Adoption of Policy Portfolio (1)

- Government Pension Investment Fund (“GPIF”) establishes the policy portfolio formed by the target allocation to each asset class, and performs investment in accordance the policy portfolio. GPIF has formulated the new policy portfolio for the fourth medium-term plan (five-year plan) which starts from FY2020. This formation has taken place for the first time since the integration of the Employee's Pension Schemes and the foundation of the Board of Governors. The new policy portfolio has been determined after 13 deliberations at the Board of Governors and will come into effect as of April 1, 2020.
- In a bid to conduct efficient deliberations at the Board of Governors, a working sub-committee, which consists of economics and finance professions, was formed under the Board of Governors in February 2018. Matters related to the policy portfolio were reviewed and discussed from multi-dimensional, comprehensive and technical perspectives at the meetings held 32 times.
- GPIF is required to secure an investment return necessary for long-term pension finance, with the lowest risk, to ensure stable pension payouts in future, while dealing with the current investment environment with forward-looking views.
- With the above in mind, when formulating the policy portfolio,
  - GPIF took into consideration results of the Actuarial Valuation conducted by the Ministry of Health, Labour and Welfare (“HLW”), the medium-term objectives established by the Minister of HLW, and the model portfolio established jointly by the four asset management entities, which have been responsible for investing GPIF’s reserve assets since the integration of the Employee's Pension Schemes.
  - In addition, the following conditions were taken into account: The policy interest rates in developed countries have remained historically low since the global financial crisis and such trend is particularly evident in Japan, although the global economy has marked weak but stable growth.
- Under such circumstances, GPIF has adopted the new policy portfolio which meets the investment return necessary for pension finance with the lowest risk, and the new policy portfolio resulted in increased allocation to foreign bonds with less allocation to domestic bonds.
- While looking at macroeconomic trends, market conditions, etc. carefully, GPIF will verify the new policy portfolio properly and in a timely way to examine whether it deviates from the investment environment that was assumed at the time of the formulation, and conduct reviews when necessary.

Adoption of Policy Portfolio (2)

○ The new policy portfolio meets GPIF's investment objectives (real investment return* of 1.7%) with the lowest risk. In addition to the current deviation limits set for each asset class, new deviation limits for total bonds and total equities have been established in order to strengthen risk management on the equity side. As a result, whereas the permissible range for total bond holdings will be the two individual bands added together: that is 50% + 13%, the range for equity holdings will be limited to 50% + 11% by the total equity holdings band.

(Old)

	Domestic bonds	Foreign bonds	Domestic equities	Foreign equities
Target allocation	35%	15%	25%	25%
Deviation Limits	±10%	±4%	±9%	±8%

(New)

		Domestic bonds	Foreign bonds	Domestic equities	Foreign equities
Target allocation		25%	25%	25%	25%
Deviation Limits	Asset class	±7%	±6%	±8%	±7%
	Bonds/Equities	±11%		±11%	

- Alternative assets (infrastructure, private equities, real estate and other assets determined through resolutions at the Board of Governors) will be classified into domestic bonds, domestic equities, foreign bonds and foreign equities based on their risk and return profiles, and will be limited to 5% of total assets. However, if economic and market conditions prevent compliance with the 5% ceiling rule, this limit may be raised after deliberation and resolution by the Board of Governors.
- Foreign bonds with a currency hedge and yen-denominated short-term assets will be classified as domestic bonds, while foreign currency-denominated short-term assets will be classified as foreign bonds.
- In light of recent extreme economic and market volatility, the GPIF will flexibly manage investments based on an appropriate, reasonably grounded outlook for the market environment and subject to the deviation limits for the new policy portfolio.

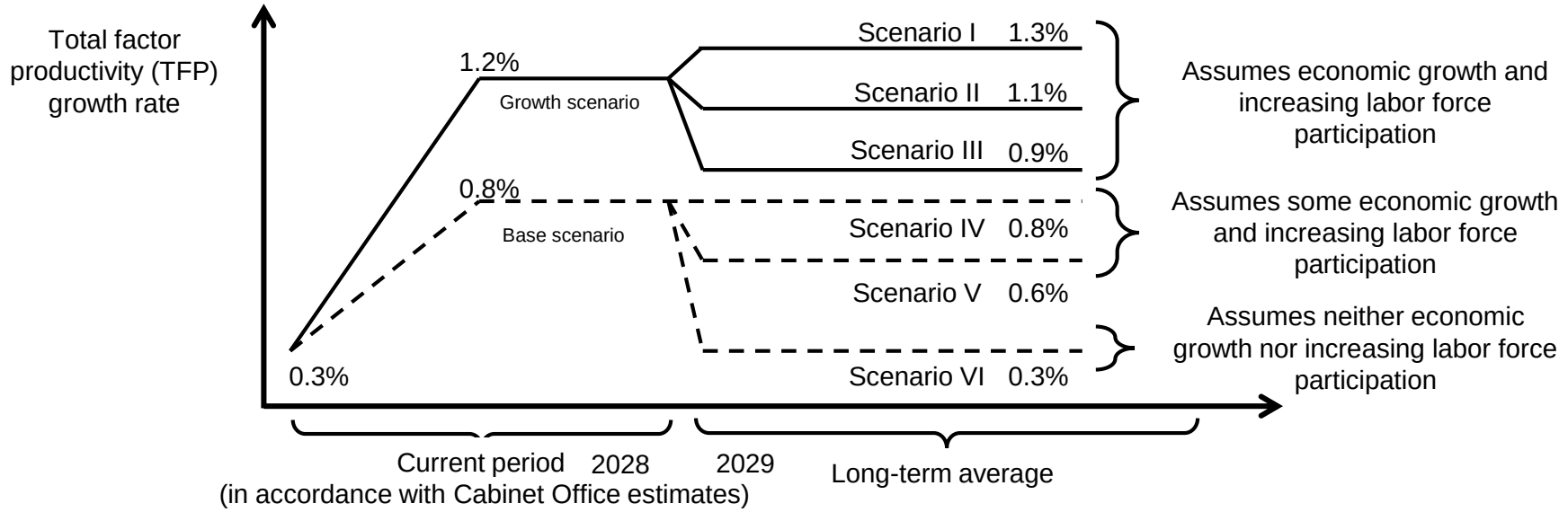
*Nominal investment return less nominal wage increase

