
Unions, Default Risk, and Pension Underfunding

Martin Cherkes and Uzi Yaari

An explanation is provided for the following seemingly unrelated pieces of evidence concerning unions and pension plans in the United States: 1) The pension wealth of union members is greater than that of other workers, but 2) union pension plans are more often underfunded and 3) more likely to be terminated by default.

I. Introduction

Recent empirical findings by Allan and Clark (1985) show that the pension wealth of union beneficiaries is 50% to 109% greater than that of nonuniform beneficiaries. Other findings by these authors and by others show that union pension plans are more likely to be underfunded. For example, Ippolito (1985) reports that the average funding ratio of union pension plans is 30% lower than that of nonunion plans. Ippolito also reports that when the rate of unionization of a firm rises from the industry average of 40% to 80%, the probability of pension plan termination due to bankruptcy increases by 70%. The objective of this paper is to offer a coherent explanation for these seemingly unrelated pieces of evidence. Under the assumption of risk aversion, we obtain an interior solution for the optimal funding ratio: shareholders' expected utility is maximized at less than full funding. The proposed model explains why, despite a substantial tax disadvantage (Feldstein and Seligman 1981; Tepper 1981), firms with or without unions often underfund their pension plans. It also explains how the effect of unions on the risk of default is likely to decrease the optimal funding ratio.

II. The Scenario

Consider a firm whose most economic production method requires a specialized durable capital which generates a quasirent.¹ To focus on the incremental effect of a union, assume that the firm also employs an organized labor force seeking to extract rent from the firm for the benefit of its members. The long-run survival of the firm depends on the action of the union. Other things equal, the higher the rent extracted by the union, the lower the probability of the firm to survive over any given period of time.

Address reprint requests to Uzi Yaari, Faculty of Business Studies, Rutgers University, Victor Hall, Camden, New Jersey 08102.

¹ For a definition and discussion of the quasirent problem see Klein, Crawford, and Alchian (1978).

Following Lazear (1983), it is assumed that the union extracts economic rent via a two-part tariff. One part is a competitive wage which keeps intact the cost of labor input at the margin; the other part a lump-sum transfer of rent in the form of increased benefits. Let it be assumed that the lump-sum benefits are paid through a pension plan, taking the specific form of a defined-benefits (DB) plan. This is the most common form of pension, particularly among firms dominated by unions (cf. Ippolito 1985). Under the DB plan, the funding decision is left, to a large degree, to the discretion of the firm.²

The ability of the firm to adjust the level of funding of its DB pension plan has an important implication for its ability to cope with a union "hold-up." If the rent extracted by the union should cause an eventual bankruptcy, the firm can protect its owners by underfunding its pension plan, in addition to avoiding reinvestment in plant and equipment. After paying for current expenses (excluding depreciation), the firm's entire income would be paid out as dividends, thereby escaping the reach of the union at the time of bankruptcy. However, in view of the fact that the firm's income is stochastic, there is some probability that the firm will survive. Should the firm survive, unfunded pension benefits would be paid from future earnings, and the firm will have lost the substantial tax advantage of full (earlier) funding. It follows that the probability of default and the tax consequence of staying in business are the two opposing forces determining the optimal funding ratio.

III. The Model

Consider a firm which utilizes durable specialized capital amortized over N years (hereafter a period). Over this period, the firm earns a quasirent, the present value of which is Q dollars. Pension plan funding and pension payments, if any, will come out of this rent. Assume that workers are organized in a union which seeks to convert the firm's quasirent into a rent for its members. For simplicity, assume further that all workers currently employed will retire at the end of the period. Under normal retirement, the rent extracted by the union will be paid in lump-sum benefits of the amount R . The plan may be funded fully or in part, with the option of overfunding ruled out. Underfunding will force a surviving firm to pay part of the pension benefits from future earnings.

The plan is fully funded if P dollars are deposited in the pension fund at the beginning of the period, such that

$$Pe^{Nk} = R \quad (1)$$

where k stands for the risk-free annual rate of return. The funding ratio is defined by

$$\phi = \frac{F}{P}$$

subject to $\phi \leq 1$, where F is the actual amount funded, which may be short of P . Should the firm survive and renew its capital to stay in business, it would pay the retiring workers a pension of $(1 - \phi)Pe^{Nk}$ from next period's revenue. The present value of this portion

² Even under ERISA, a firm has 30 to 40 years to achieve full funding.

of the pension is

$$\frac{(1-\phi)Pe^{Nk}}{e^{Nk}(1-t)} = (1-\phi)Pe^{Nkt}$$

where t is the corporate tax rate and $k(1-t)$ the posttax opportunity rate of return. That is, for every dollar of underfunding, the amount $e^{Nkt} > 1$ would be paid from next period's revenue.

