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The Way of Corporate Pension Design

**from viewpoints of risk sharing
among employees and employers
in the longevity society**

Yohei Noda, Japan



About Speaker

Yohei Noda (Japan)

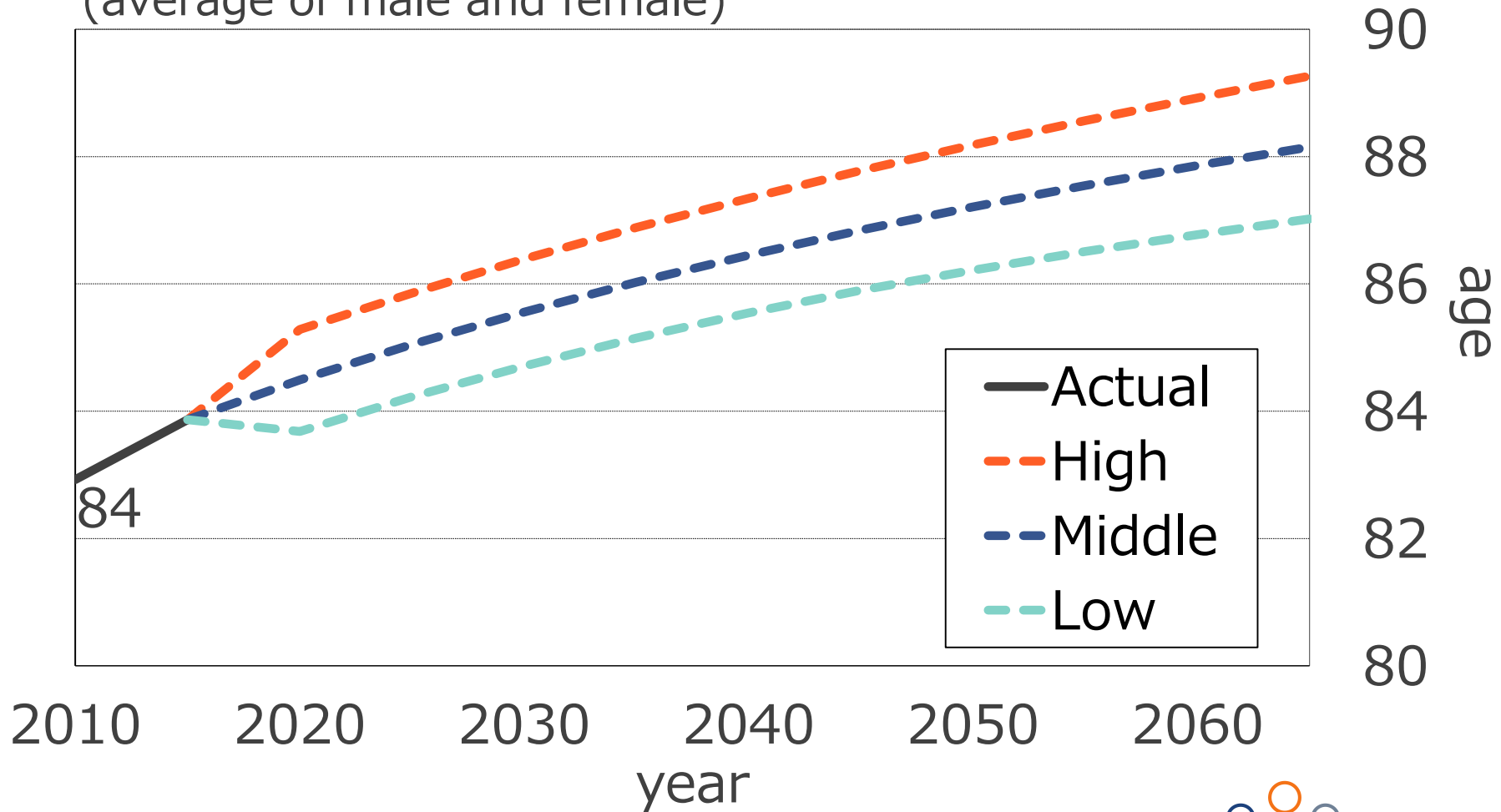
- Certified Pension Actuary (since 1st April)
- Member of  **JSCPA** The Japanese Society of Certified Pension Actuaries
- Fellow of the Institute of Actuaries of Japan
- Mitsubishi UFJ Trust and Banking Corporation
- Contact: y.noda0217@gmail.com





