Cash Balance Pension Plan in Japan –Current Situation and Future–

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Abstract; Recent years, corporate pension plan sponsors and stakeholders have confronted serious economic crisis in Japan. Suffering from severe investment environment, they have tried to manage and control a variety of risks involved in pension plans in order to minimize deficit and mitigate fluctuation of cash flow. Particularly, market risk, by which plan assets cannot be secured enough for corresponding obligation, would be one of the most important factors because of its significant impacts on financial management of pension plans.

Cash balance pension plan (CB plan) was first introduced to Japan in 2001. As a form of hybrid pension plans, it has function to control obligation and cash flow in accordance with social economic conditions. Consequently a lot of sponsors have switched their plans to cash balance pension plans.

This paper outlines the feature of cash balance pension plan in Japan and its current situation in terms of application and operation.

In addition, the modified CB plan is proposed with the function to relate its obligation to pension fund in terms of their fluctuation. The modification would enable plan sponsors to deliver more sustainable financial management even in the severe investment circumstance. It would also allow participants to select appropriate type of interest credit and design of benefit level considering their risk tolerance.

At the end, to introduce the modified CB plan in Japan as a practical matter, some issues below are discussed.

- (1) Method to measure the obligation under the accounting standard
- (2) Method to appraise caps/floors in measuring obligation
- (3) Modification of benefit reduction judgment scheme in design alternation

1. Backgrounds and Objectives

1-1. Corporate pension plan in Japan (current situation of DB plans)

Post-employment benefits system in Japan consist of public pension plan which is adapted to most people and complementary private benefit plans such as corporate pension plans, lump-sum benefit plans and private pension plans or so. Entities and individuals voluntarily establish or prepare private benefit plans.

While recent declining birthrate, a growing proportion of elderly people and severe economic environment have made public pension downscaled, private benefit plans including corporate pension plan has been expected to play more important role to achieve and maintain the stable income security in old age.

Corporate pension plans in Japan are divided into two types, Defined Benefit Pension Plan called "DB plan" and Defined Contribution Plan called "DC plan".

DB plan is generally defined as the system in which the benefit formula is preliminarily determined and contribution is calculated subsequently to balance with that fixed benefit. DC plan by contrast preliminarily determines the contribution and benefits are equivalent for the accumulation of contribution principles and investment profits.

Characteristically the predecessor of most DB plans in Japan is traditional lump-sum benefit system that became common by the early 20th century. In that system preliminarily defined lump-sum benefits are paid by entities to the retired mainly as a means of the long-term service reward rather than as the deferred salary.

The design of DB plans is generally based on that lump-sum benefit system and that lump-sum benefit at retirement is converted to annuity by prearranged rate called conversion rate. The benefit level depends on entities or plan sponsors and a lot of benefit formulas can be taken in DB plan. Final salary pension plans, career average plan, point basis plan and cash balance pension plans are all called DB plan in Japan.

DC plan was introduced in 2001 in addition to the existing DB plan. In DC plan, the amount of contribution is fixed and the obligation on accounting is off balance. However, there exists limit of contribution in Japanese DC plan by which the amount of target benefits entities intend to grant is not necessarily achieved. Moreover, employees are responsible for investment of their account and the amount of benefits paid in the future is at risk of significant fluctuation.

Though DC plan has spread to some extent since its introduction, DB plan in Japan still occupies central place to provide means of support for the unemployed and post-retirement life.

Recent years, corporate pension plan sponsors and stakeholders have confronted serious economic crisis in Japan. Particularly since 2007, deterioration of DB plan's financial condition has became more serious by significant declines of stock market.

For business owners as plan sponsors, worsening business conditions is getting it more difficult to contribute properly to corporate pension plans. That could lead to negative spiral that accelerates the financial deterioration of DB plans.

Since continuation of DB plans is a matter of concern under the serious economic situation, the Japanese government is exploring various relief measures such as temporary relaxing of funding standards and postponement of additional contribution payments. Though these measures temporary stabilize the financial condition, it is undeniable that they just put the fundamental problems on the back-burner. If economic recovery is not expected in the future, plan sponsors would be burdened larger amount of contribution in addition to contribution postponed previously.

On the other hand, Tax Qualified Pension Plans (TQPPs), one of DB plans in Japan, which have becme widespread mainly within small entities is to be statutorily abolished in 2012. Accordingly a

considerable number of TQPP would be altered to other DB plans such as Defined Benefit Corporate Pension Plans (DBCPPs) in Japan. Approximately 24,000 TQPPs still remains in March 2009.

However, there is strict funding standard in DBCPPs which TQPPs does not require. Business owners of smaller entities appear to have serious concerns regarding additional cost that funding standard would require and eventual decline of their business conditions. There is also perspective that such strict funding standard prevents the TQPPs from altering to DBCPPs. In fact, some business owners abolish TQPPs and return their post-employment benefits to lump-sum benefit plans which means they eliminate the annuity option.

Given such current situation of DB plan in Japan, some fundamental modifications would be needed to maintain DB plans. A new type of pension design that makes it possible to be stable in their operation regardless of economic condition would be one effective alternative for DB plan reformation.

1-2. Objectives in this paper

Cash balance pension plan (CB plan) was first introduced to Japan in 2001. As a form of hybrid pension plans, it has function to control obligation and cash flow in accordance with social economic conditions. Consequently a lot of sponsors have switched their plans to cash balance pension plans. These days, however, there are some discussions regarding more flexible benefit design would be needed.

This paper outlines the feature of CB plan in Japan and its current situation in terms of application and operation. In addition, some possible modifications of current cash CB plan are proposed along with consideration of their effects and problems.

2. Current Situation of Cash Balance Pension Plans (CB plan) in Japan

2-1. Brief overview of current CB plan

In CB plans, benefit is determined in accordance with the notional account balance that is accumulation of pay credit and interest credit.

Pay credit is granted to the notional account balance at each accumulation period by preliminary defined way such as certain percent of pension salary or fixed amount per year.

Interest credit is calculated by multiplying the notional account balance by the rate of interest credit.

As the rate of interest credit, statutorily designated options below are available

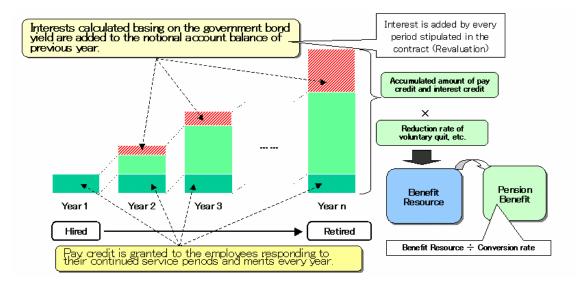
- (1) fixed rate
- (2) yield of government bonds and other objective indexes which can be estimated reasonably ¹
- (3) combination of (1) and (2)

The rate must not fall below zero and lower limit (floor) or upper limit (cap) can be added to the rate.

The amount of annuity can be reevaluated by annuity conversion rate linked to the same indexes listed above. It is possible that the different rate is adapted at each period depending on age or the length of participation period.

¹ Consumers price index or wage index are statutorily given as examples

Figure 2-1 Cash balance pension overview



2-2. Effectiveness of CB plan

The benefits in CB plan linked to such indexes enable the financial management to be delivered in accordance with the social financial environment.

Typical effects provided by CB plan are listed below,

· Mitigation of risks in financial management

In case the yield of government bonds is set as the rate of interest credit, the amount of benefits is decreased or mitigated in the recent condition that the market interest rate is kept lower. That lower amount of benefit would balance out the decline of assets.

For participants their benefits are variable depending on the indexes that the interest rates are based on. However, the rate of interest credit can not be below zero, thus it secures certain level of benefits. Moreover, it can be stated that the substantial value of benefits is maintained given the inflation trend and the growth of interest rate are generally related. In other words, CB plan has function to hedge inflation risk.

· Stabilization of the obligation and cost on accounting

The obligation of DB plan on corporate accounting in Japan (projected benefit obligation; PBO) is appraised by dividing estimated benefits in the future which corresponds to the past service period by the discount rate.

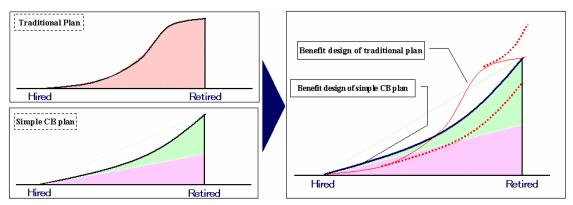
The discount rate is defined based on the yield of long-term safe bond. Increase of discount rate makes PBO lower, and vice versa. The yield of government bond is generally set as the discount rate, therefore if the rate of interest credit is based on government bond in CB plan, the rate of interest credit and the discount rate are co-related. Consequently, the decrement amount of PBO caused by decrease of the rate of interest credit could balance out the increment caused by decease of the discount rate.

