Joint Colloquium of the IACA, PBSS and IAAHS Sections of the International Actuarial Association

Westin Copley Place Hotel, Boston, U.S.A. – 4-7 May 2008

Examination of actuarial assumptions used for the calculation of the PBO

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Background

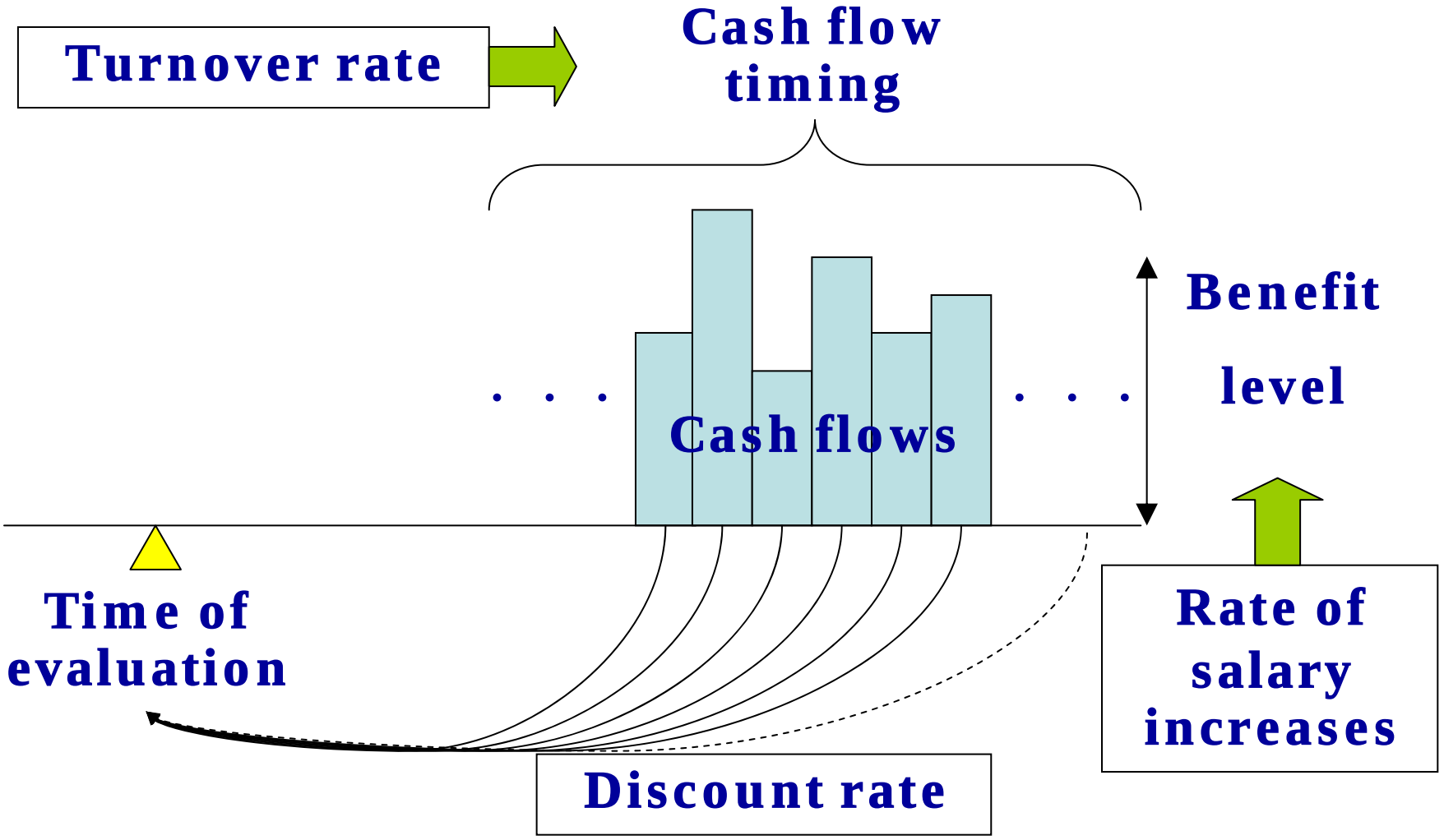
- The importance of the PBO in corporation-management-strategy has been increasing.
- Corporations face a dynamic environment.
  - Re-structuring
  - M&A
- For this dynamic business environment, are the current methods of PBO calculation appropriate?