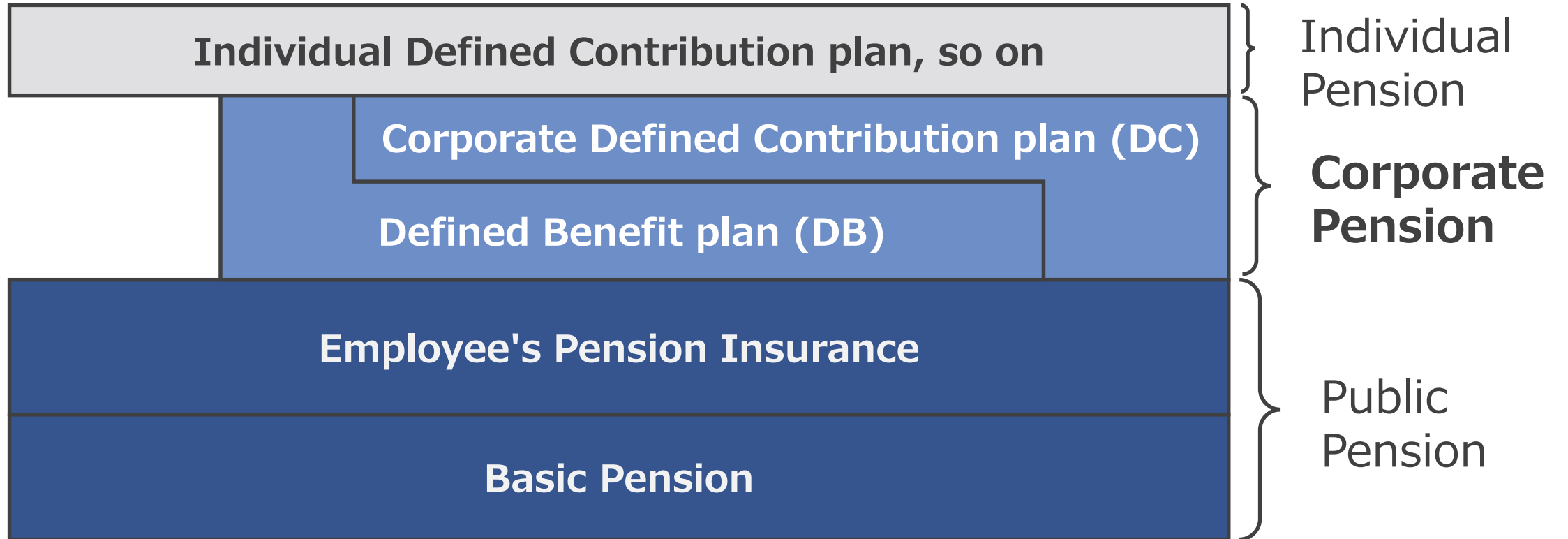
Life expectancy in Japan

(average of male and female)





Employee's Pension system in Japan





Pension Designs in Japan

Pension	Public Pension	Corporate Pensions (DB / DC)
Pension Age	Age 65 (Age 60-70)	Age 60-65
Payment Period	Life	Life / Fixed-term (5-20 years)
Inflation-indexed	Yes	No
Mandatory /Voluntary	Mandatory	Voluntary



Targets and Issues

Targets

- ✓ Providing adequate benefits in elderly
- ✓ Improving financial sustainability



Issues

- ✓ How to deal with longevity risk?
- ✓ How to share investment risk?



Issue and Suggestion on Longevity

Issue

- ✓ How to deal with longevity risk?



Suggestion

- ✓ Providing fixed-term annuity as *Bridge Pension*



Income-Outgo Simulation

Life annuity

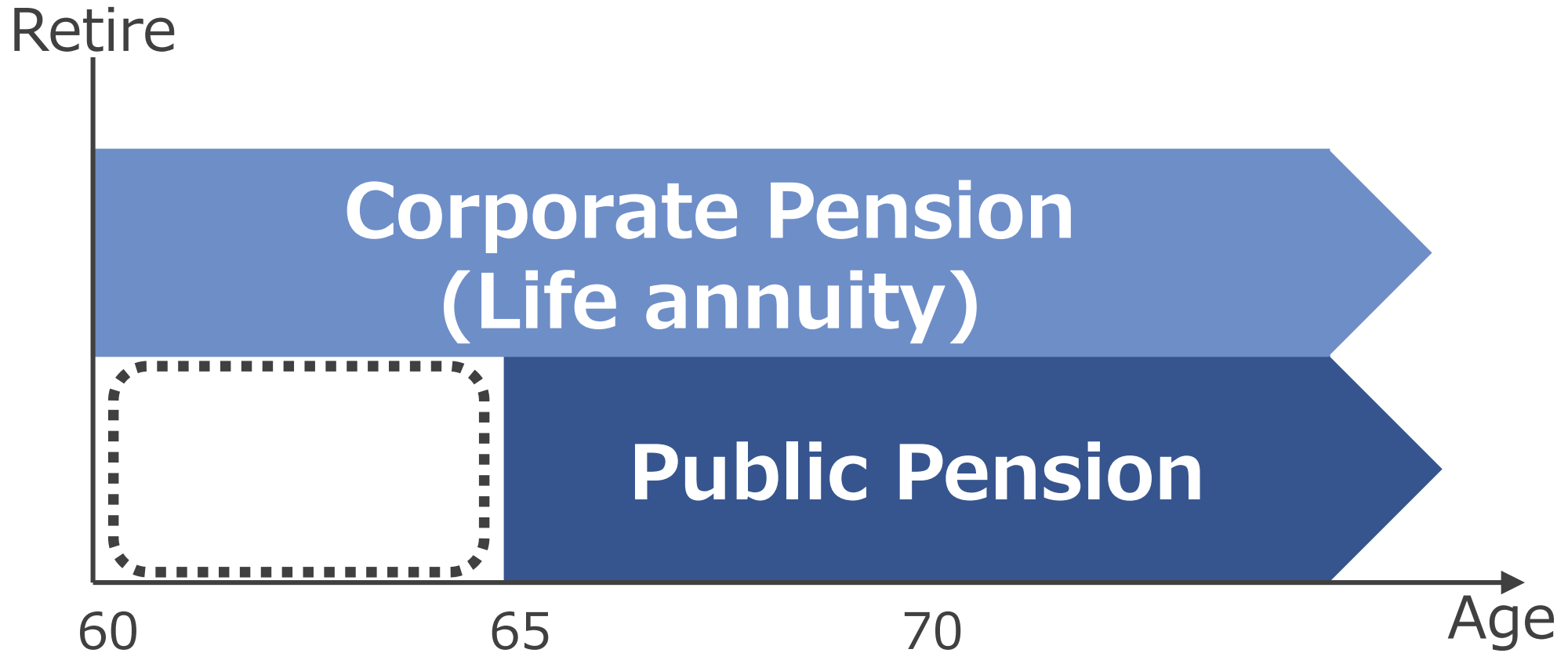
vs

Fixed-term annuity

Assumptions		
Retirement	Age 60	
Income	Corporate Pension	25 million JPY (Based on the present value)
	Public Pension	221,277 JPY / month (Based on the standard model at 2018)
Outgo	The average values in Japan ("Family Income and Expenditure Survey 2017")	