Details of New Policy Portfolio

Public Pension Scheme and Actuarial Valuation

- Japan's public pension scheme (Employees' Pension Insurance and National Pension) is a pay-as-you-go system in which contributions paid by working generations support elderly generations. Given the decreasing birthrate and aging population in Japan, funding pension benefits solely by working generation contributions would place an unduly excessive burden on this group. The pension reserve fund managed by GPIF will therefore be used to supplement payouts made to later generations.
- Under this framework, the government carries out an actuarial valuation at least every five years based on the outlook for population and economic trends.
- The actuarial valuation uses fiscal and macro-economic slide projections to verify the soundness of pension finances. The most recent valuation was conducted in 2019 (officially released on August 27, 2019), and included an analysis of six broad scenarios. The valuation focused particularly on total factor productivity (i.e. technological advances), which is a critical factor in making long-term economic assumptions. (Eight scenarios were tested in the 2014 actuarial valuation).

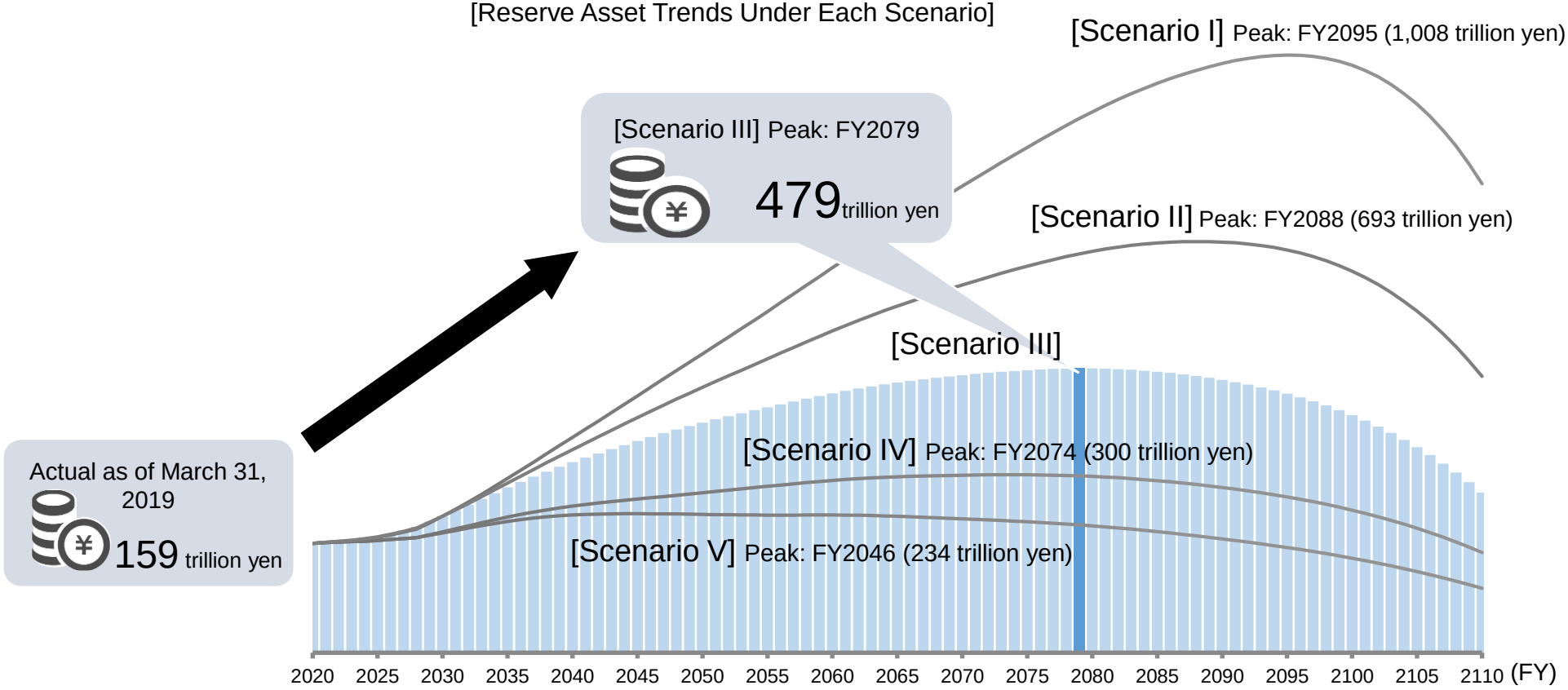
[Economic Assumptions in the Actuarial Valuation]



Actuarial Valuation Results
(Projections for Pension Reserves Over Approximately 100 years)

- The actuarial valuation conducted in 2019 projects reserve asset levels over the approximately 100-year period for each scenario.
- Projections show that reserve assets will continuously grow over a long period from the March 31, 2019 level of 159 trillion yen, though the size and trends of reserve assets vary among the scenarios.

