

# **Pension Finance and the significance of Defined Benefit pension plans**

**(Through considering the essence of Liability Driven Investment)**

**For the Joint Colloquium and Seminar of IAA, IACA, PBSS and IAAHS**

## **(Outline of this paper)**

It is necessary to consider LDI (Liability Driven Investment) in the context of pension ALM (Asset Liability Management). While an appropriate evaluation of the pension liability is indispensable to do so, there emerges the direction toward integrating debt concepts that are separately set. If the pension liability is properly evaluated by the mark-to-market basis, it might be possible to stabilize the profit and loss management of pension plans by using financial techniques. This relates to the entire pension finance, and it is a key to develop the future of the defined benefit pension plans. In the context, pension actuaries should review their principles and mind-sets.

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## **1. Background and concept of LDI**

LDI is now a popular word among domestic and foreign people in the pension world. LDI means 'Liability Driven Investment' and there seem to be the following matters in the background of it.

1. Employers want to reduce excessive fluctuations of pension costs.
2. Accounting changes have influenced pension liabilities directly.
3. Funding regulations for deficiencies have become severer than before.
4. It seems to be adequate for the management of the pension plans that are closed (exclude new comers) that have increased in the U.K. and the U.S.

Especially, there is anxiety about the reappearance of the miserable pension situations caused by 'the Perfect Storm' represented by the combination of stock market crash, interest rates fall and rapid aging population.

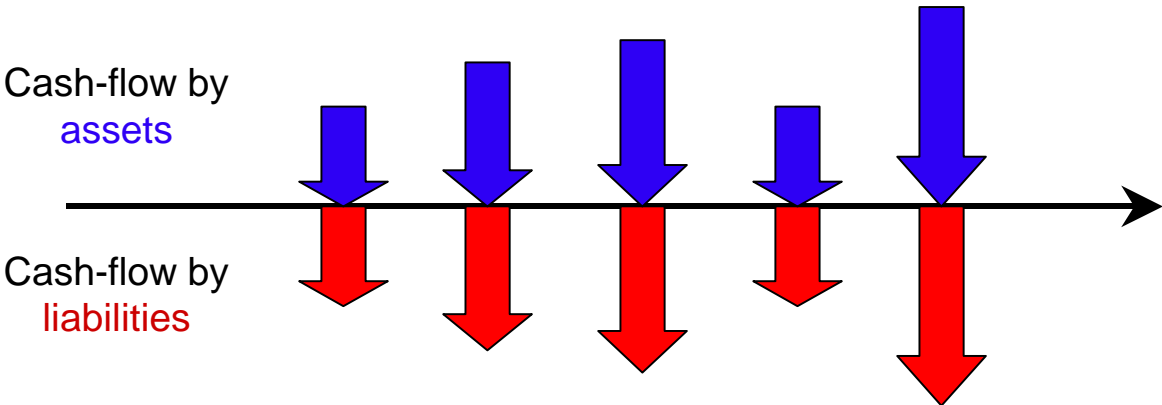
The word LDI is currently used with somewhat different meanings among people. Generally, it means the investment method whose benchmark is not the market as traditional investment strategies but the pension liability. Therefore, LDI should be considered and understood in the context of ALM (Asset Liability Management).

In this article, only the defined benefit pension plans are considered.