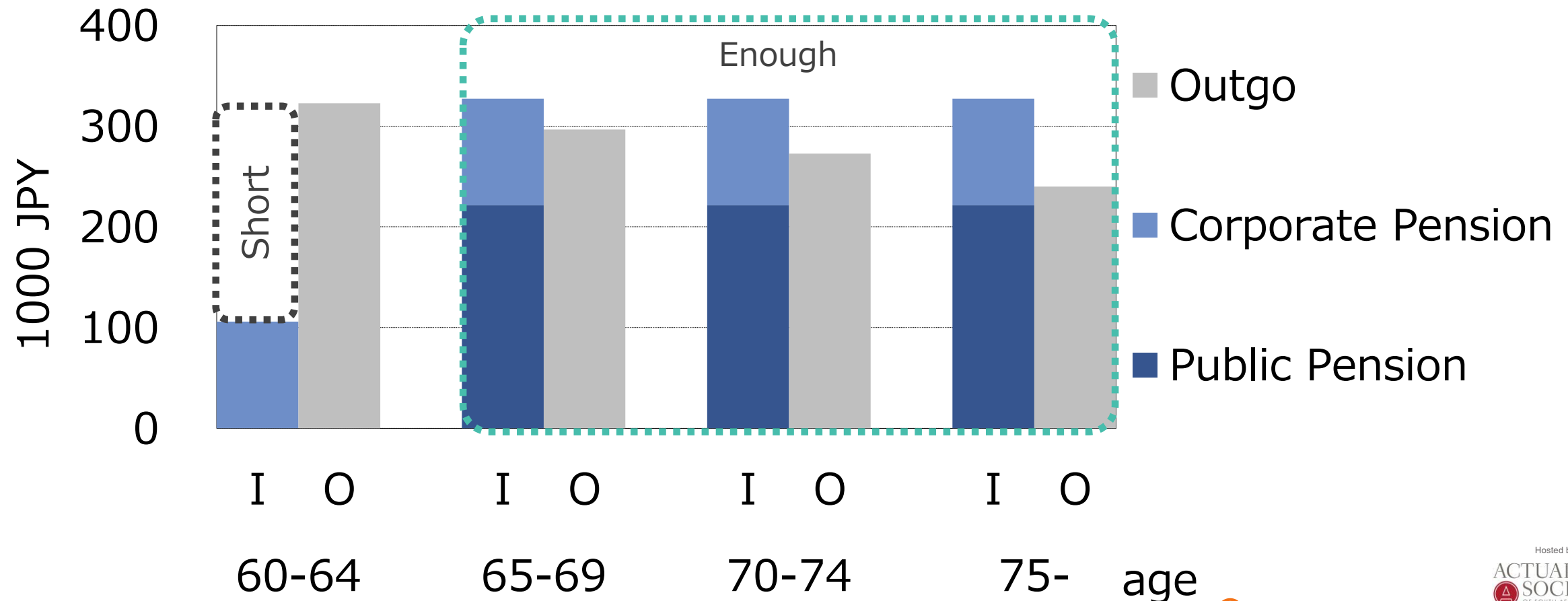
Life annuity + Public Pension





Life annuity + Public Pension

Income and Outgo (monthly)