2-3. Variation of benefit design in current CB plan

The simple design of benefit level in CB plan is formed by the principle and the interest of pay credit. In Japan, the traditional DB plan is characteristic in seniority and favorable treatment for long-term service that makes design of benefit level back-loaded as seen in previous lump-sum benefits in early 1900's. Therefore the traditional design of benefit level does not match that of CB plan in many cases. In alternation to CB plan, consistency with benefit level of former plans is one of the most important issues to be considered.

In addition to that, there is a plenty of demands employers and employees have for corporate pension plans in the recent changing work environment such as increase of job transfer and

Figure 2-3 Benefit design difference to be considered



prevalence of performance-based system or so.

In Japan the benefit design of CB plan can be delivered flexibly. The examples are indicated below.

A: Prevent the loss of human resources by adapting discounted benefit for voluntary retirement. The notional account balance can be discounted depending on length of participation period, reason of retirement or educational qualification. For instance, the discount amount for voluntary retirement is usually determined by length of participation period while any discount is not adapted to retirement by other reasons and long service leaver.

Seniority and life-long employment are still main streams in Japanese work environment. These benefit designs tend to be favorable to business owners that intend to prevent the loss of human resources. It is also to be mentioned that any particular statutory regulations to such back-loaded design are not existed in Japan except the amount of benefit must not decrease with the participation period increased.

B: Combination with point-based benefit

While pay credit is determined by multiplying pension salary by fixed rate, the benefit levels appear to be alike among the same generations because the typical pension salary structure is characteristic of seniority in Japanese society. If business owners want to design benefits in CB plan apart from existing seniority structure, combination with point-based system would be effective.

For example, business performance-based point at each appraisal-term multiplied by fixed rate as pay credit, which would be effective to reflect performance-based system in pension plans.

C: Combination of multiple indexes

Type of indexes can differ due to age, professions or participants/beneficiaries. For example, higher rate of interest credit to the elder makes the design of benefit back-loaded that could promote longer service by employees like the discount to voluntary retirement. Furthermore, to improve the motivation of employees, higher rate is sometimes given to the participant period rather than the deferred.

D: Combination with traditional pension plans

There is another possible design of CB plan combined with traditional DB plans. The final salary benefit, for example, is maintained during participation period and at retirement lump-sum based benefit calculated by final salary benefit formula is set as notional account balance that is to be revaluated by variable rate of interest credit or conversion rate during the deferred and entitled period.

This design enables the previous design before alternation to be maintained (lump-sum based benefit is preserved) and that leads to effective promotion of negotiations with participants regarding introducing CB plan.

E: Adaptation to joint operated corporate pension plan

Recent years, to reduce the administration cost, promote the efficient investment and strengthen the governance of affiliated entities, a number of entities are establishing joint operated pension plans more frequently. It is usually so difficult to balance with the previous plans particularly when the previous benefit levels are quite different among these entities. CB plan could be introduced to such case with setting the amount of benefits which corresponds the past service period as the initial notional account balances. It could maintain at least each previous benefit even after introduction of new design.

In addition to that, coordination of benefit levels for service period after the alteration among constituent entities could be relatively simple by setting various type or amount of pay credit depending on the entities.

With the merit above, latest joint operated pension plans have gradually introduced CB plan.

2-4. Current situation of CB plan

After introduction of CB plan to Japan in 2001, a lot of sponsors have altered their plans to CB plan.

Figure 2-4_shows the number of CB plan application under Define Benefit Corporate Pension Act in September 2006. It indicates CB plan has spread to a certain amount of entities.

Behind the trend of prevalence, another factor could be pointed out in addition to the function to stabilize the financial management of CB plan.

When CB plan is introduced under lower interest rate, there would be gap between the rate of interest credit expected to be achieved in the long run at the determination of plan design and the latest actual rate. On measuring PBO, estimation of future rate of interest credit as an actual assumption is generally based on that latest actual rate. Accordingly the future benefit estimated by actual calculation would be smaller than the initially assumed amount at the plan design, which leads to decrease of PBO.

After current accounting standard for post-employment became effective in 2000, the obligation on accounting has been large burden for entities, therefore CB plan was favorable for them to decrease the obligation and cost under lower interest rate of those days².

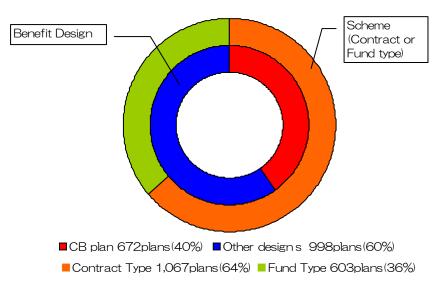


Figure 2-4: Aplication of CB plan (September 2006) (under Defined Benefit Corporate Pension Act)

source: Conference of Corporate Pension Plan, MHLW (2006)

² Nowadays, target rate of interest credit at the determination of plan design tends to be lower because higher target rate in the long run might be too optimistic under such continuing lower interest rate. Therefore effect of decreasing PBO could not be expected more than before.

2-5. Problems of the Current CB Plan

The current CB plan, despite its given level of popularity, neither necessarily serves well in the increasingly harsh economic environment nor meets the diversified needs of business owners and employees. Problems of the current CB plan are examined below.

(1) Difficulty in maintaining stability of financial management under the higher volatility of investment performance

While investment performance has been subject to increasing volatility, pension assets fluctuate substantially each fiscal year, causing profit/loss in pension financial management. Funding standards for corporate pension plans are strictly computed each fiscal year, as required by law, thus worsening financial conditions for even a short period may result in a requirement for additional immediate funding of contribution.

In terms of accounting, PBO of current CB plan is stabilized toward the interest rate when the rate of interest credit is related to the discount rate to some extent.

However, it would not be easily achieved to minimize the profit/loss on accounting by matching plan assets to the amount of PBO under such higher investment volatility.

Therefore, as other DB plans, current CB plan is considered to be incapable of fully coping with short-term rapid changes in the economic environment.

(2) Participants are unable to enjoy investment profits directly as an increase in benefits.

In current CB plan, excess returns, if any, on investment in risky assets benefit the plan sponsors but not the participants. Even if huge investment profits are gained, contribution would decrease, but such profits would not be directly reflected in the amount of benefits.

In contrast, when investment performance is substantially negative, worsening financial conditions does not directly decrease benefits but lead to additional contribution. If the entity is not financially strong enough to make additional contribution, the business owner may consider carrying out benefit reduction, eventually producing a detrimental state of affairs for the participants.

(3) Participants have no option to choose different benefit patterns (returns and risks).

Currently, indexes for rate of interest credit are fixed on a plan-by-plan basis. Although it is possible to use different interest credit definitions for participation, deferred, or entitlement periods, no schemes are available that would allow participants to choose an index from various rates of interest credit.

From a participant's point of view, CB plan could be a system in which they invest their pay credits in each term and receive the principal and investment profits at retirement. With the current CB plan, this investment-like forms are restricted to low-risk indexes including government bonds. However, some participants may prefer high-risk high-return investments at an early age before switching to low-risk investments when old. Therefore some plans allowing participants to select a benefit level design would be favorable.

The above-mentioned problems (1) to (3) in other words may occur because the current CB plan indexes for interest credit are restricted to the yield of government bonds, the consumer price index or the like. In the following chapter, the modified CB plan that includes diversified economic indexes is proposed, and points to note in introducing the new plan are reviewed.

3. Proposing a Modified CB Plan

3-1. Need for an Enhanced CB Plan

In response to the changing economic environment, there is a growing need for the existing CB

plan to offer extended function. For example:

- (1) Periodic regulatory reform requests made from industry groups to the government
- Request for more CB plan indexes: rates of interest credit related to results of the yield of pension asset investment
- (2) Proposals made by the Hybrid Plan Research Conference of the Japanese Society of Certified Pension Actuaries (April 2009)
- Benchmark Related Plan
- Integrated management of CB and DC plans for variable benefit ratios between the two plans according to a decision made by the business owner or employees

The modified CB plan (M-CB Plan) discussed in this paper is based on the Benchmark Related Plan proposed by the Hybrid Plan Research Conference of the Japanese Society of Certified Pension Actuaries.

In the Benchmark Related Plan, "service credits" accumulate according to the length of service and benefits are determined on the basis of the cumulative amount of service credits plus "profit credits". Profit credits are calculated using composite index-based rate of return, which is determined by multiplying the predetermined asset composition ratios by the up-down ratio of the economic index for each asset class. This, in terms of the existing CB plan, is something like the addition of the composite index-based rate to the existing rate of interest credit. Furthermore, if the cumulative profit credit amount is negative at retirement, the profit credits will be deemed to be zero. In the current CB plan, this is equivalent to allow the application of a negative rate of interest credit while guaranteeing the sum of pay credits.