[Reserve Asset Trends Under Each Scenario]



* Population assumes medium fertility and medium mortality

* Asset level as of March 31, 2019 is only for the pension reserve fund and does not include Pension Special Account payments, etc.

Medium-Term Objective (Investment Objectives and Risk Constraints)

○ Given the result of the 2019 actuarial valuation, the Social Security Council's Committee on Pension Fund Management discussed investment objectives and risk constraints for the fourth medium-term period and established the following targets.

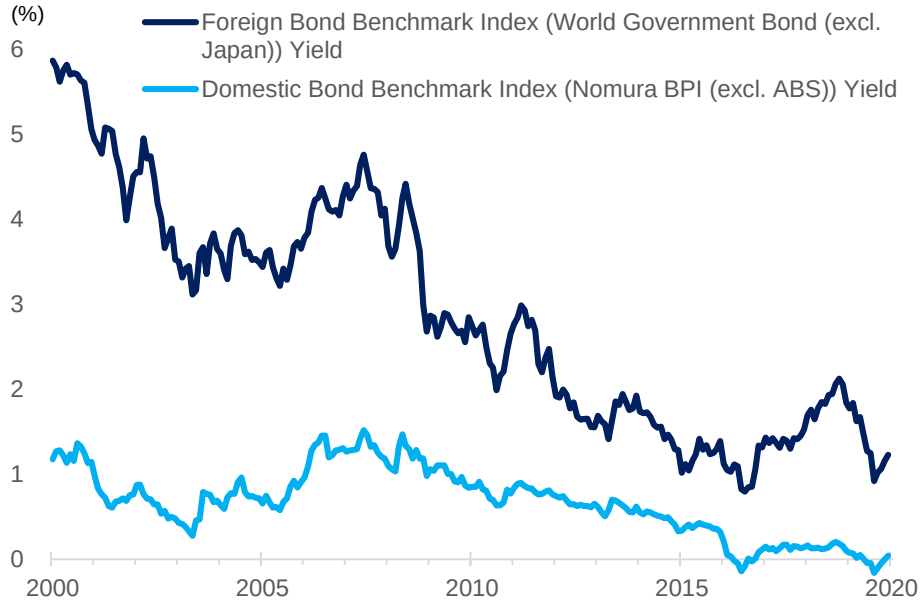
1. Based on the results of the actuarial valuation, GPIF will define and manage the policy portfolio with the objective of achieving a long-term real return of 1.7% (nominal investment return less nominal wage increase) on reserve assets with the least amount of risk.
2. The policy portfolio is formulated from a long-term perspective and incorporates generally recognized asset management expertise, domestic and overseas economic trends, and forward-looking risk analysis.
3. The downside risk to underperforming the nominal wage increase cannot exceed a portfolio comprised solely of domestic bonds, and appropriate consideration should be given to the fact that the downside risk for equities may be larger than expected. The probability that reserve assets may become smaller than originally anticipated should be accounted for and a thorough analysis of multiple risk scenarios should be conducted.

		Assumed future state of the economy		Economic assumptions				(Reference)
		Labor force participation rate	Total factor productivity (TFP) growth rate	CPI increase rate	Real wage growth rate (adjusted for CPI)	Rate of return on investment		Real economic growth rate from FY2029 20–30 years
						Real (adjusted for CPI)	Spread (adjusted for wages)	
Scenario I	Extension of Cabinet Office estimate for the growth scenario	Economic growth and increasing labor force participation scenario	1.3%	2.0%	1.6%	3.0%	1.4%	0.9%
Scenario II			1.1%	1.6%	1.4%	2.9%	1.5%	0.6%
Scenario III			0.9%	1.2%	1.1%	2.8%	**1.7%**	0.4%
Scenario IV	Extension of Cabinet Office estimate for the base scenario	Partial economic growth and increasing labor force participation scenario	0.8%	1.1%	1.0%	2.1%	1.1%	0.2%
Scenario V			0.6%	0.8%	0.8%	2.0%	1.2%	0.0%
Scenario VI		No economic growth or increasing labor force participation scenario	0.3%	0.5%	0.4%	0.8%	0.4%	-0.5%