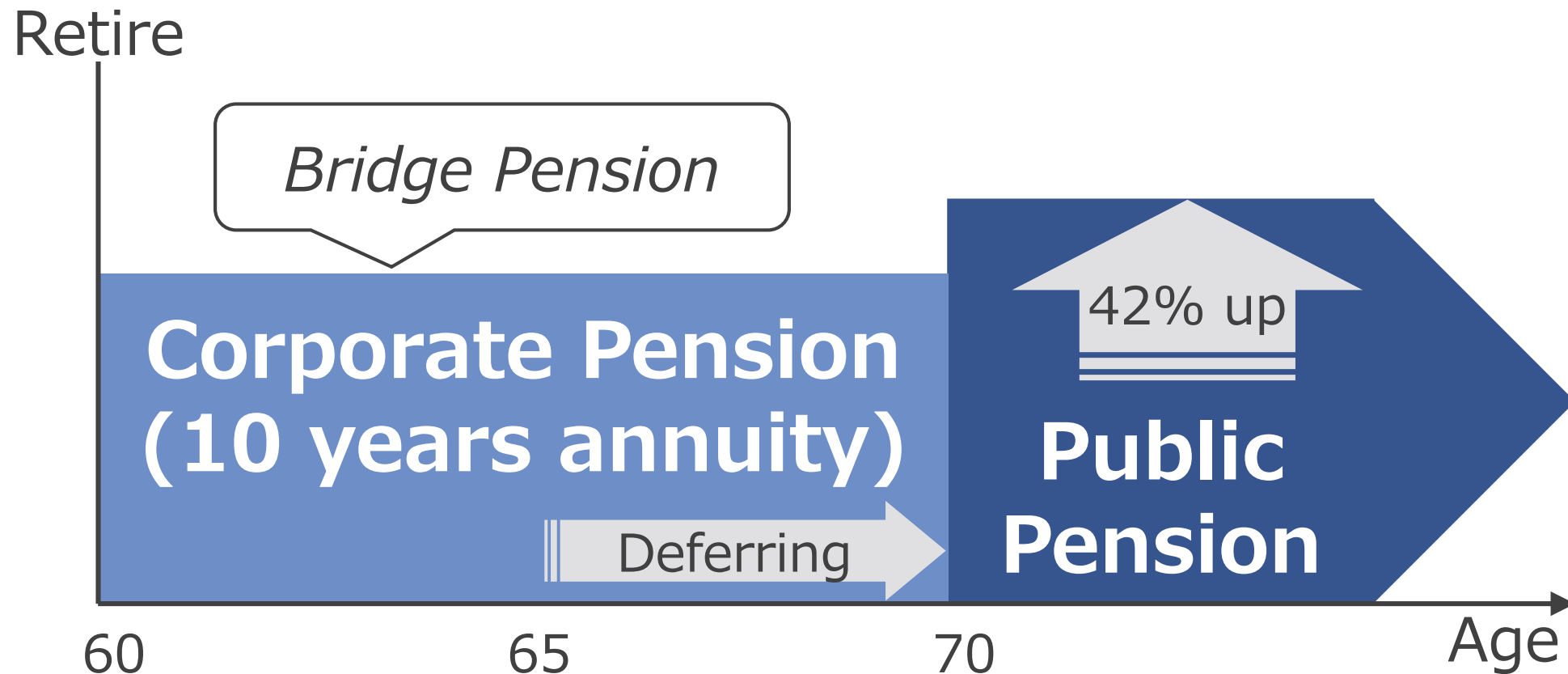


1000JPY ≈ \$9 ≈ £7 ≈ 130ZAR

Source (Outgo) : Ministry of Internal Affairs and Communications



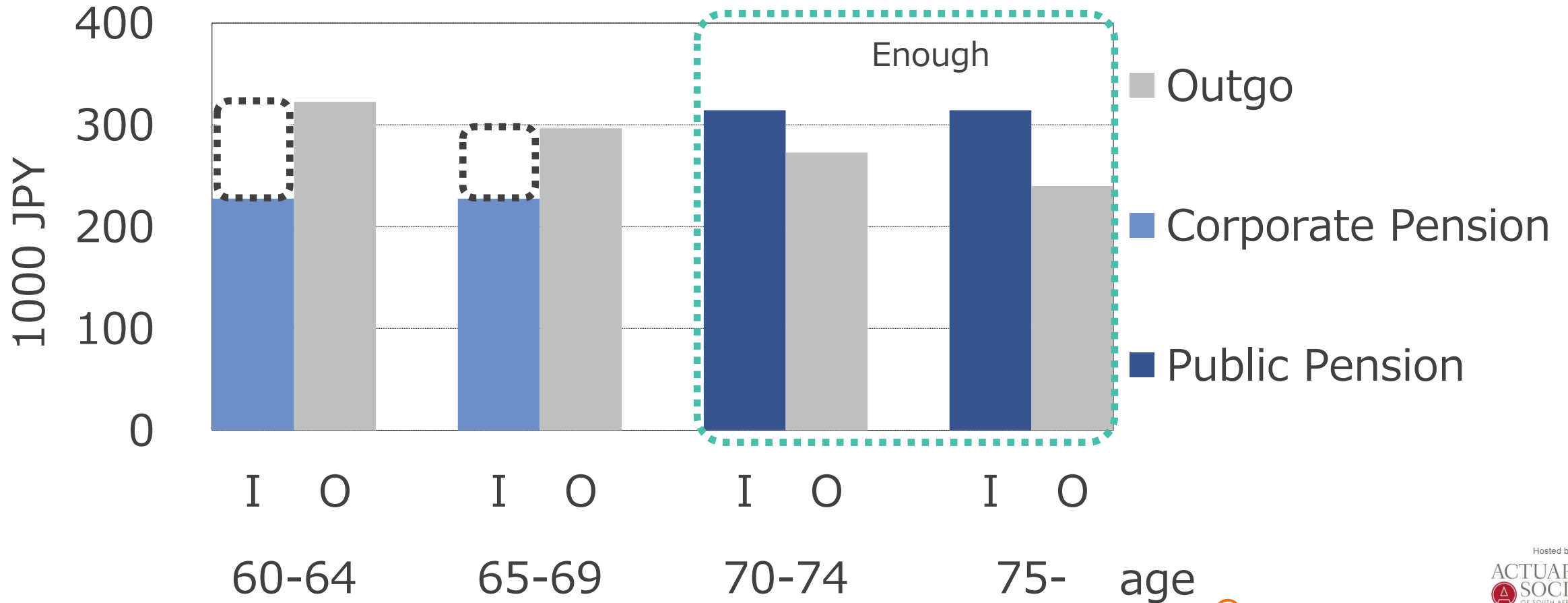
Fixed-term annuity + Public Pension





Fixed-term annuity + Public Pension

Income and Outgo (monthly)



1000JPY \approx \$9 \approx £7 \approx 130ZAR

Source (Outgo) : Ministry of Internal Affairs and Communications



Comparison of benefit types

Benefit type of Corporate Pension			Life annuity	Fixed-term annuity
Risks	Employees	Longevity	✓	✓
		Inflation	✗ ✓	✓
	Sponsor	Longevity	✗	✓
Total shortfall			13 million JPY	10 million JPY



Issue and suggestion on Investment

Issue

- ✓ How to share investment risk?