**2. Strategy of investments for pension liabilities**

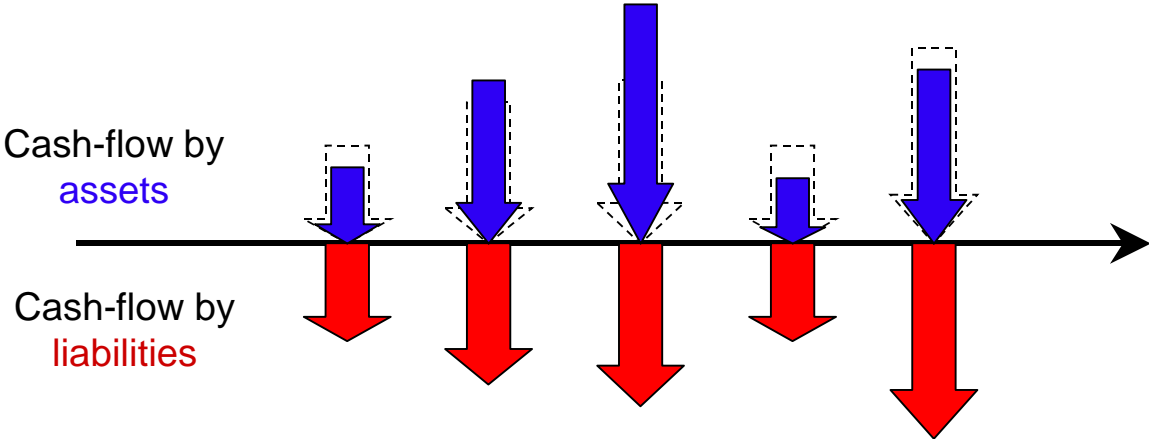
First of all, it is necessary to think about a risk-free portfolio to the pension liabilities as a base line. This is called cash-flow matching that cash-out flow by pension liabilities is completely covered by cash-in flow by pension assets as shown in Figure 1. This investment strategy offsets the fluctuations of markets.

**Figure 1: Cash-flow matching**



Next, what should be considered is pursuing investment opportunities to get more than the risk-free rate. This strategy means to accept the mismatch of cash flows between pension liabilities and pension assets and to bear the mismatch risk as shown in Figure 2.

**Figure 2: Pursuing investment opportunities**

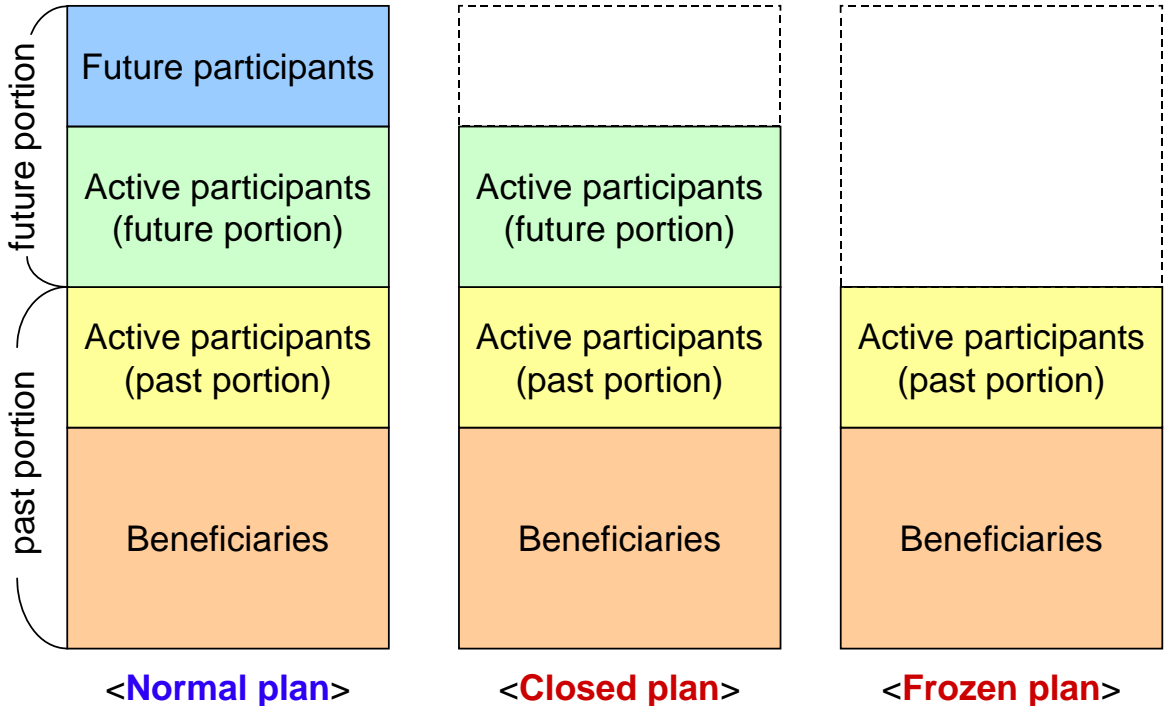


**3. Definition and structure of pension liabilities**

It is the most important for ALM (rather than LDI) how to define pension liabilities to be considered. There are some categories of pension liabilities such as for funding or for accounting. Moreover, pension liabilities can be divided into the past portion and the future portion.