The M-CB plan proposed here adopts the idea of interest credit based on the composite index-based rate of return, as proposed in the Benchmark Related Plan. In addition, the modified plan offers features that would meet business owners and employee needs, such as selectable index options for participants and upper and lower limit of interest credit setting variations.

3-2. M-CB Plan(1): Expansion of interest credit indexes

(1) Overview

This is the addition of a composite index-based rate, which is a combination of economic indexes following predetermined ratio of asset classes, to the interest credit index definitions adapted in the current CB plan. In investment conforming to the ratio of asset classes which the composite index is based on, the investment yield is generally related to the composite index-based rate of return. In such a case, the relationship between benefits and assets is fortified, and investment risks for business owners are reduced. This arrangement requires participants to take the investment risks to some extent because investment losses will be reflected in benefits. At the same time, they can expect high benefits with investment profits.

(2) Composite index

The composite index is a combination of economic indexes that represent average returns in the market of each asset class. The rate of composite index is determined by the composition ratio of constituent asset class which is to be predetermined through labor-management consultations. The up-down rate of each economic index is multiplied by that composition ratio and summed up as the rate of composite index. At the same time pension asset yields for each asset class are thought to appropriately correspond with the economic index although a complete match is not achieved.

Economic indexes, for example, can include the following as basis for a composite index.

Japanese bonds: Nomura-BPI (whole market)

Japanese stocks: TOPIX and Nikkei Stock Average

Foreign bonds: Citigroup World Government Bond Index (excluding Japan) Foreign stocks: MSCI Kokusai (reinvestment of dividends, gross basis)

In light of the recent investment environment, investment yield has been subject to higher

volatility. Under such circumstances significant fluctuation of the composite index-based return can occur. A negative composite index-based return in single fiscal year could lead to a notional account balance decreasing.

One possible way of mitigating interest credit fluctuation is to multiply the index by a factor of less than 1.0. Naturally, it is then necessary to note that the relationship of notional account balances with pension assets becomes lower.

(3) Pay credit determination procedure

In Japan, most corporate pension plans were converted from lump-sum benefit plans. Therefore, in general, target benefit is first determined on a lump-sum basis before a benefit formula is adopted to match that benefit target. In M-CB plan, as in the current CB plan, benefit target at retirement and future prospects for rate of interest credit are set to determine pay credits to achieve the target. When designing the benefit of M-CB plan, however, various options for interest credit index make it more difficult than ever before to estimate the target rate of interest credit. Assessing upper and lower limit on composite index would be specifically considered to be a key point.

Furthermore, in the event of a drastic investment environment change, it may become necessary on occasion to review the initially set future estimates for rate of interest credit and pay credit amounts in order to maintain initial benefit target.

(4) Upper and lower limit setting variations

Upper and lower limits (caps/floors) are allowed to be set on the new plan's indexes, as in the current CB plan. In the M-CB plan, it could be seen that the business owner and participants share risks at different ratios depending on caps/floors categories. Consequently, caps/floors might become an important factor in pension financial management.

Without a floor for the rate of interest credit, the index could become negative and the notional account balance would possibly be substantially lower than the benefit target. A lot of views may exist on mandatory floors. However, as DB plan, the M-CB plan should provide benefits with some guarantee.

Caps/floors can be set according to either of the following options.

A: Set caps/floors on rate of interest credits each fiscal year

B: Guaranteed (or limited) principal and interest calculated according to the applicable guaranteed rate over the whole participation period (can include deferred and payment period)

Features and points to note for these options will be explained later.

(5) Merits for the business owner

By setting investment portfolio in accordance with the ratio of asset classes which the composite index is based on, the plan asset could be correlated to the amount of notional account balance in M-CB plan. Therefore it is relatively achievable to stabilize the financial condition compared with the current CB plan. For business owners who have adopted the current CB plan and mitigated the risk of fund management with less risky asset class, they could include economic index of more risky asset in composite index and set plan assets in order to follow that composite index with the same level of target benefit maintained in M-CB plan. Accordingly they could expect higher profit in investment (with higher risk) that leads to mitigate the budget of contribution and maintain stability of financial condition by correlating the plan asset to the notional account balance.

(6) Merits for participants

Merits for participants of the M-CB plan compared with the current CB plan are as follows,

If investment policies follow the composite index, participants will enjoy investment profits as increases in benefits and economic growth will be reflected in benefits particularly when stock is included in composite index. Moreover, larger amount of benefits on average are expected as long as the pay credit remains at the same level as before.

At the same time benefit reduction risks decrease due to stabilized pension financial condition.

(7) Adjustment to joint operated corporate pension plan

Recent years, a number of entities have demands of establishing joint operated pension plan to reduce the administration cost, promote the efficient investment and strengthen the governance of affiliated entities. As discussed chapter 2, there exists difficulty to balance the benefit designs after alternation with previous plan. Current CB plan has been one of the solutions to that problem. If benefit to be paid on the condition that a participant retired at alteration date is set as the initial notional account balance, at least the amount which corresponds to past service period would be secured. Moreover, different types of pay credit set to the individual entity make it possible to design each target benefit level.

However, the variation of benefit design is still limited because the indexes available are restricted and participants can not choose their own benefit level; type of pay credit and interest credit.

Also, smaller entities which delivered TQPPs tend to have less financial strength, thus they hesitate to start the DB plan worrying about possibly additional cost required by strict funding standards and severe investment environment.

Therefore M-CB plan is expected to adapt more properly to the joint operated pension plan in terms of design flexibility and financial stability.

3-3. M-CB plan 2: Introduction of indexes selection by participants

(1)Brief overview

In M-CB plan, participants are allowed to select their own composite index from preliminarily given options. They are also able to change the index for each fixed term preliminary determined.

(2)Example

For example, rate of interest credit can be selected from 3 options below in 5 years.

A: fixed rate

B: indexes consist of bond mainly (low risk, low average of return)

C: indexes consist of stock mainly (high risk, high average of return)

Generally the young has relatively high tolerance to risk compared with the elderly. Suppose hired at age 22 and retirement at 50, typical pattern of benefit accumulation could be described blow through the options listed above.

①They try to increase their notional account balances using C rate with some risk from age 22 to 40

②gradually decrease the risk level using B rate from 40 to 50

3 during the deferred phase, constant accumulation with A rate is selected from 50 to 60 (to the beginning of entitlement)

They could also change the rate flexibly on demand considering the economic climate. If they predict the stock market condition declines within days, they may choose A rate and convert it to C rate in the upturn phase. As another case, those who want to increase their benefit steadily would use B plan for whole period.

(3)Advantage for plan sponsors and participants

Wider options of indexes make it possible for participants to design their benefits in accordance with their own investment policies and life plans. They can also get away from anxiety regarding that the benefit level by single rate is determined at the initiative of plan sponsors.

On the other hand, plan sponsors can provide for a variety of benefits which suite the sake of participants. That would lead to smooth acceptance of the participants regarding the alteration to M-CB plan.

It is to be mentioned that investment policy needs to be restructured at each phase participants can change their rate of interest credit.

4. Issues to be Examined before Introduction

4-1. Requirements to composite index

In M-CB plan the ratio of asset class, that composite indexes are based on, directly influence the amount of benefits. Thereby enough labor-management consultations would be necessary when the ratio is determined or modified. Furthermore, if benefits in deferred or entitlement period fluctuate according to composite index, the opinions and demands of the beneficiaries should be considered.

It would be another issue that excessively risky composite index makes the amount of benefits fluctuate significantly. Accordingly some measures are to be examined, for example to set the limit of risk level to the ratio of asset class.

4-2 Regulation of investment

Is it appropriate to allow the plan asset to be invested without following the composite index? Plan sponsors in M-CB plan possibly try to obtain financial surplus that could mitigate contribution burden by investing in different way from composite index. As mentioned before, however, M-CB plan involves the important framework for participants that close relationship between rate of asset return and fluctuation of notional account balance could decrease the risk of benefit reduction. The plan assets not related to the composite index could cause financial loss that eventually leads to possible benefit reduction.

Thereby the framework is to be preserved for financial stabilization by some measures below.

(1)To regulate the investment

A regulation could be proposed which requires constituent ratio of asset class in actual investment portfolio not to be widely different from that of composite index.

(2)To allow larger contribution to maintain risk buffer

It could be proposed to allow the contribution balanced with larger amount than current target obligation. The funding scheme with certain level of surplus provides the function to prevent the additional cost when investment circumstance is declined.

That also mitigates the risk of benefit reduction which could accompany deteriorated financial condition.