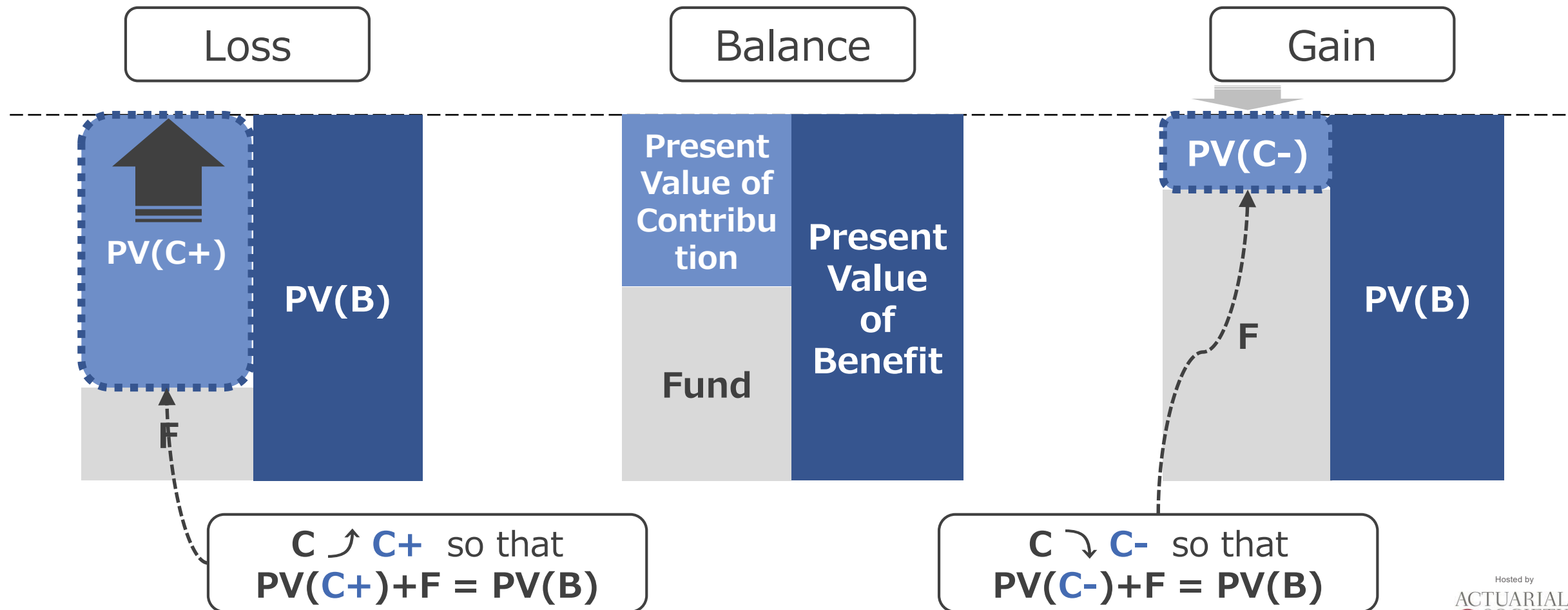


Suggestion

- ✓ Introducing *Risk-Sharing* plan



Defined Benefit plan



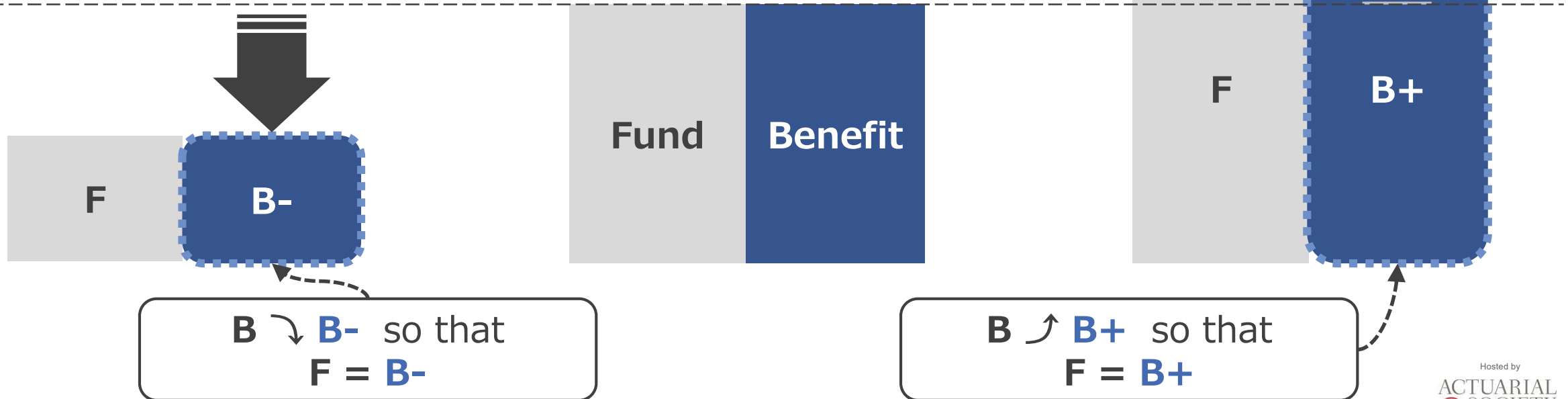


Defined Contribution plan

Loss

Balance

Gain



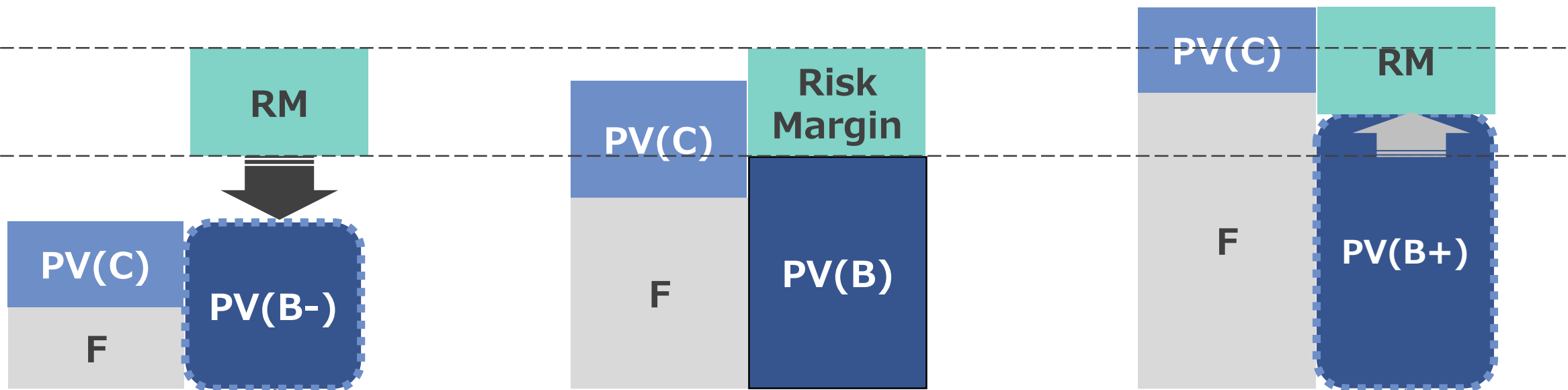


Risk-Sharing plan

Loss

Balance

Gain



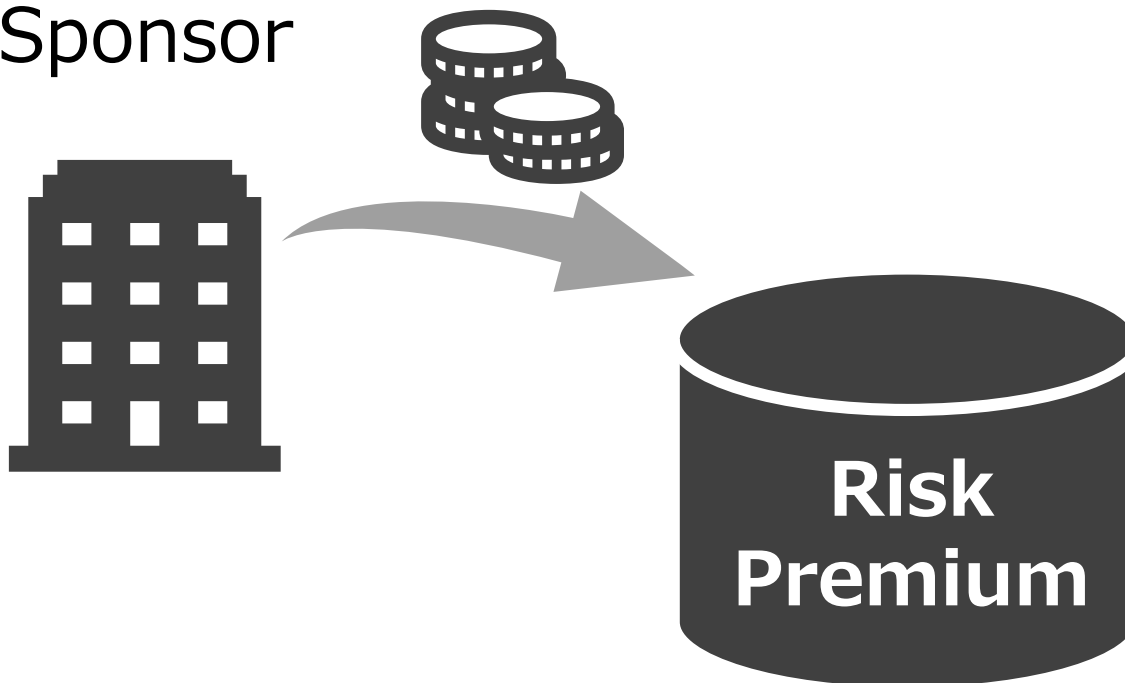
$B \rightarrow B^-$ so that
 $PV(C) + F = PV(B^-)$