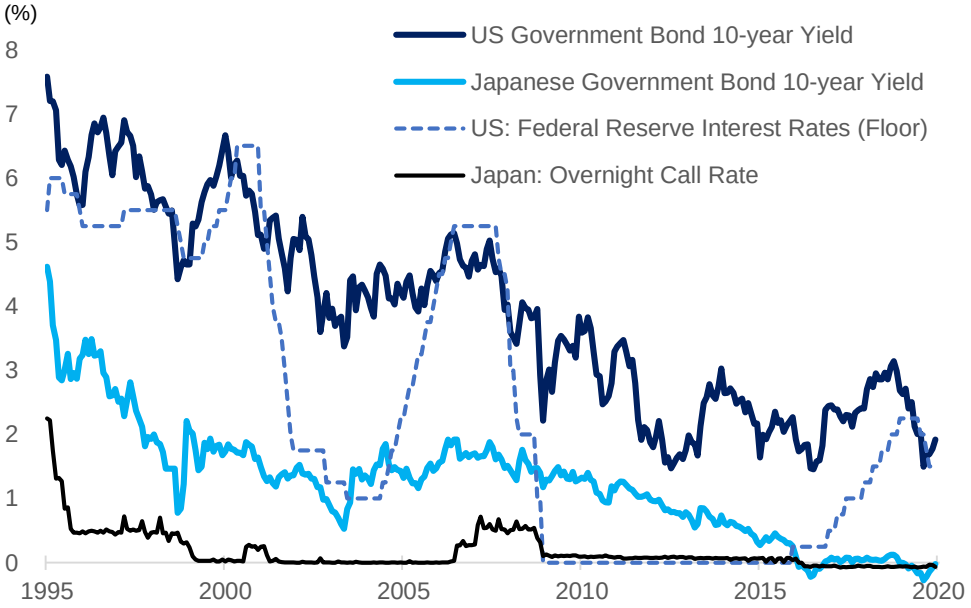
Recent Economic Conditions

- Policy interest rates in developed countries have remained historically low since the global financial crisis, and yields on the GPIF's benchmark domestic and foreign bonds have continued to decline as inflation rates have remained low.
- The IMF stated in 2016 that the biggest cause of low worldwide inflation was globalization. The BIS also indicated in 2016 that inflation rates are being affected by worldwide factors year after year due to globalizing supply chains.
- Under these conditions, Japan embarked on quantitative and qualitative monetary easing with negative interest rates in January 2016 and has continued quantitative and qualitative monetary easing with yield curve control since September 2016. Meanwhile, the United States ended its zero interest rate policy in December 2016 and has kept long-term interest rates above zero.

[Benchmark Bond Index Yields]



[Japanese / U.S. Interest Rates]



(As of Dec. 31, 2019)

Policy Portfolio Definition Process

- Based on the results of the actuarial valuation, the fund's medium-term objective and recent economic conditions, GPIF assumed the following conditions when defining the new policy portfolio.
- GPIF also confirmed that the new policy portfolio should fall within the range of median values for model portfolios.

1. We used multiple methods to estimate expected returns rather than a single method in order to enhance estimate precision. In addition to the current method, we also took into account the equilibrium return considered intrinsic to market capitalization.
2. Current policy benchmarks were used to estimate expected returns, risk and correlations. Since we refer to different assumptions made within the actuarial valuation during the portfolio optimization process, and the models used within the valuation to define long-term economic assumptions generally use a period of 25 years, the estimation period for expected returns was also set at 25 years.
3. Given that the return target set within the medium-term objective is a real return* of 1.7% - that is, the return target set under Scenario III – , we used Scenario III as the economic scenario for the basis for wage increase assumptions when setting wage-adjusted expected returns.
4. The improved estimation method for expected returns enhances the accuracy of the optimization and is likely to result in a better target allocation. Therefore, we decided to eliminate constraints (such as relative asset class size, etc.) , except for return requirements.
5. As before, the risk constraint used in the optimization included the requirement that the risk of the new policy portfolio falling below the nominal wage increase (lower partial probability) does not exceed that of a portfolio comprised solely of domestic bonds. We also used the average nominal wage increase shortfall rate (conditional average shortfall rate) to measure risk when optimizing the portfolio.
6. Looking at nominal reserve asset level trends within the actuarial valuation, while asset levels peak at different points in different scenarios, we expect that the investment policy can be maintained without reducing the reserve principal for about the next 50 years. The nominal reserve asset level peak is a critical point in investment operations, as it means that investment gains alone will not be able to cover cash payouts. Given this, we analyzed reserve asset level trends based on the new policy portfolio over the next 50 years, and compared them with reserve asset level trends within the actuarial valuation.
7. Furthermore, in light of the current low interest rate environment, domestic bonds, yen-denominated short-term assets and currency-hedged foreign bonds are all categorized as domestic bonds throughout the policy portfolio definition process, as these assets are considered to have similar risk and return profiles to that of domestic bonds. In addition, within short-term assets, those denominated in foreign currencies are counted as foreign bonds.

* Real return is the net of nominal investment return less nominal wage increase.

Assumptions for New Policy Portfolio (Expected Return)

- We projected domestic bond returns by taking the average return rate calculated within the bond investment simulation (which assumes different future long-term interest rate scenarios), and combined this with the equilibrium return rate[1] deemed intrinsic to market capitalization.
- To estimate expected rates of return on domestic equities, foreign bonds, and foreign equities, we used a building block method[2] for each asset that adds a risk premium to short-term interest rates, and combined this with the equilibrium return rate deemed intrinsic to market capitalization.
- The expected return for short-term interest rates which forms the basis for calculations is estimated using the market yield curve.
- The nominal wage increase rate used to convert nominal expected return to wage-adjusted real return was 2.3%, which is the average future nominal wage increase used in the economic assumptions within the actuarial valuation (Scenario III).

[Expected Return (Nominal Return)]

Short-term interest rate	Domestic bonds	Foreign bonds	Domestic equities	Foreign equities
0.6%	0.7%	2.6%	5.6%	7.2%

[Expected Return (Real return: Nominal Return Less Nominal Wage Increase Rate <2.3%>)]

Short-term interest rate	Domestic bonds	Foreign bonds	Domestic equities	Foreign equities
-1.7%	-1.6%	0.3%	3.3%	4.9%

1 The equilibrium return rate is the implied market return derived by observing current indicators such as global market capitalization and risk and correlations for each asset class.

2 The building block method estimates expected return for each asset class by adding together estimates for expected short-term interest rates and the risk premium (i.e. compensation for taking risk) for each individual asset class. Historical data for policy benchmarks were used to estimate risk premiums.

Assumptions for New Policy Portfolio (Risks and Correlations)

○ We estimated risks and correlations by using the annual data of the policy benchmarks for the past 25 years after the collapse of Japan's bubble economy.