4-3. Obligation of M-CB plan on accounting

4-3-1. Problems under current standard

This section discuss about measurement of obligation on accounting in M-CB plan.

The principle issue would be whether current obligation measurement (projected benefit obligation; PBO) is properly suitable to M-CB plan. If current measurement is not appropriate, another measurement should be considered.

First, this section describes issues to be examined when current measurement is adapted to M-CB plan. The principle assumption is also set in this section that investment policy of plan asset follows the composite index in M-CB plan.

In Japan, the discount rate for PBO is defined as long-term safe bond return in practical standard. Given that, a lot of plan sponsors adopt the government bond yield of which term corresponds to average service period to retirement(or average remaining period to entitlement) as the discount rate.

The rate of interest credit also tends to be based on government bond yield in current CB plan, that leads to the effect rate of interest credit and discount rate are co-related. Consequently, the decrement amount of PBO caused by decrease of future estimation of interest credit could balance out the increment amount caused by decrease of discount rate.

When plan sponsors examine the introduction of current CB plan, such function to automatically

stabilize obligation is taken as merit for them.

In M-CB plan, how would PBO fluctuate? The following factors which would influence the level of fluctuation are to be examined in next part.

- (1) Estimation of future rate of interest credit in calculation of PBO
- (2) Linkage between the rate of interest credit and the discount rate
- (3) Linkage between notional account balance and plan assets
- (1) In M-CB plan the method to set the estimation of future rate of interest credit as actual assumption is key issue regarding the fluctuation of PBO.

Japanese practical standard suggests some options as the estimation of future rate for current CB plan; the actual rate at measurement date, the average rate for past period and the estimation value based on perspective for future market or economic environment.

The actual rate of interest credit in M-CB plan can fluctuate significantly each measurement date and sometimes fall below zero with its high volatility. Accordingly it is not appropriate in terms of obligation stability. Also the actual value in single period would not reasonably indicate future trend.

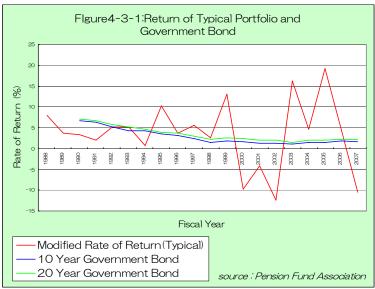
As the second option, the average for past 5 years is cited. It is, however, to be considered how to be treated when the average falls below zero and whether it can be reasonable estimation for future expectation.

At the end it would be better to use the perspective for future market, for example as the estimation value, the interest rate on financial management which is estimation of expected return on plan assets for long-term can be set if investment policy of plan asset follows the composite index.

(2)If the investment policy follows the composite rate, level of linkage between the rate of interest credit and the discount rate is generally indicated by the relationship between the asset return and yield of government bonds.

Suppose that ratio of asset class in typical portfolio among corporate pension plans in Japan is set as the basis of composite index in M-CB plan. The linkage in recent 15 years between the rate of asset return based on that typical portfolio and yield of government bonds is shown below.

Recent trend implies that the rate of composite index which would follow the rate of asset return fluctuate significantly while yield of government bonds is kept lower. In that condition, not only the actual rate of interest credit but also the estimation of future rate of interest credit would not follow the discount rate regardless of the estimation measurement method discussed above.



Therefore it appears to be difficult to expect the function to stabilize PBO by correlating rate of interest credit with discount rate in M-CB plan.

(3)When invested in accordance with composite index in M-CB plan, notional account balance is correlated with asset return, thus the financial deterioration in severe investment environment can be balanced out by decrease of notional account balance. Therefore notional account balance would be correlated with PBO to some extent, and the function to stabilize PBO could be expected. However, it is not always correlated with PBO due to the influence by discount rate.

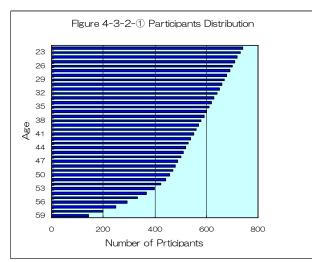
Even in current CB plan, similar function could be expected with return on plan asset correlated with notional account balance. As a matter of fact, however, to obtain the financial surplus, risky asset class such as stock is usually included in portfolio that makes it difficult to expect that correlation.

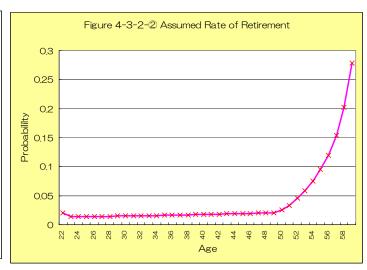
In summary lower correlation between rate of interest credit and discount rate than current CB plan causes decrease of the stability of PBO in M-CB plan. At the same time it can be noted that possibly higher correlation between PBO and asset return would partly cover the lack of stability.

4-3-2 Simulations of PBO under current standard based on historical data

To recognize the fluctuation of PBO in M-CB plan, some simulations are carried out based on historical data. Additionally PBO in current CB plan is also measured to be compared with M-CB plan.

Participant distribution is set in figure 4-3-2-①.





Plan designs are listed below.

Plan design	CB plan; Notional account balance is paid. No benefit discount to particular reason of retirement
Type of payment	Only lump-sum benefit
Pay credit	320 thousand yen per year at any age Granted once at the beginning of each year
Interest credit(M-CB plan)	Composite rate is based on the same ratio of class asset as typical portfolio in Figure 4-3-1 Correlated with return on plan asset
Interest credit(Current CB plan)	Single year average of 20 year newly- issued government bond yield
Target benefit at age 60 (join at age 22)	Approximately 240 million yen
Expected return of plan assets	3.20%
Benefit payment	Once at the end of fiscal year

Actual assumption is set as follows

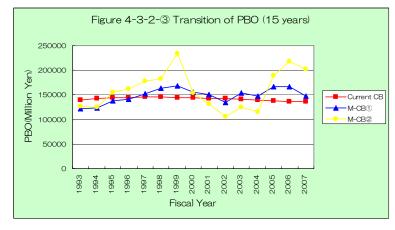
Return assumption is set as follows						
Average remaining service period	Approximately 18 years					
Discount rate	Single year average of 20 year newly-issued government bond yield					
Measurement attribute	Years-of-service approach ³					
Estimation of future rate of interest credit(CB plan)	Latest actual rate					
Estimation of future rate of interest credit(M-CB plan)*	 Expected rate of composite index (plan assets) 5 years average of actual return 					

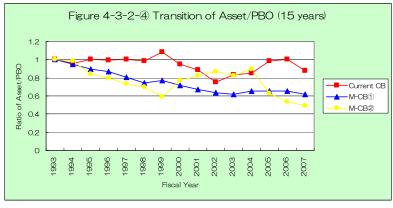
^{*}Volatility of the latest actual rate in M-CB plan appears to be so high that it is excluded in this simulation.

Rate of interest credit in M-CB plan, rate of asset return and discount rate are set to follow the historical data described in Figure 4-3-1. The amount of plan assets is set equal to each PBO in the initial year. The transition of funding level indicated by Asset/PBO is measured on the condition that the rate of interest credit and the return on plan asset follow the actual value of past 15 years and 10 years. The result of simulation is as follows,

(1)Based on the actual data of past 15 years

Asset/PBO	Year	1997	2002	2007
Current CB		1.00	0.75	0.88
M-CB(rate of intere	est credit 1.)	0.81	0.63	0.62
M-CB(rate of intere	est credit 2.)	0.74	0.87	0.50





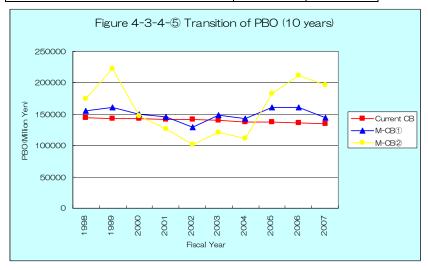
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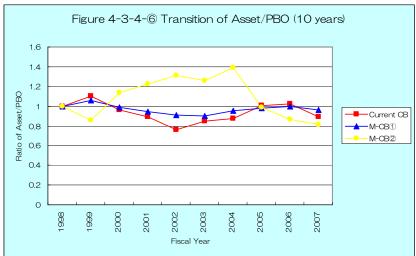
^{*}If 5 years average falls below 0%, 0% is set alternately.

³ the principle attribution method in actual standards in Japan. The amount of benefits regarded as already vested at the measurement date is determined by multiplying future benefit at any possible retirement by the ratio of service period at measurement date to the period at retirement date.