$B \rightarrow B^+$ so that
 $PV(C) + F = PV(B^+) + RM$



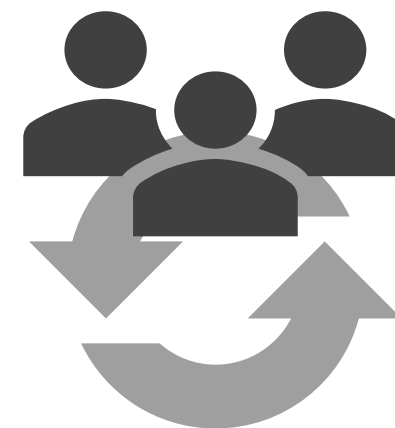
Note of Risk Share and Transfer

Sponsor



Risk-OFF

Employees



Risk-ON

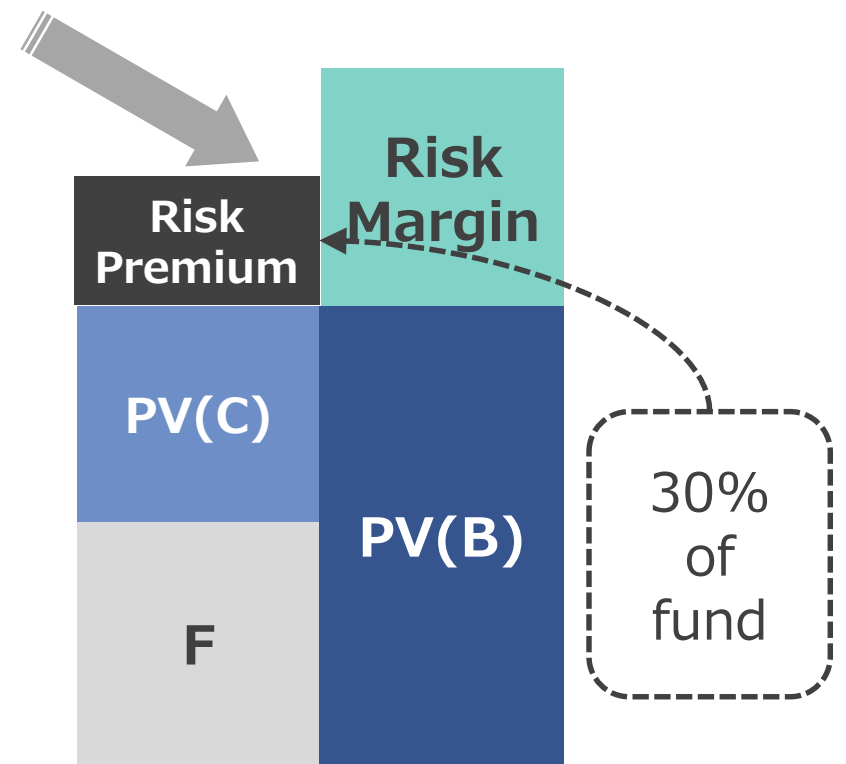
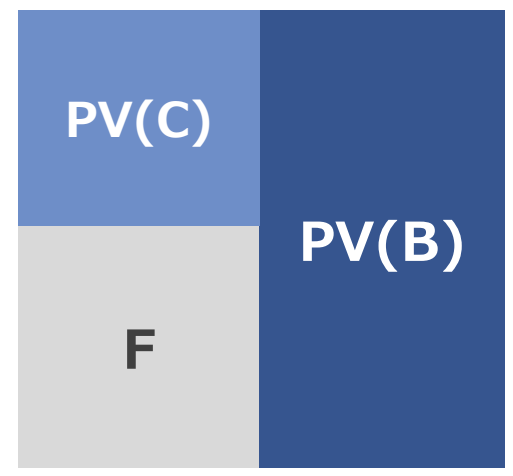
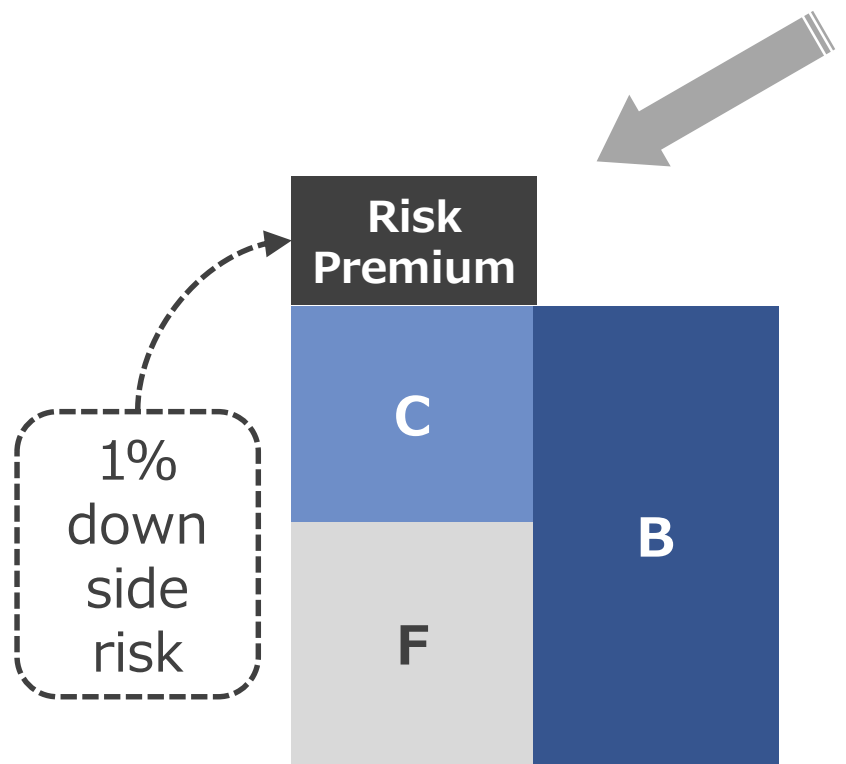