[Risk (Standard Deviation)]

	Domestic bonds	Foreign bonds	Domestic equities	Foreign equities	Wage growth rate
Standard deviation	2.56%	11.87%	23.14%	24.85%	1.62%

[Correlation]

	Domestic bonds	Foreign bonds	Domestic equities	Foreign equities	Wage growth rate
Domestic bonds	1.00				
Foreign bonds	0.290	1.00			
Domestic equities	-0.158	0.060	1.00		
Foreign equities	0.105	0.585	0.643	1.00	
Wage growth rate	0.042	-0.010	0.113	0.099	1.00

Policy Portfolio Definition

○ We identified the new policy portfolio from the following perspectives.

1. Based on the returns, risks and other factors of the four asset classes, we identified a variety of portfolios and projected returns, risks (standard deviations), probability of falling below nominal wage increases (“lower partial probability”) and average rate of nominal wage increase shortfalls (“conditional average shortfall rate”).
2. Among a variety of portfolios, we identified a portfolio which meets the investment objectives (nominal wage increase plus 1.7%) with the lower partial probability smaller than the reference probability and the smallest conditional average shortfall rate.

○ We applied the currently used 5% interval to compose the target allocation of each asset class in the new policy portfolio. In addition to the current permissible ranges of deviation set for each of four asset classes, a new permissible range of deviation has been set for each of total bonds and total equities by combining domestic and foreign assets, in a bid to strengthen risk control of equities.

[New Policy Portfolio]

		Domestic bonds	Foreign bonds	Domestic equities	Foreign equities
Target allocation		25%	25%	25%	25%
Deviation Limits	Asset class	±7%	±6%	±8%	±7%
	Bonds/Equities	±11%		±11%	

[New Policy Portfolio Profile]

Real Return	Nominal Return	Standard deviation	Lower Partial Probability	Conditional Average Shortfall Rate	
				Normal Distribution	Empirical Distribution
1.7%	4.0%	12.32%	44.4%	9.2%	10.9%

(Reference) Profiles of All-Domestic-Bond Portfolio

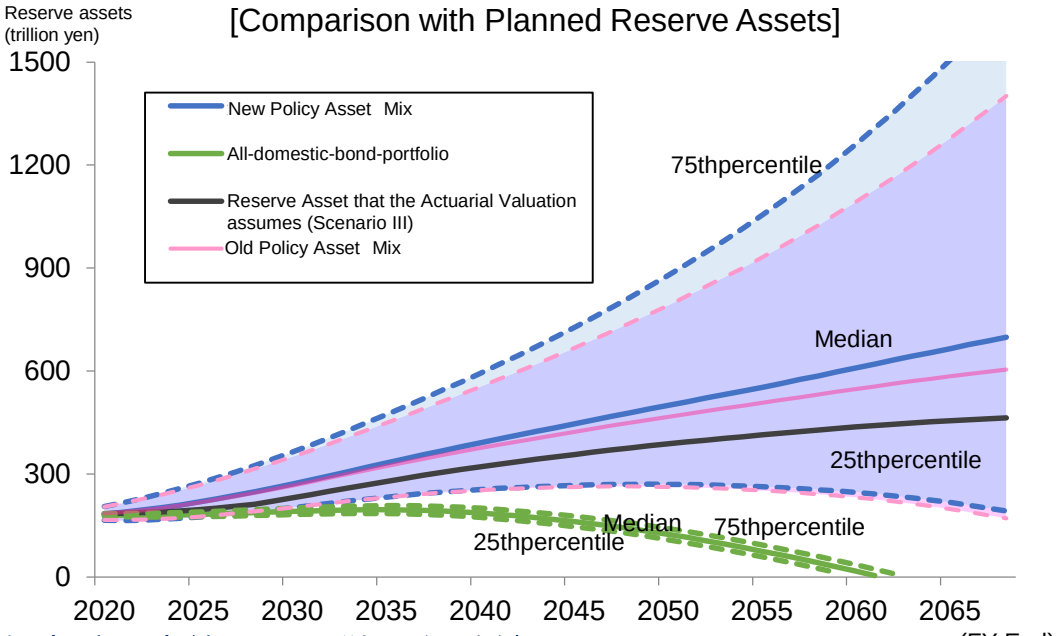
-1.6%	0.7%	2.56%	70.7%	3.0%	3.0%

* We also conducted a simulation for the conditional average shortfall rate by using the empirical distribution, instead of the normal distribution, with consideration that stocks may have a larger downside probability (tail risk). The empirical distribution is a projection based on real returns over the past 25 years.

Risk Verification for New Policy Portfolio

- It is important to verify the magnitude of the risk that long-term investment under the new policy portfolio results in reserve asset levels falling below that within the actuarial valuation ("planned reserve assets"). In a bid to observe future reserve asset level trends assuming long-term investment under the new policy portfolio, we conducted a Monte-Carlo simulation over one million times using the expected return, standard deviation and correlations for each asset to generate a distribution of such trends, and examined results compared to reserve asset levels within the actuarial valuation (Scenario III).
- Results indicate that the probability (risk) of falling below the planned reserve assets has declined compared to the old policy portfolio.
- Meanwhile, a simulation conducted with an all-domestic-bond portfolio resulted in future reserve assets always falling below planned reserve assets.
- From the overall perspective with the aspects of lower partial probability and conditional average shortfall rate, the new policy portfolio is the most efficient portfolio to meet the investment objectives while minimizing downside risk.