(2) Based on the actual data of past 10 years

Asset/PBO Year	2002	2007
Current CB	0.76	0.90
M-CB(rate of interest credit 1.)	0.91	0.96
M-CB(rate of interest credit 2.)	1.31	0.81





(1)Compared to current CB plan, PBO in M-CB plan fluctuates more. For example, the decrease of government bond yield and the discount rate from 2nd year to 5th year pushes up the amount of PBO. In case of current CB plan, decrease of actual and estimated rate of interest credit mitigates the increase of PBO.

(2)On the other hand, the correlation between notional account balance and plan assets in M-CB plan is higher than that of current CB plan that leads to stable funding level. The following decrease of notional account balance when the asset decreases seen in the 3rd year mitigates fall of funding level. However, in the 2nd year, PBO increase with the growth of asset which results in preventing improvement of the funding level. For past 10 years the discount rate is relatively stable and the accompanied fluctuation of PBO is not significant, that appears to be a factor which stabilizes the funding level. It is also to be mentioned that past 5 years average indicates still high volatility and that causes lack of PBO stability. Therefore the past average would not be reasonable as the estimation value of rate of interest credit. As a practical matter, the estimation of future rate of interest rate would be set in accordance with estimated return on plan assets.

4-3-3. Personal opinion regarding a new measurement method

This chapter has discussed about PBO under current standard. It appears to be difficult to fully reflect the stability of M-CB plan.

M-CB plan would minimize the risk of additional contribution required by funding standards on the condition that plan asset is kept equal to notional account balance⁴ and its portfolio is correlated to composite index. However, discount rate is not linked to estimated future rate of interest credit in M-CB plan that leads to profit/loss generated on accounting even if the amount of plan asset and notional account balance is the same. The result in 4-3-2 also indicates under current standard M-CB plan is at risk of generating large profit/loss in spite of that more stable financial management is delivered from the perspective of additional contribution.

Except the influence of floors/caps, discount to voluntary retirement, or additional cost of annuity, M-CB plan could deliver financial management as stably as DC plan which requires no additional contributions regardless of investment performance. Given DC plan is not required to account for obligation, it is doubtful whether current measurement standard which generates such profit/loss on accounting is fully suitable to M-CB plan. Consequently more reasonable measurement method should be proposed and examined well.

In light of these issues above, it seems to be reasonable the obligation of M-CB plan on accounting would be based on the notional account balance.

However, as long as M-CB plan is defined benefit plan, some degree of guarantee should be provided. As discussed 4-4, the floor makes financial management less stable. The same issue can be said to the case of discount to voluntary retirement or adding the life-term annuity option. Such cases involve the risk of additional contribution, so that it is hardly insisted that the with asset equal to notional account balance, the obligation of M-CB plan need not to be accounted.

A possible solution to that issue would be that the amount of notional account balance plus the quantification of that additional contribution risk is defined as obligation on accounting. The method to quantify that additional contribution risk as option cost should be considered⁵.

From another point of view, it must be inspected carefully whether that option cost based obligation could be applied to only M-CB plan. Another plan can be operated so as not to generate additional cost by setting portfolio which correlates the investment performance with fluctuation of obligation. Is this new measurement, if any, applied to such cases? If so, how is traditional plan which applies the current measurement distinguished from that new measurement application? There would be more issues to be inspected.

When level contribution is accumulated under Japanese actual standard, the actual obligation of simple M-CB plan on financial management seems to be almost equal to the sum of notional account balances. However, considering the influence of discount to voluntary retirement, caps/floors, or cost of providing annuity benefit, they would not be necessarily the same. If investment performance follows the rate of composite index in M-CB plan, the actual obligation equal/near to notional account balance correlates to plan assets and minimize the possibility to conflict financial standards each fiscal year. Therefore, it could be expected that risk of additional contribution required by financial standards is mitigated.

⁴Fundamentally, risk of additional contribution should be examined after discussing the method to measure the actual obligation on financial management. This paper does not cover the detail but the brief description would be below,

⁵ When a floor is set as guarantee for whole period, the benefit in M-CB plan would be regarded "higher of option" described in discussion paper of IAS 19. At current state, the detail about measuring such type of benefit is still being discussed and inspected.

4-4. Method and points to be considered for floors/caps in M-CB plan

4-4-1 Necessity to set guarantee

Fluctuation of the benefit amount is one of the most important concerns for participants when M-CB plan is introduced. In this plan, rate of interest credit is linked to economic indexes including equity market, so volatility of benefit amount is relatively higher than that of current CB plan. With the index based on high-risk asset class, future benefit can fall much below the target amount assumed at the beginning.

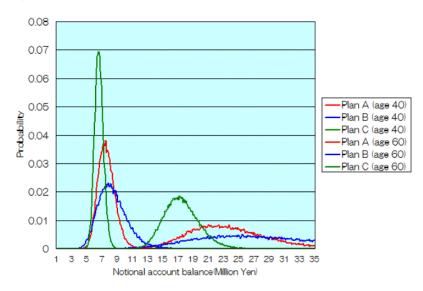
Figure 4-4-1 provides an example of distributions based on three types of rate of interest credit listed in table 4-4-1.

Table 4-4-1 examined types of composite index

	Plan A	Plan B	Plan C
Expected rate of interest credit (%)	3.50%	4.50%	2.10%
Standard deviation	5.50%	8.40%	3.35%

^{*}estimated by past 20 years actual records before 2008

Figure 4-4-1 Distribution of benefits



This analysis assumes the case participants join a plan at age 22 and pay credit is 300 thousand yen per year through the whole term.

Rate of interest credit is set to follow normal distribution, and notional account balance is calculated by 60,000 times at each age.

Table 4-4-2 Distribution of benefit at each age									,000 yen
		Age 30			Age 40			Age 60	
Distribution	A	В	С	A	В	С	A	В	C
Average	2,810	2,940	2,639	7,600	8,427	6,615	23,913	30,149	17,534
Lower 1%	2,228	2,039	2,296	5,376	4,914	5,385	14,039	12,898	12,907
Lower 5%	2,380	2,267	2,388	5,926	5,716	5,707	16,233	16,169	14,046
Lower 10%	2,467	2,395	2,441	6,253	6,183	5,890	17,601	18,272	14,727

Plan A gives the average 24 million yen at age 60 and the benefit falls below 80% of the average at the probability of 20%. On the other hand, B plan, in which the average (30 million yen) is relatively high, is based on high-risk asset class, therefore, the benefit falls below 80% of the average at the probability of 32%.

Considering the corporate pension plans' importance of existence to make a contribution to stable

old life after retirement, such a case benefit could fluctuate drastically should be avoided as far as possible. Namely, a sort of guarantee (floors) should be set to ensure the minimum amount of benefit.

The expected future benefit will increase by floors and that increment is to be additional responsibility of plan sponsors. On the other hand, setting the maximum amount (cap) to manage the future benefit would be one of options which mitigate that additional budget.

In M-CB plan, ratio of risk responsibilities between plan sponsors and participants depends on the types of floors/caps, thus these are the important factors for financial management.

4-4-2 Variety of floors/caps

4-4-2-1. Setting floors

M-CB plan provides for two options of floors.

A: To set the floor for the rate of interest credit at each single-year

B: To guarantee capital and interest of pay credit based on certain rate during whole period (not single year)

Floor A can prevent notional account balance from largely varying by single year due to the floor rate for each year. However, it is difficult for participants to recognize how large amount of benefit is guaranteed at retirement. For instance, the floor 0% for each annual rate of interest credit guarantees only the capital of pay credit that is just 11.4 million yen against the expected average, 24 million yen in A plan. It would be suspicious whether ensuring less the half of assumed target benefit could be fully profitable for participants. The floor 0% is sure to increase the average of benefit, but participants hardly image the concrete amount of future benefits with this floor.

It is also difficult to set reasonable floor which matches plan sponsors' demands. Because of the high volatility of a portfolio with high-risk assets, rate of interest credit easily falls below the floor 0% which leads to direct burden to plan sponsors.

It comes to that plan sponsors hesitate to choose high-risk assets as part of their composite index to avoid an additional responsibility. However, to correlate the return of plan asset to low-risk composite index, they have to set low assumed yield rate with low-risk portfolio on financial management that leads to high amount of contribution.

At the same time by setting caps to composite indexes, plan sponsors have chances to obtain the surplus return which exceeds the cap. Therefore, balance of a floor/cap is significantly important.

In terms of floor B, certain guarantee amount during the participation or the vested period is adapted. The guarantee of B is more explicit and comprehensive for participants than that of A. On top of this, fixed guarantee prevents benefits from falling excessively low by downside of the interest credit unpredictable in plan design phase.

However, B does not guarantee the rate of interest credit every single year and that makes notional account balance fluctuant because it can sometimes fall largely to the floor in a year. That indicates benefit of floor B appears to be less stable.

By contrast, range of benefit decrement of A is limited to some extent. Floor A of 0% in a year means notional account balance never decreases and that would give participants reassurance.