Dynamic environment

- Re-structuring
  - **Turnover rate** is distorted by the one-off increase in the number of retirees arising from reductions caused by re-structuring.

- M&A
  - Fluctuations of **rate of salary increases** are caused by unification of several different corporations' pension plans induced by M&A.

Cash flow projections of benefit payment



Purpose of this study

- We analyze the influence on accounting standards and LDI
  - when we project future volatilities of the **turnover rate** and the **rate of salary increases** under re-structuring and M&A (dynamic pattern)
  - or when there is no change (static pattern).

Outline

	Accounting Standards	LDI
Turnover Rate	Less Important	Important
Rate of salary Increases	Important	Less Important

Model
-Concept for simulation-

< Static pattern >

Number of employees and salaries at T_0

Simulation based on the **same assumption** as usual*

Number of employees and salaries at T_∞

< Dynamic pattern >

Number of employees and salaries at T_0

Simulation based on the assumptions **reflected re-structuring and M&A**

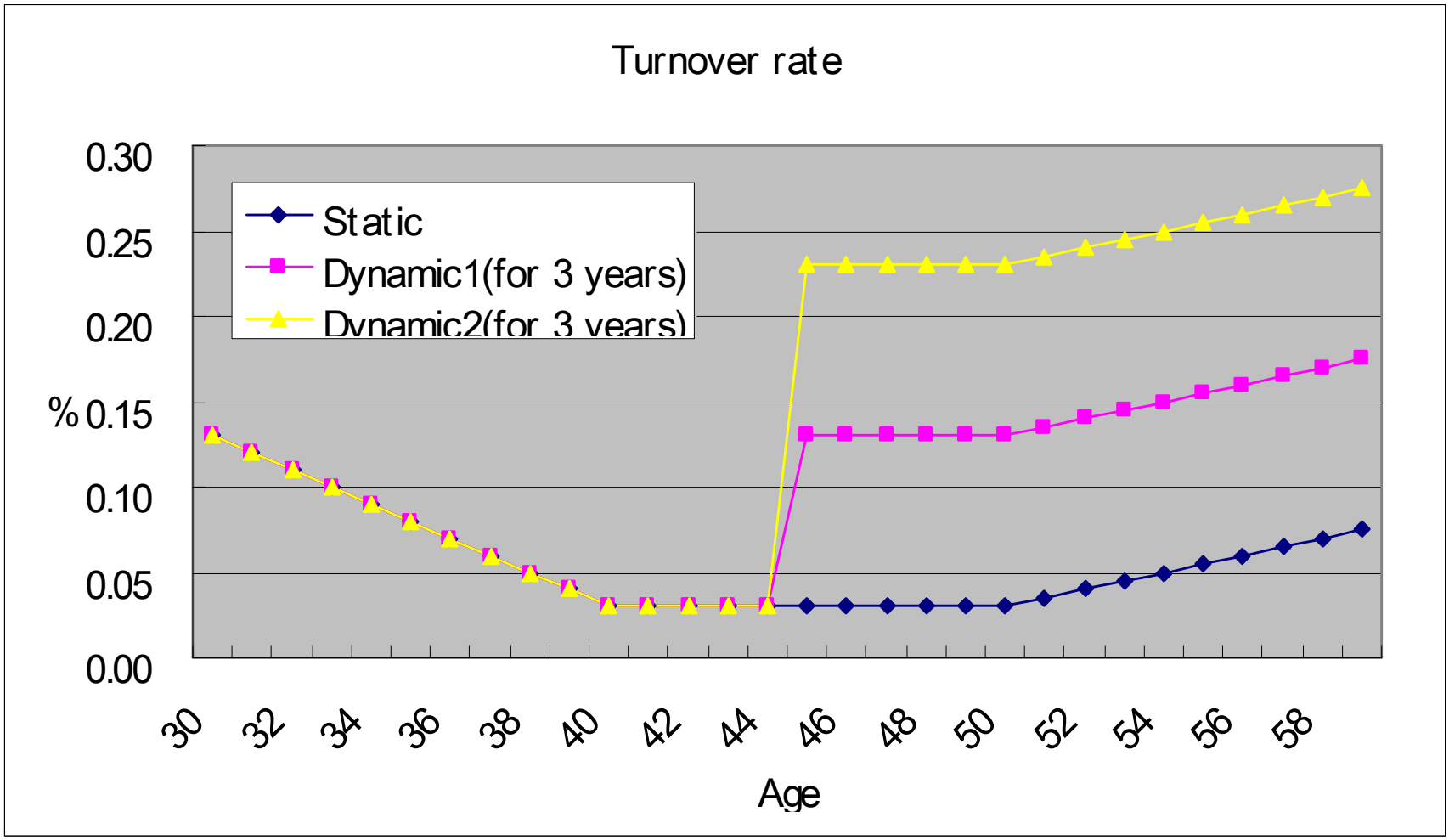
Number of employees and salaries at T_n

Simulation based on the **same assumption** as usual*

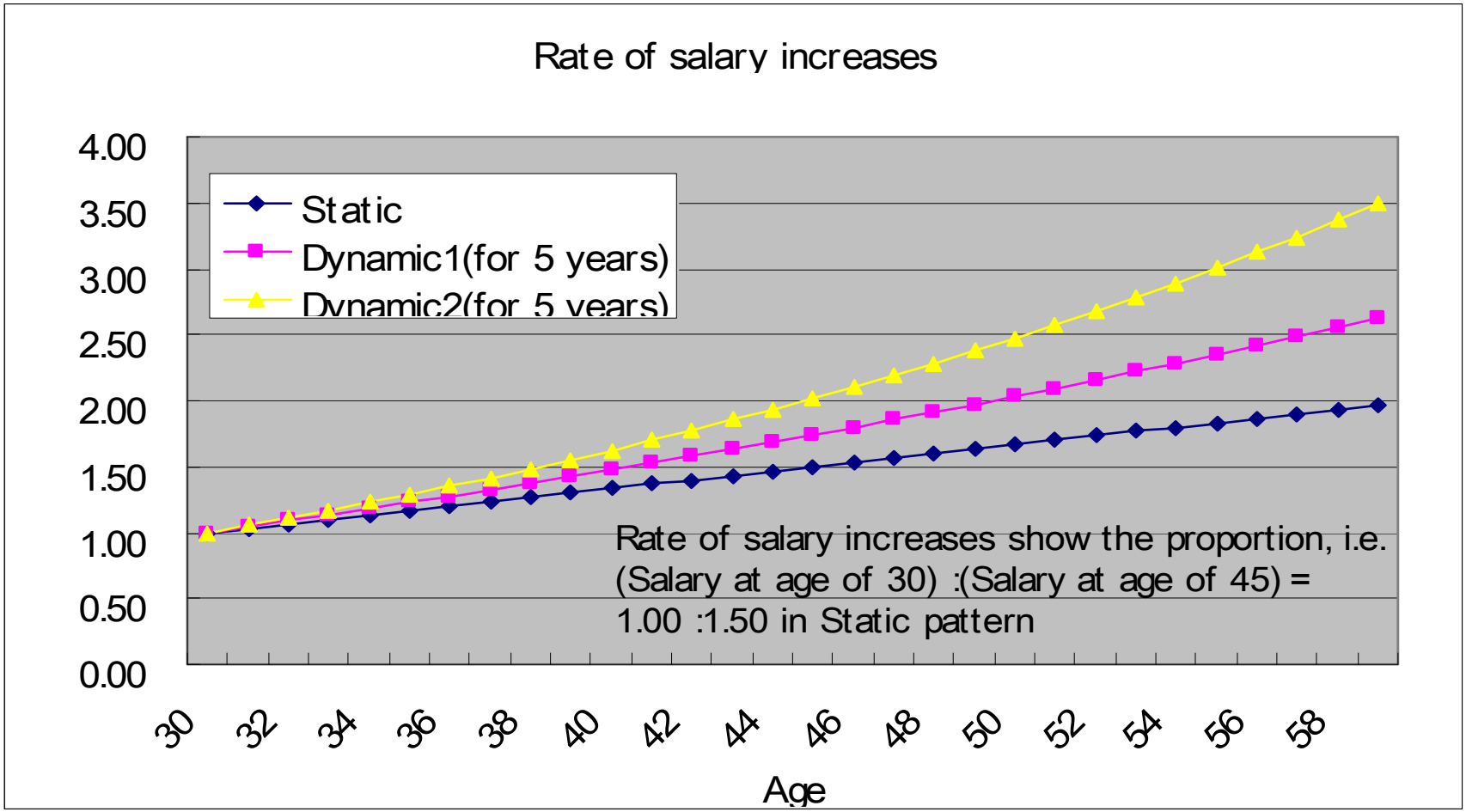
Number of employees and salaries at T_∞

* without considering re-structuring and M&A

Model
-Turnover rate-



Model
-Rate of salary increases-



Model
-Pension plan-

- Employees
  - No new employees are assumed to enter.
- Payment design
  - It is assumed that all the members select lump-sums.