Changing DB plan to Others

DC

DB

Risk-Sharing





Assumptions of Simulation

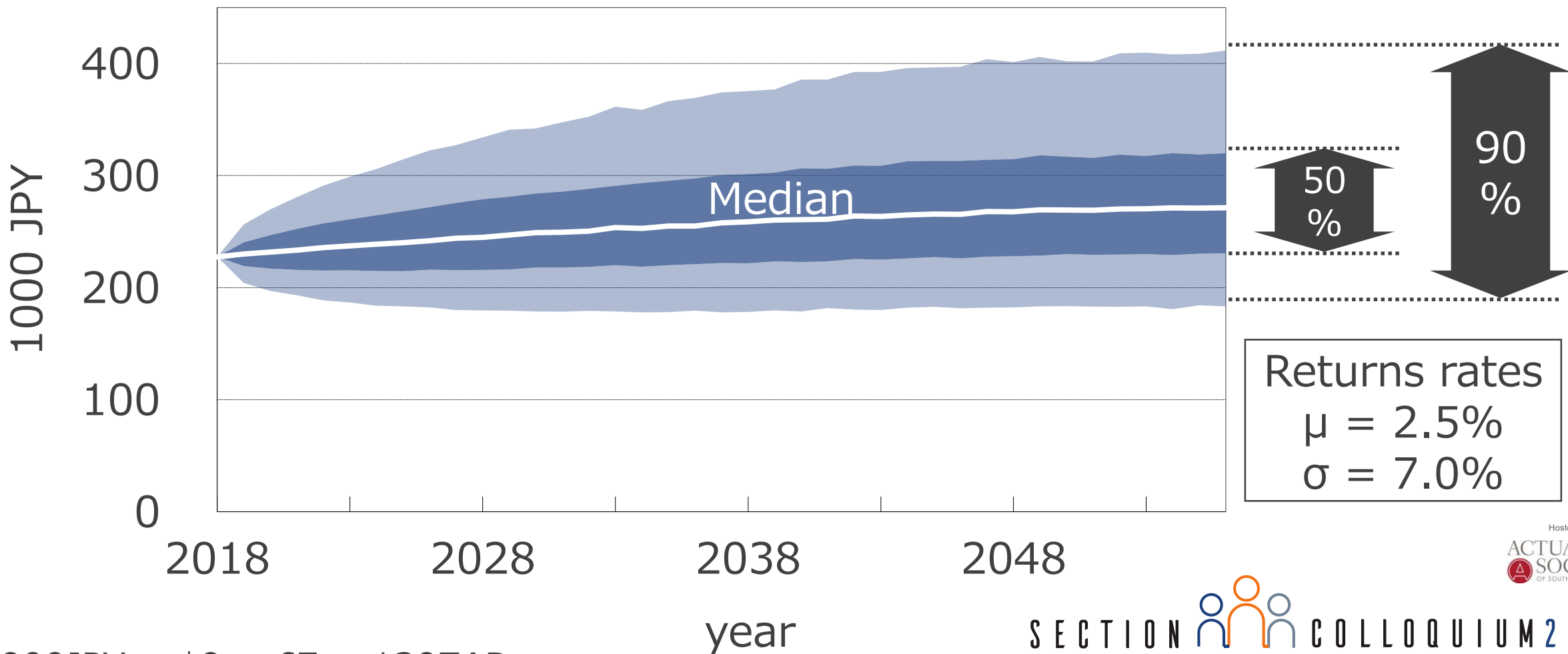
Plan	
Benefit design on DB / <i>Risk-sharing</i>	Cash balance plan
Standard pension amount	227,000 yen (monthly)
Entry age	Age 22
Retirement age	Age 60
Pension age	Age 60
Payment period	10 years annuity
Risk premium	Add to the normal contribution by 22%

Calculation	
Expected interest rate	2.5%
Distribution of return rates	Gaussian
Expected value of return rates (μ)	2.5%
Standard deviation of return rates (σ)	7.0%
Population	Stationary population
Method	Monte Carlo simulation (n=10000)



Simulation on DC plan

Pension amount at age 60 (monthly)