The guarantee rate in B can be selected in a various way, annual minimum statutory interest rate, fixed rate 1.5% or 2.5%, for example. Assuring just principle of pay credit that equals to the fixed guarantee rate of 0% is also available. Though, it would not be enough and unacceptable for participants only with principle of pay credit, just part of target benefit, given that corporate pension plan is based on the traditional lump-sum plan that surely guarantees certain degree of target benefit.

From another perspective, the longer period from hired to retirement, the less additional cost plan sponsors shall pay for guarantee benefit since that long term raises the possibility of notional account balance exceeding guarantee amount.

4-4-2-2. Setting caps

If investment performance exceeds the cap, that surplus would be the return for plan sponsors to mitigate the contribution budget. In current situation, government bond yield does not fluctuate drastically, thus, caps for current CB plan has not been touched frequently. When the rate of interest credit is linked closely to indexes of high-risk asset class in M-CB plan, volatility of the rate would get high and cases the rate exceeds the cap will be seen more frequently than before. Caps are also available to decrease the expected future benefit which floors once raised.

As well as floors, a type of caps can be selected from these two options below.

A: to set a cap for the rate of interest credit at each single year

B: to set the maximum capital and interest based on certain rate during whole period

4-4-3 Balance between a floor and pay credit

It is obvious that a floor raises the average of future benefit. When floor 0% is set each single year in plan A, the average at age 60 increases to approximately 29 million yen from 24 million assumed at the beginning. In that case, plan sponsors have two options to control the target benefit,

- ① Setting cap
- 2 Decrease the amount of pay credit

In respect of ②, the example described in table 4-4-2 indicates that the average of benefit can be limited to 24 million by holding the pay credit down from 300 thousand yen per year to 240 thousand yen. However, it is much difficult to estimate the exact average of benefit with the floor, and the figure, if any, appears to be not comprehensible for participants. That causes it difficult to achieve participants' agreement on introducing M-CB plan and cost a lot of time for that consensus building. It indicates setting floors at the expense of decreasing pay credit should be carried out carefully.

4-4-4. Average of benefit increased by floors

The distribution of benefit at age 60 in the case of plan A is estimated in 3 types of floors described below, the result of which is shown in table 4-4-4-① and figure 4-4-4. Conditions except for the floor follow that of section 4-4-1.

Floor A-①: 0% for each year

Average

Lower 1%

Floor A-②: 2.5% during participation period (38 years)

Floor A-③: decreasing pay credit from 300 thousand yen to approximately 250 thousand in addition to floor A-① to the extent that the average of benefit equals to that of floor A-②

Guaranteed benefit of floor A-2 is approximately 19 million yen that corresponds to 80% of initially assumed benefit without floor.

Table 4-4-4-① Distribution of benefit with 3 types of floors

 Unit: 1,000 yen

 A(no floor)
 Floor A-①
 Floor A-②
 Floor A-③

 23,913
 29,251
 24,289
 24,289

 14,039
 19,799
 19,100
 16,441

Lower 5% 16,233 21,851 19,100 18,145 Lower 10% 17,601 23,100 19,100 19,182 Lower 20% 19,339 24,800 19,339 20,593 Upper 10% 30,987 36,145 30,987 30,014

The increment of average benefit can be taken as additional cost by the floor. The average benefit by floor A-② is just 25 million yen while 29 million of A-②. That indicates the single year floor

raises the average more.

Comparing A-② with A-③, the average is almost the same, though, the distributions of benefit is different. Floor A-② secures at least 19 million under which benefit never falls. On the other hand, floor A-③ does not prevent benefit from falling substantially below the initially assumed benefit. However, table 4-4-4-2 indicates that the possibility of benefit exceeding the initially assumed is relatively high in floor A-③.

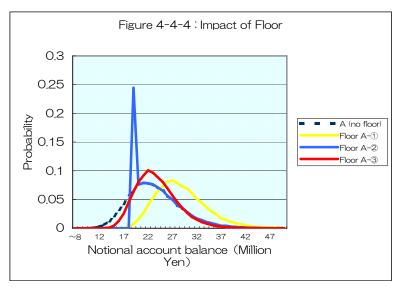


Table 4-4-4-2 Possibility of exceeding the assumed benefit

Possibility	floor A-2	floor A-③
exceeds the initially assumed benefit	44.6%	47.7%
exceeds 90% of the initially assumed benefit	63.2%	71.2%

As discussed in 4-4-2, participants could easily recognize that their benefit are secured in floor A-② because guaranteed amount is specified clearly. Floor B in contrast never decrease their notional account balance and prevents the significant fluctuation of benefit.

Advantages and disadvantages are different in these two options and in each participant's preference. Therefore plan sponsors should consider the characteristic of them in determination of the floor.

4-4-5. Impact of floors on financial management of pension plan

What type of floor is favorable to plan sponsors?

In the next place, this section focuses on the impact of floors on financial management.

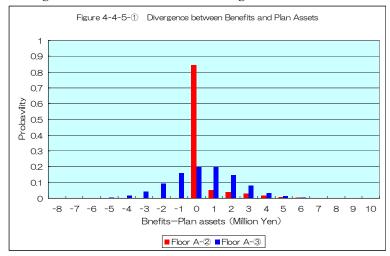
It is measured by divergence between distribution of the investment performance and amount of benefit with floor A-② or A-③, which causes profit or loss on financial condition. It is assumed in this analysis that investment performance follows the rate of composite index.

The measurement substituted distribution of benefit at age 60 with no floor for investment performance. To be exact, the average of benefit with floors and that of investment performance represented by benefit with no floor are not the same, however, that difference would not cause huge impact on comparison of the divergence between two types of floors. Therefore, any treatment such as additional contribution is not set.

The result is presented in figure 4-4-5-①.

It indicates that floor A-② generates less divergence that leads to stabilization of financial condition. That appears to be because benefit matches investment performance with floor A-② only except that benefit falls below the guaranteed amount at retirement age, in contrast that floor A-③ can generate the divergence every year when the rate of interest credit falls below the floor rate. It is to be mentioned, however, such divergence in case of floor A-③ would be mitigated by lower floor such as -2%.

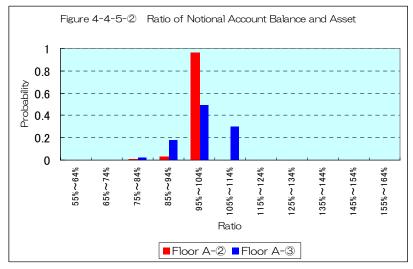
As described above, the impact on financial management depends on types of floor even if the average of benefit is the same among them.



Furthermore, some simulations are carried out by using the model pension plan to measure the funding level influenced by types of floor A-② and A-③.

Some assumptions is set as follows,

- Level contribution, 300 thousand yen per a participant, is paid once a year.
- · Investment performance follows the composite index which interest credit is based on.
- Other design, actual assumptions and distribution of participants follow that of analysis in 4-3.
- In the first fiscal year, funding level equal to 1.0 (namely the plan asset is equal to the obligation)
- Estimation of future rate of interest credit with floor A- $\ 3$ as actual assumption is set 4.4% coupled with floor 0%
- Return of plan asset and interest credit is set to follow the normal distribution, and funding level after 10 years later is calculated by 60,000 times



As a result, financial condition of floor A-2 tends to be more stable than floor A-3.

4-4-6. Impact of caps/floors on financial management of pension plan

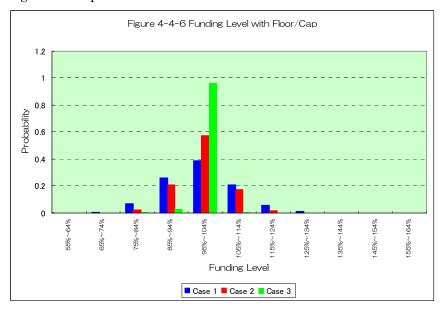
Next measurement is to analyze the impact on financial condition when both cap and floor are set. Assumptions are the same as 4-4-5.

Case1: 0% for the floor, 7% for cap for the annual rate

Case2: -2% for the floor, 9% for the cap for annual rate

Case 3: 2.5% for the floor, 4.5% for the cap for whole period

Figure 4-4-6 provides the result of simulation.



Case 3 is superior to others in terms of financial stability. However, it should be noted stability goes better in annual floor and cap by extending the gap between them.

4-4-7 Characteristic and variation of caps/floors for whole period

What to be mentioned in setting a floor for whole period is that possibility of additional cost depends on the initial difference between notional account balance and guaranteed amount. In case3 of 4-4-6 initial notional account balance is set as if M-CB plan was introduced since participation, so that the possibility of account balance falling below the floor is low for elderly participants in particular. However, initial account balance in an actual case appears to be different from that theoretical value because connection of benefit level with previous design has to be considered.