On the other hand, many defined benefit pension plans have been "closed" (i.e. exclude new comers) in the U. K., the U.S. and other countries. Furthermore, there are some "frozen" plans (i.e. stop future accruals for current participants). The structure of pension liabilities as such is shown in Figure 3.

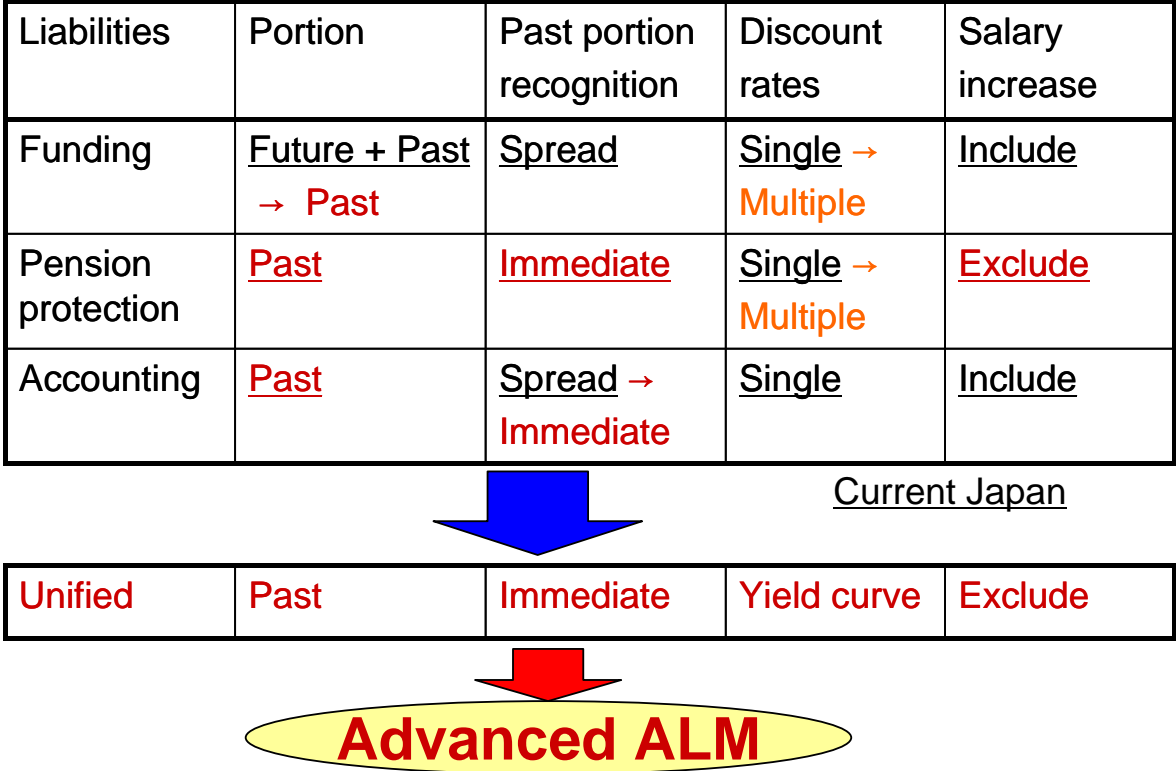
**Figure 3: The structure of pension liabilities**



There are many factors to influence the parts of pension liabilities. They are the hiring plan for future participants, the salary increase for the future part of active participants, the re-valuation of benefits (such as indexation) for the past part of active participants and the re-valuation and the longevity for beneficiaries. In addition, the interest rate changes will influence heavily on the pension liabilities of active participants and beneficiaries.