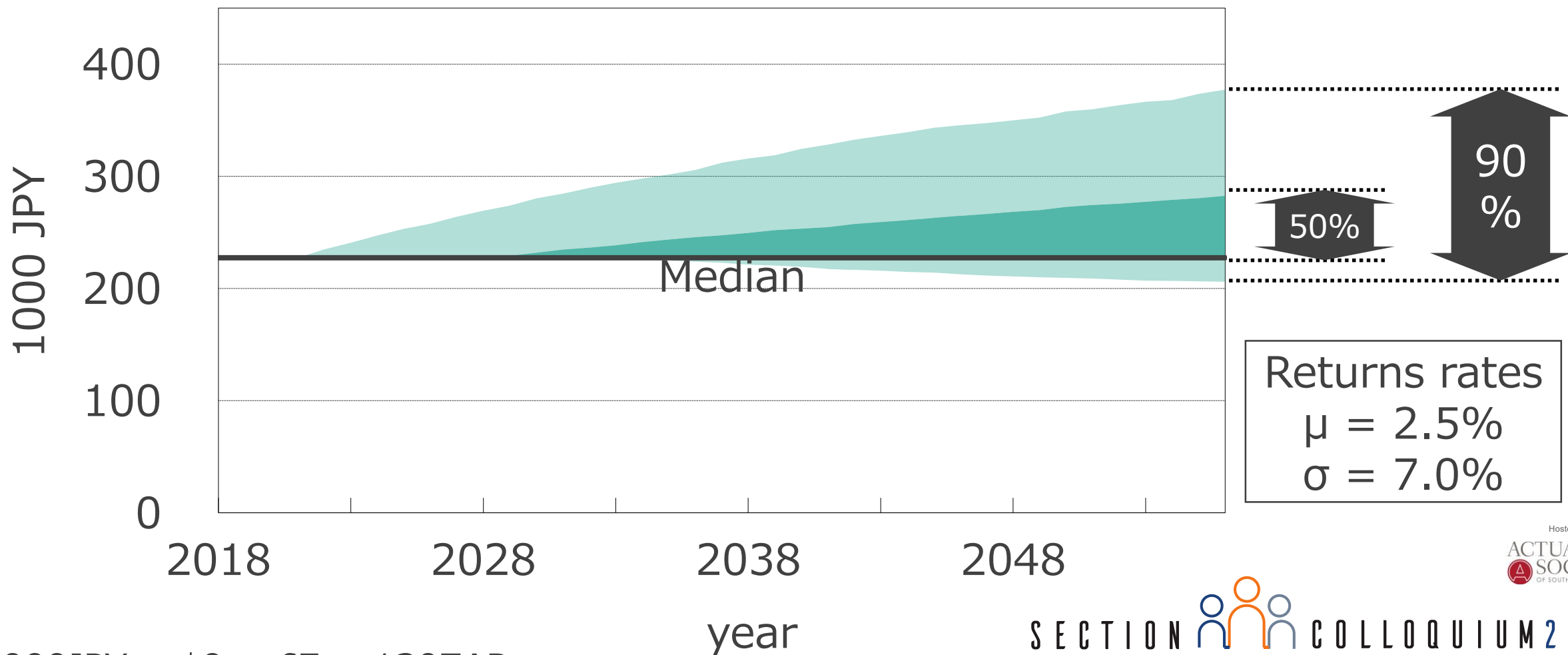


1000JPY \approx \$9 \approx £7 \approx 130ZAR



Simulation on *Risk-Sharing* plan

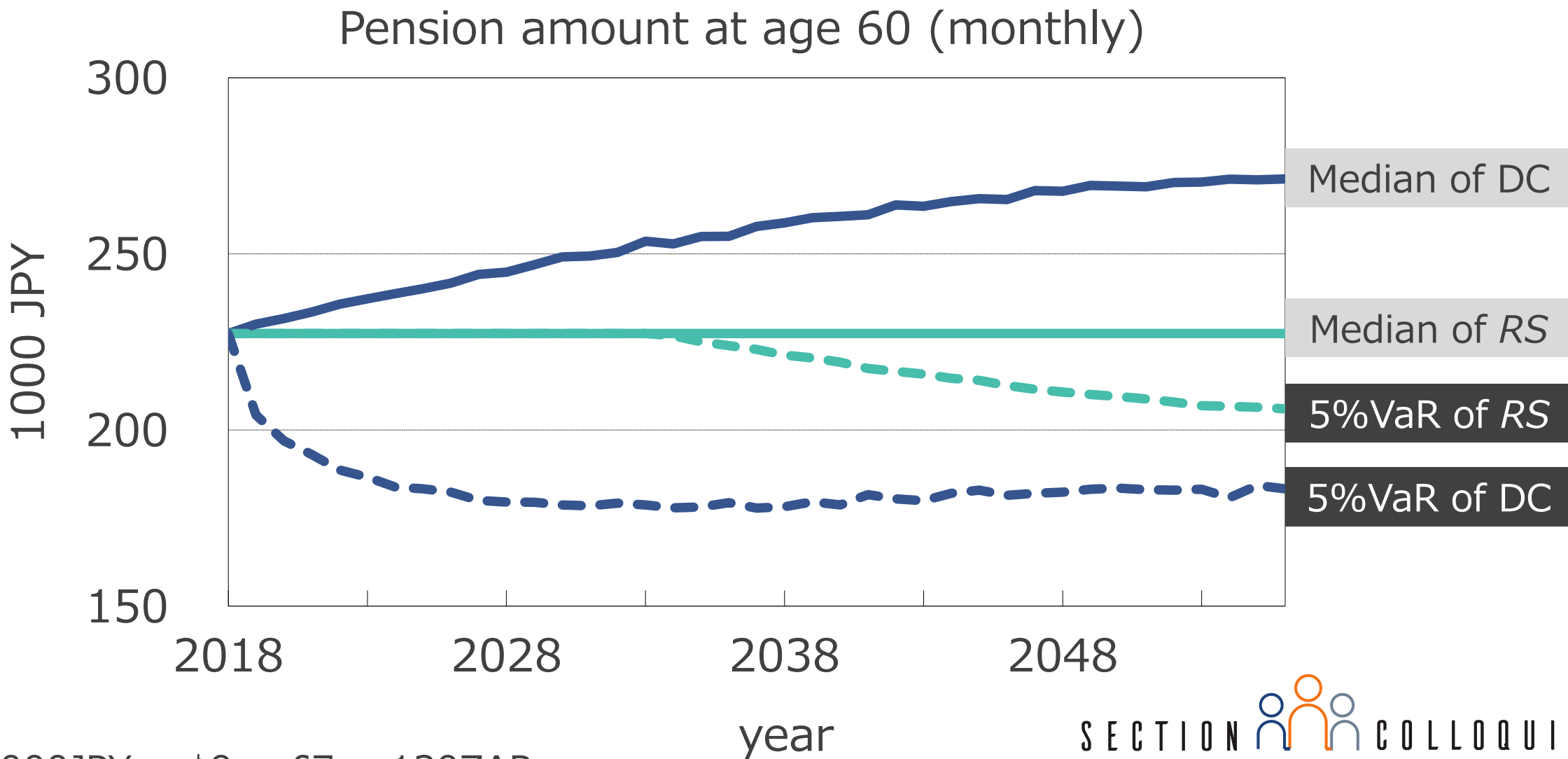
Pension amount at age 60 (monthly)



1000JPY \approx \$9 \approx £7 \approx 130ZAR



Comparison of plans



1000JPY \approx \$9 \approx £7 \approx 130ZAR



Comparison of plans

Plan		DB	DC	<i>Risk-Sharing</i>
Investment Risk	Employees	✓	✗	✗ ✓
	Sponsor	✗	✓	✓



Summary

Targets

- ✓ Providing adequate benefits in elderly
- ✓ Improving financial sustainability

Issues

- ✓ Longevity risk
- ✓ Investment risk

Suggestions

- ✓ *Bridge Pension*
- ✓ *Risk-Sharing plan*