Another characteristic to be pointed out is that long participation (investment) period can mitigate the possibility of additional cost. It means the case of early leavers raises that possibility. Table 4-4-7-① shows that possibility of falling below the guarantee amount at each age.

Table 4-4-7-① Possibility of additional cost –simple case

	Age	e 30	Age	e 40	Age 60		
Guarantee rate	Guarantee (thousand yen)	Possibility of additional cost (%)	Guarantee (thousand yen)	Possibility of additional cost (%)	Guarantee (thousand yen)	Possibility of additional cost (%)	
2.50%	2,686	33.90	6,884	27.27	19,135	18.64	
2.00%	2,626	26.11	6,552	17.10	17,171	8.24	

^{*}hired at 22 years old, pay credit: 300 thousand yen, interest credit follows portfolio A

Necessarily smaller guarantee amount and lower probability of additional cost would be profitable to plan sponsors and stabilize financial condition. Therefore multiplying the guarantee by discount rate to early leaver might be taken to mitigate guarantee amount.

In Japan, benefit is generally discounted at voluntary retirement, so that it would be appropriate to discount the guarantee under such social conventions.

Table 4-4-7-② describes the result of simulation in which guarantee at age 30 is multiplied by 0.8 and age 40 by 0.9.

^{*} rate of interest credit follows normal distribution, and notional account balance is calculated by 60,000 times for each age.

Table 4-4-7-② Possibility of additional cost —discount to voluntary retirement

	Age	e 30	Age	e 40	Age 60		
Guarantee rate	Guarantee (thousand yen) Possibility of additional cost (%)		Guarantee (thousand yen)	Possibility of additional cost (%)	Guarantee (thousand yen)	Possibility of additional cost (%)	
2.50%	1,880	00.00	5,507	1.55	19,135	18.64	
2.00%	1,838	00.00	5,242	0.62	17,171	8.24	

^{*}other assumptions are the same as table 4-4-7-①

Applying the guarantee to only mandatory retirement or elderly participants is also effective option to mitigate the additional cost generated by the floor. However, such a limited guarantee should be taken carefully not to make benefit excessively lower.

4-4-8. Estimation of future rate of interest credit and effect of floors/caps

In calculating the actual obligation of CB plan, estimation of future rate of interest credit as actual assumption is needed. In case government bond yield is defined as rate of interest cost, the example such as the value at appraisal point, average of past record or predicted value based on future perspective for market or economic circumstances are shown in actual standard in Japan, though, guideline to consider caps/floors into estimation of future rate of interest rate is not specified clearly.

If the rate of interest credit is supposed to fall below the floor or exceed the cap in the future in current CB plan, plan sponsors might take that trend into account for estimation of future rate respectively.

In case of M-CB plan, volatility of the rate of interest credit would be larger than that of current CB plan, thus there would be more cases of the rate falling below the floor or exceeding the cap. Given that the amount of obligation would be influenced by estimation of rate of interest credit, it should be determined carefully with its floor/cap.

It is however actually difficult to set any exhaustive risk distribution of floors/caps. Therefore some simplification would be needed to take floors/caps into account.

As simulated in 4-4-1, the average of benefit with the risk considered can be estimated by assumed distribution or past record. The simulation indicates the average of benefit in portfolio A increases from 3.5% to 4.4% with assumption that rate of interest credit follows normal distribution and the average and deviation can be estimated by past records.

Besides that, the current situation under which an estimated value partly depends on plan sponsors' own judgment is not appropriate. Explicit standard will need to be provided.

4-5. Fluctuation of annuity

4-5-1. Fluctuation of annuity in M-CB plan

As stated above, the rate of interest credit in M-CB plan has the function to mitigate investment risk by the plan asset adjusting to the composite indexes.

The next step is to discuss about the conversion rate of annuity interest in M-CB plan. Is it appropriate to approve fluctuation of the annuity in conjunction with composite index as well as participation period? Is the decrement of annuity by those indexes acceptable for the vested?

In Japanese corporate pension plans, the benefit right is generally regarded to be vested at the beginning of entitlement or determination of benefits amount at retirement. Therefore, it would not be easily accepted that the actual amount of benefit during entitlement period falls below that already accrued benefit.

To some extent with any sort of guarantee, it would be considered reasonable and properly because the current CB-plan actually provide for annuity variable in accordance with yield of government bond. However, excessively large fluctuation of the annuity is not favorable for the vested who rely on the annuity incomes in their old life after retirement, thus certain level of guarantee would be required.

Under current regulations, the conversion rate of annuity is required to more than the statutory minimum interest rate that is at least barrier to variable annuity in M-CB plan. Keeping the conversion rate beyond the minimum rate is one option, though, without any caps it would increase the cost of providing annuity. Another option is to set the floor 0% each year on the condition that the rate could be under the statutory minimum rate. Compared with the former option, it can mitigate the cost of annuity conversion by lower guarantee, still maintaining some degree of the amount.

It is to be remarked these floors above are both for each single year, which could cause large mismatches between cost of the annuity and investment performance.

Not only that kind of floor explained above, another type which guarantees certain rate for whole period of participant, deferred and entitlement could be proposed. If 2.5% is set as this type of floor for whole period from hired to the end of entitlement, the guaranteed annuity is calculated by multiplying the lump-sum based guarantee at the beginning of entitlement by the guaranteed conversion rate of annuity, 2.5%. The lump-sum based guarantee is capital and interest of pay credit revaluated by 2.5% during participant and deferred period. This method provides for the explicit minimum annuity, but still probably causes the significant annuity downside.

4-5-2. The difference between two types of floor

As shown at 4-5-1, two types of floor can be taken during entitlement in M-CB plan.

- (1) to guarantee the amount based on fixed rate of interest credit and conversion rate applied to whole period (not single year)
- (2) to set a floor of the conversion rate for each year

Each option has its unique characteristic below to stabilize the fluctuation of annuity. It should be carefully chosen in terms of benefit right protection and financial conditions.

(1) Regardless of the amount of notional account balance at the beginning of entitlement, the concrete minimum annuity is secured. However, range of annuity would be larger due to the minimum guarantee. For example, under assumptions such as 300 thousand yen per year for fixed pay credit, 3.5% for the expected average of interest credit, 2.5% guaranteed rate and age 22 as hired, the notional account balance at 60 age is assumed approximately 24 million, lump-sum guaranteed amount is 19 million and amount of annuity per year is assumed approximately 2.8 million, guaranteed 2.1 million which means that annuity can fluctuate in the range of 25% of assumed amount. The larger actual account balance than assumed at the beginning of entitlement generates more fluctuation. That appears to make a situation that the level of gap between the notional account balance and the guaranteed amount has a great influence on participants decision whether they choose the entitlement of annuity or alternative lump-sum. If notional account balance is almost near to the guaranteed amount, they would decide to choose the annuity because the annuity has a great tendency to be more than lump-sum in this case. Otherwise the larger account balance generates a risk of significant decrement of annuity value. Participants would select alternative lump-sum to fix the large amount of benefit. It might not be appropriate to lead participants and beneficiaries to choose alternative lump-sum instead of annuity from the perspective of pension plans' nature, support for old life.

For plan sponsors, additional cost generates only when the amount of annuity falls bellow the guarantee, thus it would not to be negative factor for financial management that participants choose the alternative lump sum as it is beyond the guarantee. Besides that, it is not necessarily negative that annuity is chosen on the condition that notional account balance is below the guarantee because possible investment return during entitlement period can be obtained to recover

the loss at the beginning of entitlement. If lump sum is taken at that point, loss and additional cost are fixed.

Meanwhile, the case annuity is chosen when notional account balance is a little above the guarantee seems to be a negative factor. During entitlement period a little investment loss can generate additional cost while alternative lump-sum does fix the benefit with no additional cost.

(2) The level of floors/caps determines the fluctuation range of annuity. Under assumptions that the conversion rate of annuity is set as expected average 3.5%, floor 0% and cap 5.5%, the fluctuation range of annuity is approximately 15% of the assumed per year. If negative conversion rate is not approved in M-CB plan, the floor must be above 0% at least which makes the fluctuation limited to some degree. In this formula, the range of annuity is not related to the initial amount of notional account balance, thereby participants are not induced to take alternative lump-sum as seen in case (1).

On the other hand, each time composite index falls below the floor, additional cost generate. It is notable the amount of individual allocation at the beginning of entitlement does not matter in case (2). By contrast, large notional account balance mitigates the additional cost to some extent in case (1).

4-6 Judgment of benefit reduction

4-6-1 Problems of benefit reduction under current standards

In case of DB plan in Japan, with participants' acceptance and unavoidable reasons such as significant deterioration of business conditions, plan sponsors could reduce all or specified participants' /beneficiaries' pension benefit.

