking is also affected by labor unionization and sponsor incentives to maximize tax benefits, restore financial slack, and justify the accounting choices of pension assumptions. Sponsors shift toward an aggressive risk strategy when their pension plans emerge from underfunding, bankruptcy risk is reduced, or marginal tax rate decreases. Overall, we show that corporate sponsors adopt a dynamic risk-taking strategy in their pension fund investments.

"... [T]he biggest pension problem facing Corporate America and its investors is not the shortfall, but the risk mismatch between pension assets and liabilities."

– Robert Merton, Nobel Laureate, at BNP Paribas pension conference in London, October 21, 2004

1. Introduction

Corporate defined benefit (DB) pension plans play an important role in financial markets, with an aggregate size of over $2 trillion in 2008 (Investment Company Institute, 2008). They also represent a significant component of sponsors' integrated balance sheets–sponsors' leverage ratios are about 35% higher after incorporating pension assets and liabilities into the capital structure (Shivdasani and Stefanescu, 2010). The recent market crisis has amplified the financial risks for both pension funds and sponsors themselves. Bruno (2008) reports that large corporate pension funds lost over $100 billion during the first week of October 2008, and Towers Watson (2012) estimates the aggregate funding gap for Fortune 1000 companies to be $343 billion at the end of 2011.

The dramatic loss of pension funds as well as the resulting funding shortfall prompts questions over whether pension funds have undertaken excessive investment risks and how sponsors determine the investment risk of their pension funds. In this paper, we provide the first comprehensive empirical study on pension fund risk-taking strategy, using data from Internal Revenue Service (IRS) filings of Form 5500 from 1990 to 2007. We examine the major determinants of pension fund investment risk as measured by pension beta (Jin et al., 2006), after considering various sponsor incentives, plan constraints, the correlation between operating risk and pension risk, and the intensity of labor unionization. Our study provides strong evidence that corporate sponsors adopt a dynamic risk-taking strategy in their pension fund investment. Such investment strategy is significantly affected by sponsor funding ratio, default risk, intensity of labor unionization, and incentives to maximize tax benefits and to justify the accounting choice of pension assumption. This study also has important policy implications and suggests that pension risk mismatch should be a critical issue for regulators to address when designing pension laws to ensure the soundness of US pension systems.

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A number of studies have investigated DB plan funding and asset allocation policies, but the results are not conclusive. For example, Sharpe (1976) and Treynor (1977) conceptualize Pension Benefit Guaranty Corporation (PBGC) insurance for DB pension plans as a put option, and show that sponsors can maximize the put value (and accordingly maximize shareholders' wealth) by maintaining a minimum level of pension funding and investing in a maximum level of risky assets, or a "mini–max" strategy. As an interesting contrast, Black (1980) and Tepper (1981) suggest a "max–mini" strategy by showing that a tax arbitrage exists if sponsors maintain a maximum level of pension funding and invest in a minimum level of risky assets. A recent survey reports that for a typical pension fund, the allocation is 63% in equity, 30% in bonds, and the rest in other asset classes (Pensions and Investments Survey, 2004). This finding appears to be inconsistent with previous theoretical models.

In contrast to the majority of studies, which use equity percentage as a measure of pension risk (i.e., Bodie et al., 1987; Rauh, 2009), we use pension beta as an encompassing univariate measure for pension risk, as in Jin et al. (2006). Pension beta is defined as the difference between pension asset beta and pension liability beta, adjusted by the value of pension assets and liabilities as a percentage of sponsors' total market value. Pension beta is a preferred measure of pension risk for several reasons. First, it incorporates both pension assets and liabilities into a consolidated corporate balance sheet framework. This consolidation is important because an ultimate objective of managing pension funds is to meet pension liabilities. Second, as a dynamic measure, pension beta appropriately reflects the extent to which a sponsor's pension assets *mismatch* its pension liabilities over time. In contrast, equity percentage completely ignores the size and risk characteristics of pension liabilities. Third, pension beta accounts for the magnitude of pension assets and liabilities relative to a sponsor's market value. It indicates that pension asset–liability risk misalignment is particularly severe for sponsors with large pension assets relative to their market capitalization (Merton, 2006a).[1]