[Comparison with Planned Reserve Assets]



[Probability (Risk) of Falling Below Planned Reserve Assets]

	In 25 years (As of the end of FY2043)	In 50 years (As of the end of FY2068)
New policy portfolio	38.1%	39.8%
All-domestic-bond-portfolio	100.0%	100.0%

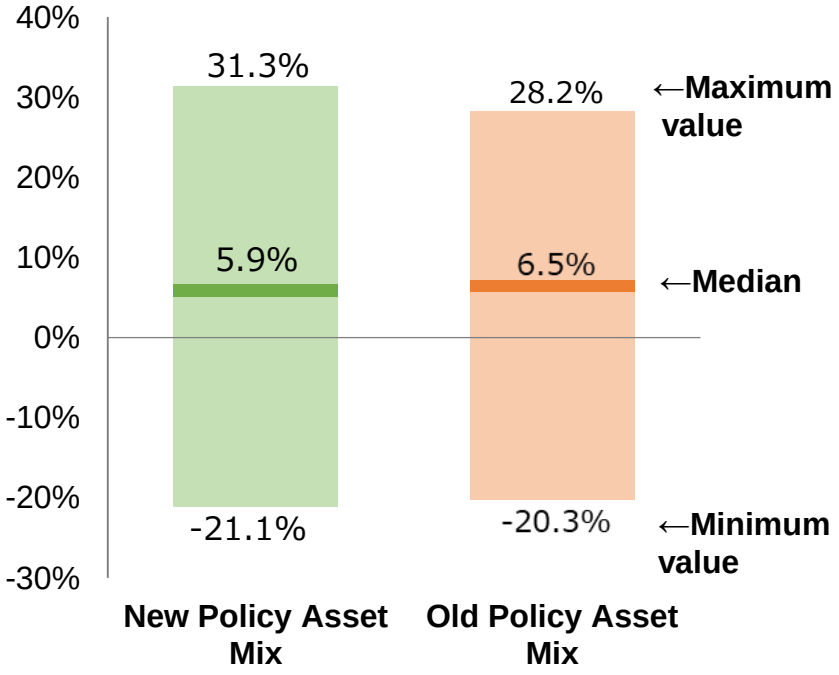
(Reference)

Old policy portfolio	40.0%	43.0%

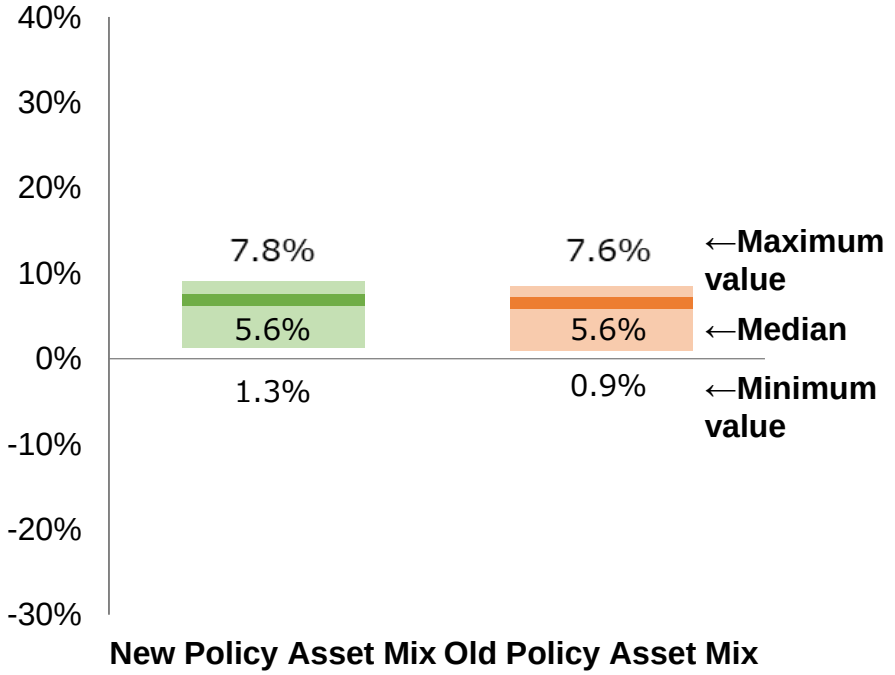
Distribution of Return Under Old and New Policy Portfolio Using Historical Data

- We generated a distribution of the annualized average rate of return on the entire portfolio for both the new and old policy portfolios on a short-term (one year) and long-term (10 year) basis, using actual data of benchmarks of each asset over the past 34 years.
- Results indicate that the average rate of return fluctuates with a slightly wider range in the short term but stays in a stable range over the long term when investing under the new policy portfolio. (The average return on the 10-year basis always shows a positive figure over the past 34 years, with the lowest return of around 1%.)

[Short-Term Average Return (one-year basis)]



[Long-Term Average Return (10-year basis, annualized)