When the design of the corporate pension is altered, the judgment procedure of benefit reduction is needed to verify whether it corresponds to the disadvantageous alteration for participants. The procedure is applied to not only the case of simply reducing the level of benefit such as cutting down the conversion rate, but drastic alteration of pension design such as changing from a final salary plan into a points basis plan. Steps of the judgment are described below.

A: Does the present value of future benefits, calculated with probability of retirement and pension salary growth in the future, decrease compared with the plan before the alteration?

B: Does the minimum funding requirement (the present value of the benefits that would be paid on the condition that participants retire at the measurement date) decrease compared with plan before the alteration?

In this section A is called "Evaluation of expected benefit right" which includes possible future benefits not yet generated at the measurement date. At the same time, B is called "Evaluation of accrued benefit right" because it focuses on the benefit already fixed at the measurement date.

Actuarial assumptions when calculating the present value of future benefits and minimum funding requirement are regulated as follows.

(1) The same assumptions must be applied in comparing pension designs.

(2)In the case of CB plan, the rate of interest credit and the conversion rate must be determined by five years average of past actual records.

It seems that each conditions above is set for the following reasons,

- (1) to exclude the impact of difference of assumptions which could change the result.
- (2) to set the reasonable estimated value for the future rate of interest credit or conversion rate without plan sponsors' possible arbitrary intension.

Since the introduction of CB plan in Japan, the average of past government bond yield has been stable, so the adequacy of past average as assumption for future rate has not been the major issue. However, if drastic economic changes happen, it would be wondered whether past average is reasonable as the estimated value. For example, in the aspects of the rate of interest credit rising up, the actual rate in the future would be larger than the average. In such a case, the present

value of future benefits of CB plan would be relatively smaller than the actual amount. Moreover, the method to estimate the assumptions for the rate with floors/caps is also unclear. Under the current regulations, if the rate over past five years does not touch a cap/floor, impacts of such a cap/floor are not considered in the assumptions of future rate for the judgment of benefit reduction. For instance, when the CB plan sets the government bond as the index of interest credit and a cap (5%) is introduced under recent lower interest rate circumstances, the average rate over the past five years is the same as the case without the cap because the past figure does not reach 5%. Hence the introduction of the floor is not judged as benefit reduction even though future benefit is possibly reduced due to the floor.

4-6-2. Issues in the introduction of M-CB plan

As described above, some problems regarding benefit reduction in current CB plan are already inherent. In the next place, some topics about benefit reduction in introducing M-CB plan are discussed. M-CB plan would confront the similar problems as current CB plan. As follows,

- (1) Is the average over past five years approved as the reasonable assumption for future rate?
- (2) How to evaluate floors/caps?

Such problems seem to be more significant because a variety of indexes including high-risk assets are available in M-CB plan and the volatility of the composite index would be larger than the rate of interest credit in current CB plan.

Table 4-6-2 shows recent average rate of return among corporate pension plans in Japan and the 5 years average. Suppose the composite index follows this typical portfolio in recent market circumstances, the rate of composite index is expected to follow such trend in Table 4-6-2. Volatility of the 5 year average is so high that the average would not be appropriate assumption for reasonable future estimation.

Table 4-6-2 Rate of return in typical portfolio among Japanese corporate pension plans.

Year	1999	2000	2001	2002	2003	2004	2005	2006	2007
Adjusted net yield(%)*	13.09	-9.83	-4.16	-12.46	16.17	4.59	19.16	4.51	-10.58
Average over past 5 years(%)	7.04	3.02	1.46	-2.16	0.56	-1.14	4.66	6.39	6.77

^{*}appraisal standard for rate of plan assets return of corporate pension plan at fair value basis

Source: Pension Fund Association

It indicates that more reasonable method to estimate future rate needs to be investigated as long as current standards is not properly suitable to M-CB plan.

4-6-3. Personal opinion: a modification to current standard of benefit reduction

Therefore, I would like to propose a concept "Possibility of benefit reduction" in addition to current standard, "benefit reduction". Possibility of benefit reduction represents that the design alteration has "possibility" to reduce benefits at any future retirement date and the actual presence of reductions concerned is uncertain at the alteration date.

The current procedure continues as it is, so that modified standard passes through 2 stages. If the present value of future benefits or the minimum funding requirement is "surely" reduced, it corresponds to benefit reduction. Other cases are to be inspected whether possibility of benefit reduction is applied to.

In the case of the expected benefit right, certainty of benefit reduction is inspected for the first step. It could be determined by judging whether benefit at any date decrease or not without using actual assumptions such as retirement rate. If clearly judged in this way, the alteration corresponds to "benefit reduction". For instance, alterations such as cutting down the rate of pay across the board make future benefits decrease ant any retirement date. Otherwise, the procedure proceeds to the

next step, that is, to determine "possibility of benefit reduction".

When a pension design is converted from the final-salary plan to the point basis plan, the present value of future benefits differs depending on assumed pension-salary growth rate as the actuarial assumption. In point basis plan, the benefits of two participants, who are the same age and to obtain the same benefit from final-salary plan, are not necessarily the same because their points are sometimes variable due to appraisal of their business performances in each term. However, in such a case, the single pension-salary (point) growth rate is generally set, so that the same present value of future benefits are calculated, the difference of their points not fully considered. For participants, such present value of future benefits is not compelling as the appraisal of their future uncertain benefits.

The example above indicates that the present value of future benefits is not always the appropriate tool to determine benefit reduction. M-CB plan will confront the similar problems. It is more difficult to set appropriate actual assumption of future rate of composite index as for the judgment of benefit reduction. This case, thereby, should be designated as "possibility of benefit reduction", not "benefit reduction".

Naturally, an alteration which does not decrease future benefit explicitly is neither benefit reduction nor possibility of that as judged under current regulation.

Regarding accrued benefit right, current standard requires that to be appraised by the benefit which accrues in the case participants retire at the measurement date, that is, there is not much factors that depend on actuarial assumptions. Therefore, current standards seem to be overall appropriate except for one factor involved in CB plan.

Actual assumptions of future rate of interest credit and conversion rate need to be set for accrued benefit right in CB plan, because these rates are variable due to economic conditions. Furthermore, these assumptions in M-CB plan with high volatility of rate of available indexes are less reasonable for judgment of benefit reduction.

Without these uncertain assumptions in M-CB plan, possibility of benefit reduction should be adapted when lump sum based benefit at the measurement date dose not decrease. If lump sum based benefit is reduced, it is to be determined as benefit reduction regardless of other actuarial assumptions.

If the alteration is judged as benefit reduction under current standard, agreements of two thirds of participants or beneficiaries whose benefits are to be reduced must be obtained. Possibility of benefit reduction would also follow that requirement. In this regard, benefit reduction and possibility of that reduction should be explicitly distinguished and explained to participants and other stakeholders. Besides that, expected benefit rights and accrued benefit rights should be also separated and the agreement should be obtained for each right.

Under this proposed procedure, it happens that benefit reduction corresponds to the accrued benefit right and possibility of benefit reduction to expected benefit right. In such a case, impact for each right should be explained respectively to participants so as to decide properly whether the alteration is acceptable for them.

Moreover, enough information should be provided for them to understand the difference of benefit between the altered design and before. An example of such information is the model benefit at mandatory retirement day and the assumed range of benefit depending on individual business performance or economic condition.

5. Conclusion and Next Step

The circumstance surrounding corporate pension plans in Japan is still severe and DB plans in particular are confronting significant crisis. There is no doubt regarding that not only drop-in relief measures but also fundamental restructuring are needed for Japanese DB plans.

M-CB plan proposed in this paper is a new type of pension plan which is equipped with the function to relate pension fund to its obligation in terms of their fluctuation. With this plan, plan

sponsors could deliver more sustainable financial management even in the sever investment circumstance. It also enables participants to select favorite type of interest credit and design of benefit level which match their risk tolerance.

To introduce this plan as a practical matter, however, some issues described below should be examined more profoundly.

- (1) Method to measure the obligation under financial management and accounting standard
- (2) Method to appraise caps/floors in measuring the obligation
- (3) Modification of benefit reduction scheme in alternation

On the other hand, this plan could fluctuate the amount of benefit widely, thus the greatest attention is to be paid to exclude the unprofitable designs for participants and beneficiaries such as those with no floor.

I hope this paper could make some contributions to the future of DB plan.

Reference

- (1) Mitsubishi Trust Banking Corporation (2003), "Cash Balance Plan", Tyuokeizaisya, Inc.
- (2) The Japanese Society of Certified Pension Actuaries (2009), "Improvement of the Hybrid Pension Plans in Japan"

Acknowledgment

All the opinions described in this paper are that of the author alone and do not necessarily reflect the views of his employer.