Following this, the variations of pension liabilities can be as shown as in Table 1.

Table 1: Variation of Pension Liabilities



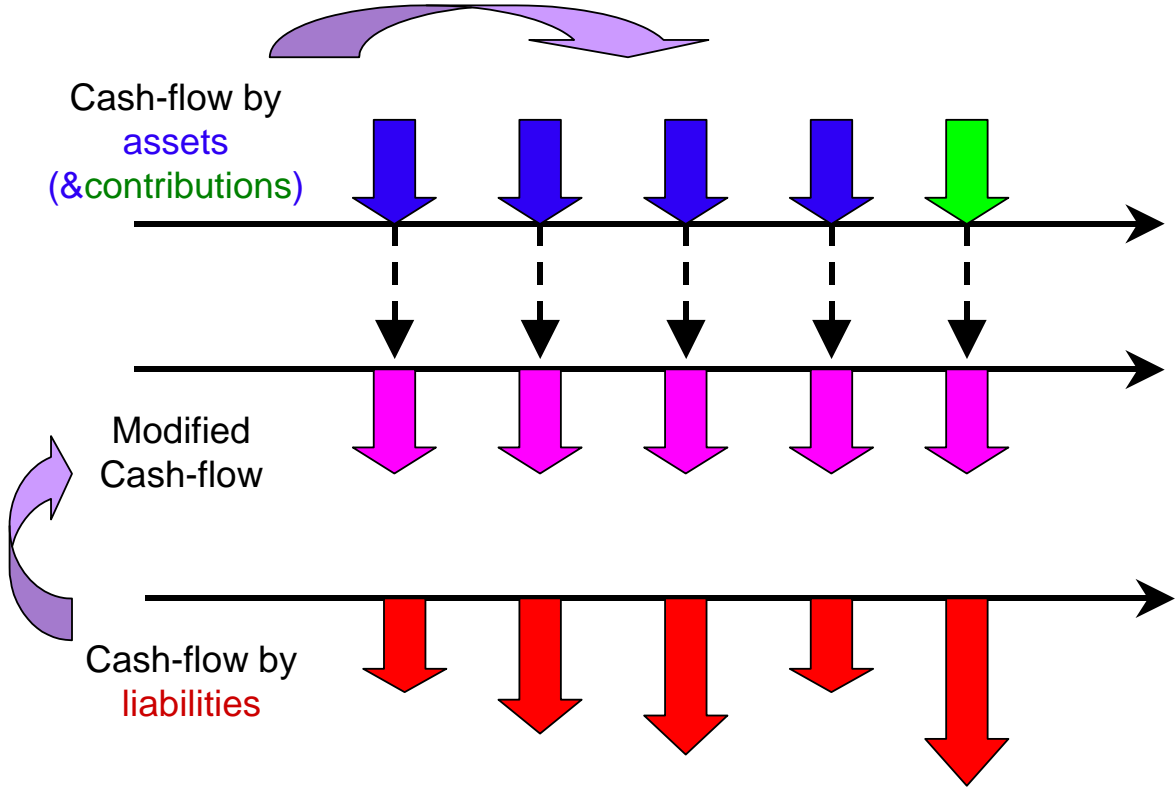
The arrows “→” in the table show the global directions to change. The current situation of Japan is shown by underlines. From this table, pension liabilities seem to move toward integration. The direction is focusing the past portion, recognizing it immediately and excluding future salary increases because of the past portion (in this respect, the accounting liability is not reasonable).

The most remarkable factor is the discount rate. In the past, a single rate had been used for any purpose of pension liabilities despite the timings of cash flows. However, the use of a rate that does not contain term structure is not consistent with the concept of financial engineering and is difficult to establish the suitable investment strategy. There emerged the use of discount rates allocating to the divided periods for pension protection, so the overall use of the yield curve for discount rates may be introduced in the near future.