  - The amount of benefit (lump-sum) =salary at the time of resignation ×number of years of service.

Examination Method -Accounting Standards-

- First step
  - calculate PBO based on each scenario
  - describe the differences between the results of calculation

- 3 scenarios:
  - Static
  - Dynamic1
  - Dynamic2

If the differences are significant

- Second step
  - estimate the actuarial gain or loss
  - investigate the implied risks of the accounting procedure

- Actual:
  - Dynamic1
  - Dynamic2
- Assumption:
  - Static

Examination Method -Accounting Standards- First step

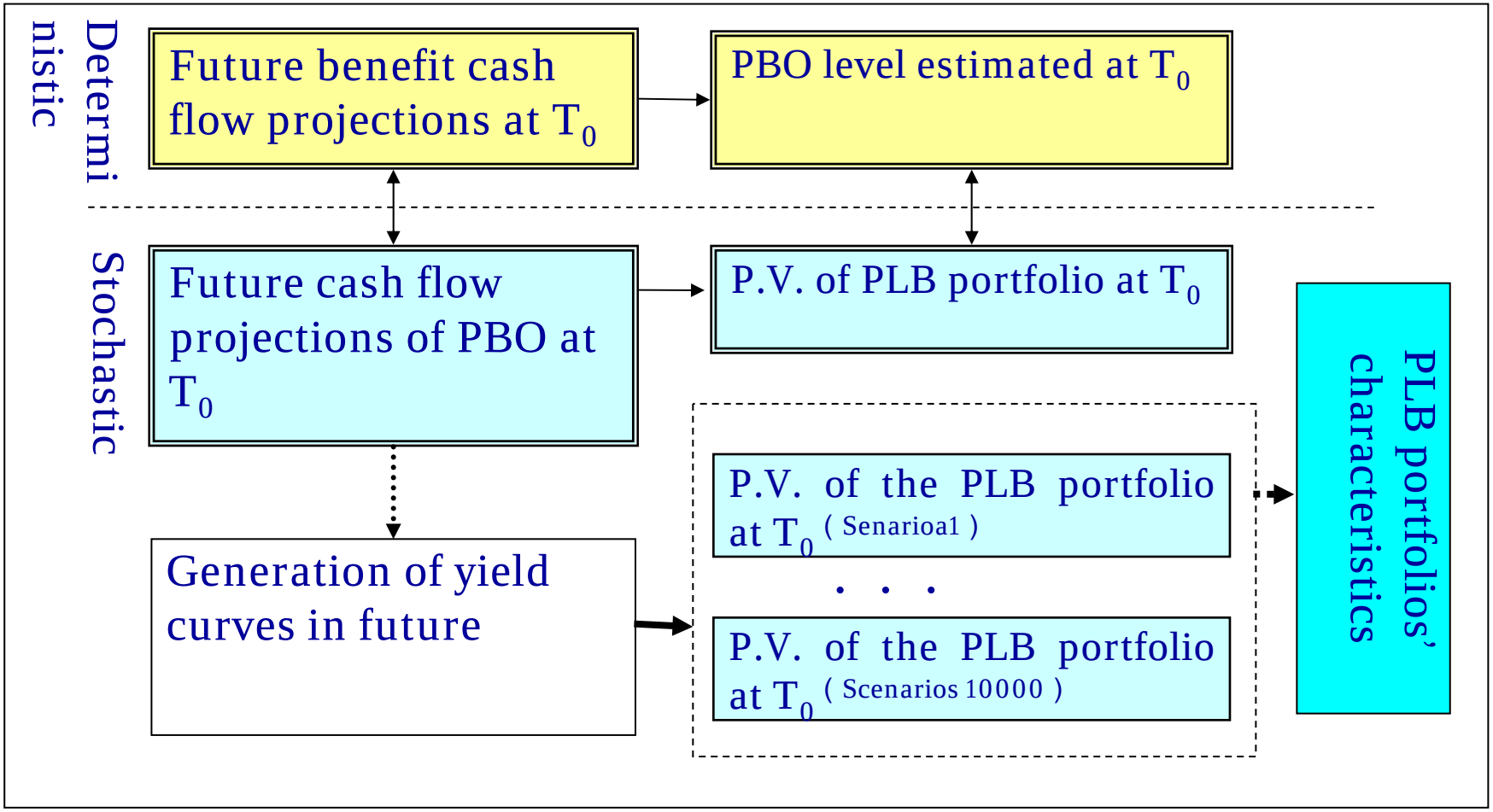
Turnover rate	Static pattern	Dynamic 1 pattern	Dynamic 2 pattern
PBO (thousand JPY)	221,097	221,767	222,218
Ratio to Static pattern	1.000	1.003	1.005