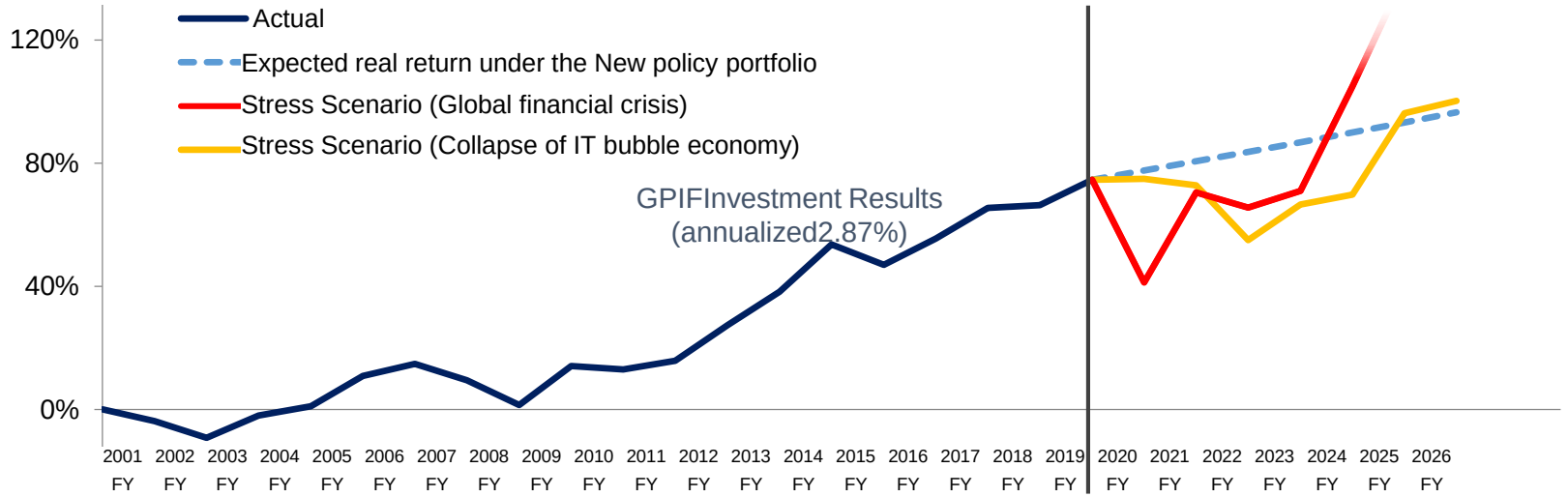


Note 1: Rebalancing assumed at fiscal-year end
Note 2: Analysis period: 34 years from March 1985 to March 2019

Implementation of Stress Tests

- We conducted multiple stress tests under the assumption of the occurrence of a financial crisis. The stress tests were conducted based on the respective scenarios using actual market data in the aftermath of the global financial crisis in 2008 and the collapse of the IT bubble economy in 2000.
- Results in both scenarios indicate that the cumulative value of real return temporarily falls, but turn upward to the level of expected return along with a subsequent market rebound several years later.

[Actual and Estimated Real Return (Cumulative)]



* The figure for FY2019 is replaced with the result as of Dec. 31, 2019.
* GPIF's investment results (annualized return of 2.87%) are based on the figures through to FY2018.

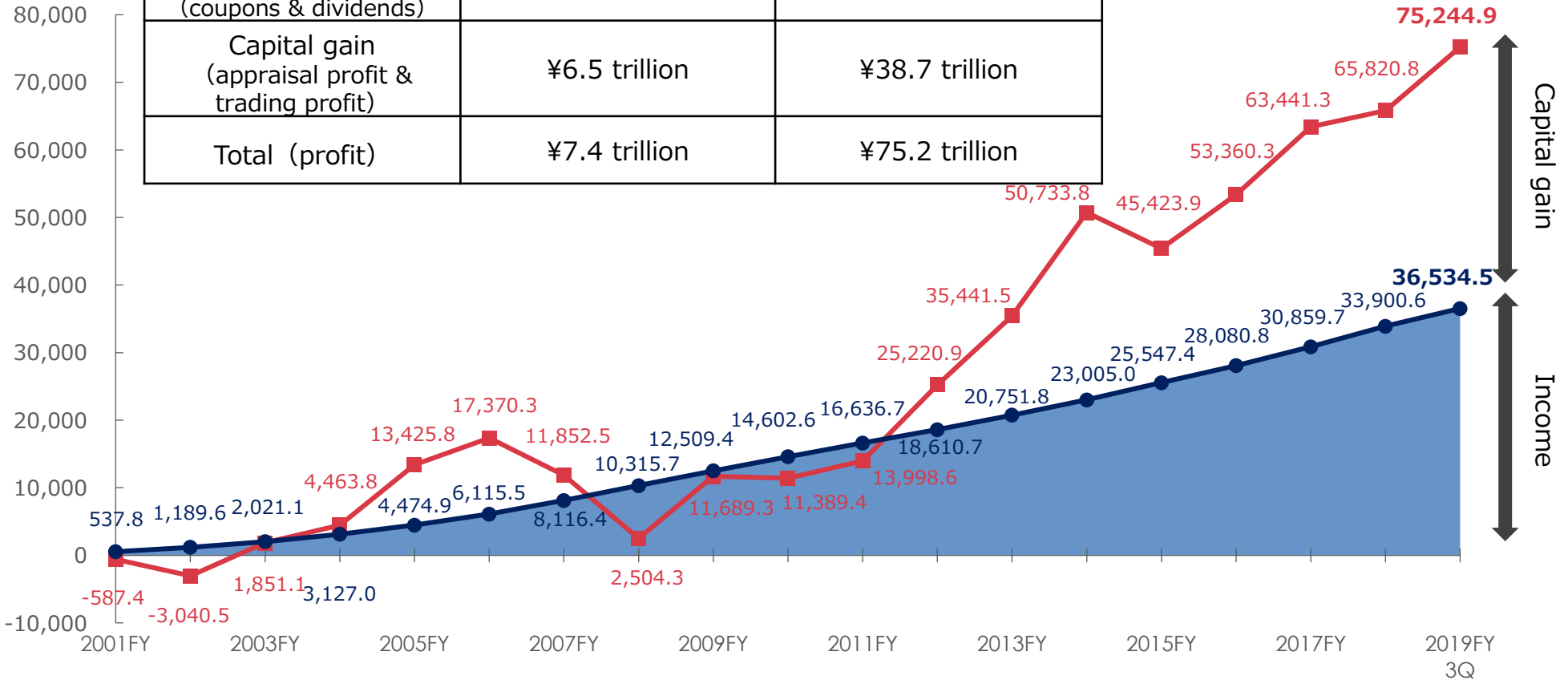
- The negative return with the largest loss over the test period was -19.4% in the scenario of the global financial crisis and -11.4% in the scenario of the IT bubble economy.
- We also observed the probability of the occurrence through the empirical distribution in the stress test and assessed that a loss equivalent to the aftermath of the global financial crisis would occur once every 70 years, while that similar to the aftermath of the collapse of the IT bubble economy once every 7 years.