**4. Effectiveness of financial techniques**

For the integrated pension liabilities, rapidly developing financial techniques enable changes to cash flows of pension liabilities and selection of corresponding investment products as shown in Figure 4.

**Figure 4: Effectiveness of Financial Engineering**



The change of cash flows is not special any more. A typical example is a housing loan where the selection and the change of the fixed interest rate option and the floating interest rate option is easily achieved by using financial techniques such as derivatives.

The stripped bond that separates the principal and the coupons of 30-year government bond was launched during 1980s in the United States. By using the stripped bond, each cash-out flow can be matched by the generated zero-coupon bond. The cash-flow matching is not only theoretical, but practical.

Now, it is very popular not only to sell off the part of liabilities, but to

target a company as a whole by M&A. Considering the remarkable development of financial techniques as such, there are no basic restrictions to manage pension liabilities that are adequately evaluated.

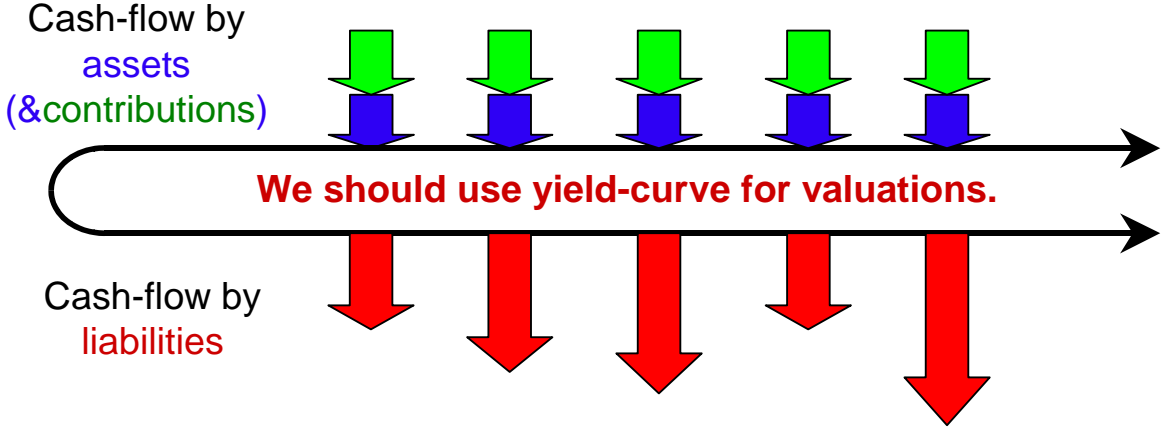
Already in the U K. where the closed pension plans have increased, the financial institutions have appeared to trade pension liabilities. This movement should be considered to accelerate in the future.

Of course, there are peculiar problems associated with pension liabilities. There are many who think that the risk of revaluation and longevity is not easy to be adequately handled. However, the supply with innovation should arise to the demand. The very long-term bond with 50 year maturity or the indexation bond can be thought as examples. The sound market produces methods for hedging the risk and for taking advantage of the opportunity with the risk.

**5. Origin of pension finance**

By the way, is the use of financial techniques very new for pension system? I don't think so. Please see Figure 5.

**Figure 5: The structure of Pension Finance**



This Figure shows the structure of pension finance. The cash-out flows that are produced for benefits are financed by cash-in flows that are produced by pension assets (the accumulation of past contributions) and future contributions to balance as a whole future periods.

The concept of balancing inputs and outputs is the essence of pension financing, and those who have been in charge of it are pension actuaries. They have contributed the needs of employers by converting volatile benefit flows into stable contribution flows by using a pension outside the company. As a result, they have also contributed to protect benefit rights of pension beneficiaries.

However, the importance of the cash flow management for companies has been decreased because various ways to finance flexibly cash needs for them have emerged with advanced financial techniques. On the other hand, it is the profit and loss management for the market and companies to have increased importance. The importance of the profit and loss management based on liabilities and assets has been increasing in the movement of corporate accounting toward mark-to-market basis.