Rate of salary increases	Static pattern	Dynamic 1 pattern	Dynamic 2 pattern
PBO (thousand JPY)	221,097	229,928	239,070
Ratio to Static pattern	1.000	1.040	1.081

Examination Method -Accounting Standards- Second step (Rate of salary increases)

Year	Actuarial loss (Million JPY)		Actuarial loss / PBO	
	Dynamic1	Dynamic2	Dynamic1	Dynamic2
0	-	-	-	-
1	2.3	4.7	1.1%	2.1%
2	4.6	9.2	2.2%	4.3%
3	6.7	13.6	3.3%	6.5%
4	8.8	17.9	4.5%	8.8%
5	10.8	22.0	5.7%	11.2%

Examination Method -LDI-
Flow of understanding the characteristics of the PLB portfolio



Examination Method -LDI-
Comparison analysis matrix

Pension liabilities side / Pension assets side		Future benefit cash flow projections and PBO level at T_0			
		Turnover rate& dynamic1	Turnover rate& dynamic2	Rate of salary increases & dynamic1	Rate of salary increases & dynamic2
PLB portfolio	Focus on turnover rate	Case 1	Case 2		
	Focus on rate of salary increases			Case 3	Case 4

Comparison analysis of cash flow mismatches and surpluses derived by changes of actuarial assumptions

Examination Method -LDI-
Influence of the revised turnover rate assumption is・・・

	Rate of change of surplus			
Case	Case 1		Case 2	
Focusing on turnover rate	Dynamic 1 pattern for both	Dynamic 1 pattern for liabilities	Dynamic 2 pattern for both	Dynamic 2 pattern for liabilities
Average	0.13%	0.68%	0.61%	0.76%
S.D.	1.11%	1.35%	1.29%	1.97%
Kurtosis	9.51%	36.68%	16.44%	51.30%
Skewness	- 9.28%	5.98%	- 8.01%	- 12.33%
cVaR(95%)	- 2.22%	- 2.21%	- 2.13%	- 3.65%

Examination Method -LDI-

・・・ larger than that of the revised rate of salary increases assumption on surplus.

	Rate of change of surplus			
Case	Case 3		Case 4	
Focusing on rate of salary increases	Dynamic 1 pattern for both ⇔	Dynamic 1 pattern for liabilities	Dynamic 2 pattern for both ⇔	Dynamic 2 pattern for liabilities
Average	0.57%	0.57%	0.57%	0.57%
S.D.	0.97%	1.00%	0.98%	1.01%
Kurtosis	15.75%	15.35%	15.65%	15.49%
Skewness	- 9.02%	- 7.23%	- 9.66%	- 10.70%
cVaR(95%)	- 1.50%	- 1.56%	- 1.51%	- 1.60%

Conclusion

- Thinking of corporations' strategies, PBO calculation methods or the way of estimating assumptions should be developed to reflect the real position of dynamic corporations.
  - The rate of salary increases assumption is a key factor for the accounting procedure.
  - The turnover rate assumption, which influences the rate of change of surplus, is a key factor for implementing LDI.

Note

- This presentation is solely for the purpose of summarizing the original paper; and not for any other purpose.
- Any errors and all opinions remain the author's own.