To investigate the determinants of pension fund risk-taking, we develop several hypotheses based on previous studies, including the risk shifting (moral hazard) (Sharpe, 1976; Treynor, 1977), the risk management (Rauh, 2009), the tax benefit (Black, 1980; Tepper, 1981), the financial slack (Bodie et al., 1987), and the accounting effect hypotheses (Bergstresser et al., 2006). We also formulate the risk synchronicity hypothesis, derived from the common risk correlation between a sponsor's operating risk and its pension investment risk (Broeders, 2010), and the labor union hypothesis after considering the effect of the employer–labor relationship on sponsor pension risk. We test all these hypotheses within an integrated framework using multivariate regressions, and control for potential endogeneity issues arising from the contemporaneous measure of sponsor pension risk, funding ratios, and bankruptcy risk. We also address the sensitivity of pension liability beta assumptions. This unified design allows us to examine the effect of each determining factor on pension risk-taking while holding other factors constant; whereas previous studies generally focus on one particular risk factor and test its effect on pension investment risk in isolation.

But this study goes beyond simply combining various hypotheses together. We examine the *dynamic* nature of corporate pension investment risk by asking the following questions: Do sponsors change their pension risk once they emerge from pension underfunding? Do they become more aggressive in pension investment when their bankruptcy risk is reduced? Do they adjust pension fund risk if their tax status changes? The answers to these questions will shed new light on the dynamic nature of corporate pension risk-taking strategy, as well as the interdependence between pension risk and sponsors' financial performance.

Furthermore, we take a closer examination of the risk-shifting hypothesis for two groups separately: (1) financially distressed sponsors; and (2) sponsors that either freeze or terminate DB plans, or convert them to defined contribution (DC) plans (termed as "event sponsors"). Our motivation is that the first group of sponsors is on the verge of bankruptcy and faces the largest plan termination probability. In such extreme cases, the put option provided by PBGC insurance has the highest value, which could enhance the moral hazard incentive and distort the relation between various determinations and pension risk. Moreover, when sponsors have severe financial distress or are near bankruptcy, employment contracts and future pension benefits are likely to be terminated. Under this circumstance, many otherwise growing pension obligations would be settled at lower values than previously estimated by actuaries or as recorded on balance sheets. This effect would produce a low or negative pension liability beta for sponsors approaching bankruptcy. Such a dynamic reduction in pension liability creates incentive for sponsors to shift pension risk rather than manage that risk. Comprix and Muller (2011) show that eliminating all future pension accruals is an important reason that sponsors hard freeze DB pension plans. Sponsors could also convert DB to DC plans as an escape route (Broeders and Chen, 2010). The second group of event sponsors therefore is naturally served as a good candidate to conduct an *ex post* analysis of the moral hazard incentive.

We summarize the major findings as follows. Sponsors with high default risk and low funding levels generally undertake low investment risk, consistent with the risk management hypothesis (Rauh, 2009). Pension fund risk is also affected by sponsor incentives to maximize tax benefits, restore financial liquidity, justify the accounting choice of the pension return assumption, and is affected by the intensity of labor unionization (i.e., the percentage of employees unionized or covered by a collective bargaining agreement). In addition, sponsors tilt toward high investment risk when their pension plans emerge from underfunding, when the bankruptcy risk is reduced to below industry median level, or when their marginal tax rate decreases to below industry median. These findings remain significant after controlling for potential endogeneity bias, and are robust to changes in pension liability beta assumptions. More importantly, financially distressed sponsors are strongly influenced by the risk-shifting incentive (moral hazard) – they take high pension risk when they are on the verge of bankruptcy. In addition, using sponsors who either freeze/terminate, or switch DB to DC plans as a subsample, we show that these sponsors gradually increase their pension investment risk as they approach the event year.

To summarize, corporate pension risk-taking strategies are a function of several important factors, including pension funding levels, firm default risk, marginal tax rate, labor unionization, and sponsor incentives to justify the choice of pension accounting assumptions and restore financial liquidity. Consistent with previous theoretical models (Sharpe, 1976; Treynor, 1977), we show that the risk shifting or moral hazard incentive dominates financially distressed sponsors and sponsors that freeze, terminate, or convert from DB to DC plans.

The remainder of this paper proceeds as follows. Section 2 discusses the institutional background of DB pension plans. Section 3 sets forth a literature review and develops the major hypotheses. Section 4 describes data, the sample, and major variables. Section

[1] Merton (2006a) illustrates this point using GM as an example. The automaker had $93 billion in pension assets as of January 2006, or seven times its market equity value of $13 billion. GM invested 65%, or about $60 billion of its pension funds, in the equity market. Given such a large exposure to the stock market, even a small amount of volatility in the market, e.g., a fluctuation of 10%, would result in a $6 billion swing in the pension fund, an amount equivalent to half of GM's total equity market capitalization.