Given the probability π that the firm will survive into the next period,³ the typical shareholder with a utility function U is faced in the beginning of the period with the problem of⁴

$$\max_{\phi} \{ \pi U[(1-t)\{Q - \phi P - (1-\phi)\rho P\}] + (1-\pi)U[(1-t)(Q - \phi P)] \} \quad (2)$$

where $\rho \equiv e^{Nkt}$. The first-order condition for problem (2) is

$$\pi U'[A](\rho - 1) + (1 - \pi)U'[B] = 0 \quad (3)$$

where

$$A \equiv (1-t)\{Q - \phi P - (1-\phi)\rho P\} \quad (4a)$$

$$B \equiv (1-t)(Q - \phi P). \quad (4b)$$

The second-order condition ($U'' < 0$) is fulfilled by the assumption of risk aversion. The first-order condition implies

$$\frac{U'[A]}{U'[B]} = \frac{1-\pi}{\pi(\rho-1)}. \quad (5)$$

IV. Analysis

Denote by ϕ^* the optimal funding ratio implied by equation (5). Based on equation (4), we can write

$$B - A = (1-t)(1-\phi)\rho P$$

so that

$$B - A \geq 0 \Leftrightarrow \phi \geq 1$$

and based on equations (4) and (5)

$$\phi^* < 1 \Leftrightarrow B < A \Leftrightarrow \frac{U'(A)}{U'(B)} < 1 \Leftrightarrow \frac{1-\pi}{\pi(\rho-1)} < 1 \Leftrightarrow \pi < \frac{1}{\rho}.$$

³ A more complete model would state the probability of default as a function of the ratio between the rent extracted by the union and the quasirent earned by the firm. This modification would considerably complicate the model without changing the main results.

⁴ We focus on the incremental effect of a union by concentrating on that portion of the pension which represents a rent. The analysis can be readily extended to the other portion of the pension which is not affected by the presence of a union but has a similar influence on the consequences of survival versus default.

It follows that $\pi < 1/\rho$ is a necessary and sufficient condition for an optimal funding ratio below unity. It is further seen that the left-hand side of equation (5) is a decreasing function of ϕ , implying that a decrease in the parameter π will also drive ϕ^* down, so that a firm with a lower survival probability will seek a lower funding ratio.

It remains to demonstrate that the inequality $\pi < 1/\rho$ is met under feasible parameters, so that pension underfunding is the optimal policy. Historical evidence (Fabbri 1977) shows that the average risk-free interest rate for the period 1900–1975 was relatively low, about 1.55%. For $N = 20$, $t = .5$, and $k = .0155$, the inequality $\pi < 1/\rho$ (based on $\rho = e^{Nkt}$) requires π which is just below 85%. Under the assumption of binomial distribution, this implies an *annual* default probability of .0077, or about .75%. For the 30-year period 1953–82, the annual default rate among all U.S. corporations averaged .46% (*U.S. Statistical Abstract 1985*); yet, Ippolito (1985) finds that heavily unionized firms have a default rate which is 70% higher than the average, or about .78%. The perceived default risk of individual firms—with or without unions—can be much higher.

V. Conclusions

This paper shows that risk-averse shareholders may choose to underfund a defined-benefits pension plan, despite a substantial tax advantage of full funding. The two parameters entering the funding decision are the perceived probability of default and the risk-free rate of interest. For feasible values of these parameters, underfunding is shown to be the optimal policy, where the extent of underfunding increases with the probability of default. This result explains the recent evidence that unionized firms tend to have larger pension plans which are characterized by a lower funding ratio and a shorter life span.

Bibliography

- Allen, S., and Clark, R. August 1985. Unions, pension wealth and age-compensation profiles. NBER Working Paper No. 1677.
- Fabbri, B. J. December 1977. How inflation affects interest rates. Monograph, Salomon Brothers.
- Feldstein, M., and Seligman, S. 1981. Pension funding, share prices, and national savings. *Journal of Finance* 4:801–824.
- Ippolito, R. A. 1985. The economic function of underfunded pension plans. *Journal of Law and Economics* 28:611–651.
- Klein, B., Crawford, R. G., and Alchian, A. A. 1978. Vertical integration, appropriable rents, and competitive contracting process. *Journal of Law and Economics* 21:297–326.
- Lazear, E. P. 1983. A competitive theory of monopoly unionism. *American Economic Review* 73:631–643.
- Tepper, I. 1981. Taxation and corporate pension policy. *Journal of Finance* 36:1–13.
- U.S. Statistical Abstract*. 1985. U.S. Printing Office, Washington, D.C.