Then, the requested method is how to stabilize volatile benefit cash flows of a defined benefit pension plan on the profit and loss calculations.

It should not be difficult by using financial techniques.

To do so, however, the use of the yield curve becomes an indispensable condition. There are some among pension actuaries who justify the use of single rate regardless of term based on the long time commitment of pensions, but I feel that they only adhere to the customary practice to simplify calculations.

We now have the advanced financial techniques owing to the remarkable development of the IT technology and matured sophisticated market. The use of them should be a key to open the future of defined benefit pension plans .

At the same time, we should not forget that the cost of a defined benefit pension plan is not only financed by the pension asset which is the accumulation of past contributions, but the pension promise for future contributions by a company.

## **6. Future significance of defined benefit plans**

The number of observers who think that DB plans will decrease or even disappear altogether in the not-too-distant future seems to be increasing, not only in Japan but also overseas. According to this view, DB plans will largely be replaced by DC plans. How should we evaluate such a trend?

A proper pension system should provide both a saving as well as an insurance function. However, a defined-contribution plan lacks the latter, and some people might therefore argue that it is no pension plan at all. It is certainly doubtful whether a defined-contribution plan can be classified as a pension system when

we look only at its definition, but if we judge by its function, providing old-age income security, it might actually be called a pension plan.

However, if DC plans were really to remain the only sort of corporate pensions, the story would become quite different. In such a case, the favorable tax treatment of the pension system would become merely a privilege for a special type of saving. Although it is excellent that a lot of senior citizens have their own savings, favorable tax treatment for the pension system as a national policy can only be justified when it provides old-age income security beyond savings. From this point of view, favorable tax treatment should be directed first to public pensions, then to DB-type pensions with a mutual-help function, and only finally to an individual annuity. The DC plan without a mutual-help function should be treated the same way as an individual annuity.

On the other hand, let us consider this issue from the position of a company that offers such a pension plan. There are many who argue that prepayment as wages or contributions to a DC plan is better than providing DB plans, because such a system takes better care of ex-employees than current employees.

To illustrate this point, let us draw an analogy with a basic business transaction. An employee acquires the right to receive compensation as a reward for his or her labor. That is basically the same as when a merchant acquires the right to receive money when he or she sells goods. In the case of labor, an employee is a seller and his company is a buyer. For the seller, it is certainly safest to be paid the price at once. Therefore, the seller side

will basically demand a lump-sum cash payment. If the buyer side responds with such a payment, the transaction is settled and another transaction will follow. Now let us assume that a company on the buyer side proposes to the seller side that the payment is deferred for some time. Behind such a request, there may be the financial need to retain money for the construction of a new factory, or various other reasons. How should the seller think about this offer? If the buyer worries, he should refuse the offer and demand instead a lump sum payment. On the other hand, when he can trust the seller and the proposed bill payment is more advantageous or continuous dealings with the seller can be expected in future, he may choose to accept the proposal.

The same kind of situation applies to the corporate pension system. Although there might be a trend at the moment for companies to prefer prepayments because of changes in retirement benefit accounting etc., there have also emerged some cases where employees demand prepayments instead of pensions because they are concerned about the future of their companies. In business, a company cannot expand simply by cash transactions. For a merchant, the most important thing is said to get trust, and the ability to obtain deferred payments should be thought of as one sign of such trust. Of course, excessive deferred payments might cause problems, and the seller would not accept them. However, if all payments had to be in cash only, a company would face too many restrictions in its business activities. In short, it is desirable to have an adequate balance of prepayments and deferred payments.

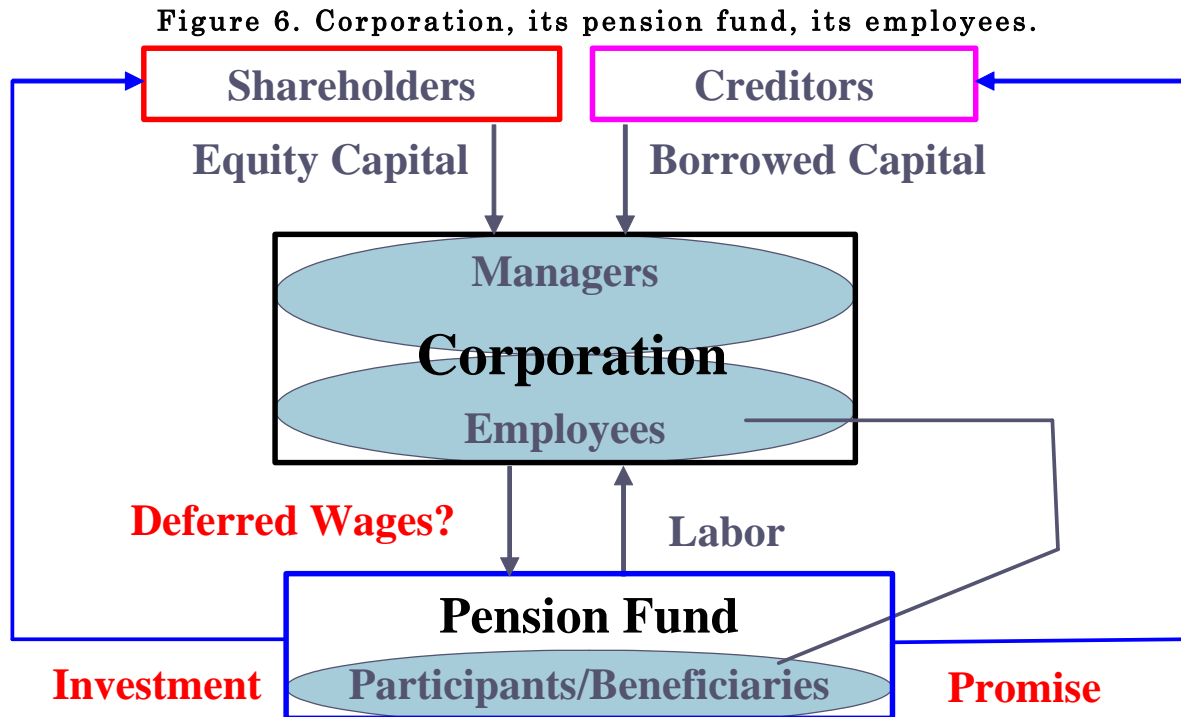
Another important advantage of DB plans with deferred payments is that the level of payments and the manner of payment can be flexibly adjusted. Moreover, the benefits of these plans can be structured in such a way as to limit early employee excess and to make them stay longer with a company. That means that employees who leave a company after a relatively short period of time will not receive their full accrued benefits whereas benefits increase progressively for those who commit themselves longer to the company.

If we think about the future of corporate pensions in Japan, it is necessary to think about the relationship between companies and their employees now and in the future. As for the companies, the power of

shareholders represented by institutional investors has become much stronger in recent years, and voting rights are exercised more actively in order to influence management and corporate governance. Under such circumstances, some companies have started to focus too much on short-term profits, sometimes reducing wages and firing employees. Of course, a company that finds itself in financial trouble needs to reduce costs. However, this should not be carried out at employees' expense, for it is on them that the company's fate ultimately depends.

## 7. Corporation and its pension fund

Another important aspect is the relationship between employees and pension funds, as shown in figure 6.



Pension funds provide capital through stock investment and thus become shareholders of the company. However, the capital of pension funds stems ultimately from the deferred payments that employees have acquired by their labor. Consequently, pension capital will decrease if employees' pay is squeezed by wage reduction or restructuring. The entire mechanism may finally collapse if too much pressure is put on the company. This suggests that the pension fund should not focus excessively on short-term profits.

In a defined benefit plan, the full amount of the benefit is not necessarily funded. It is quite common to observe funding deficiencies. How should we feel about this? Although pension assets are important for the security of pension benefits, they are not the only and most important part of a defined benefit plan. The most important part is the company sponsoring the plan, and the trust provided by the participants and the beneficiaries. This can be easily understood by referring to the transaction example mentioned above.

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