Reference materials

Income from Buy & Hold

○ Long-term investors like GPIF can benefit from global growth through dividends and coupons by holding assets. This incomes is relatively stable and contribute to consistent gains.

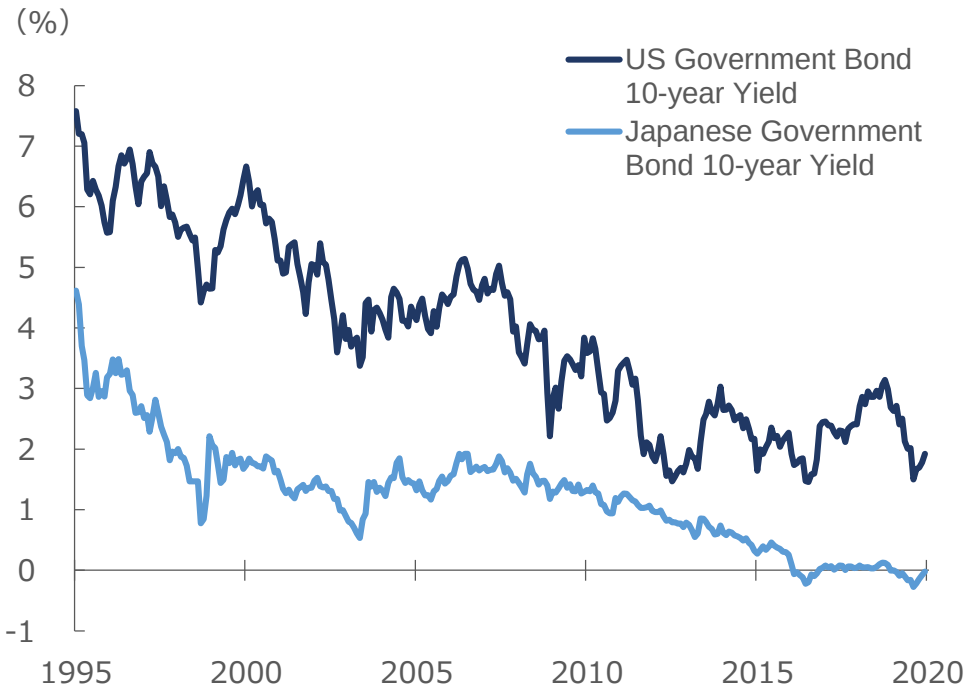
	2019 3Q (Oct～Dec)	Since inception (18years and 9 months)
Income (coupons & dividends)	¥895 billion	¥36.5 trillion
Capital gain (appraisal profit & trading profit)	¥6.5 trillion	¥38.7 trillion
Total (profit)	¥7.4 trillion	¥75.2 trillion



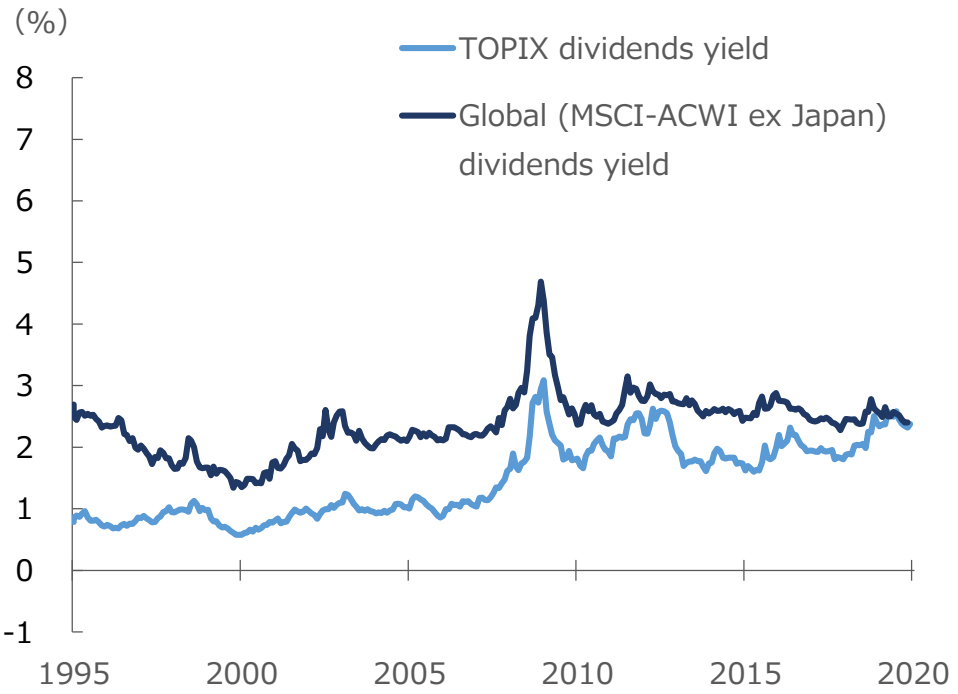
Income from all assets

- Bond yields are dropping everywhere especially in Japan, while it remains positive in the US. Dividends yields are around two percent in the long run, which are higher than the current bond yields.
- Through investing both in bonds and equities globally and domestically, we expect to earn income steadily.

【10-years yield, US & Japan】

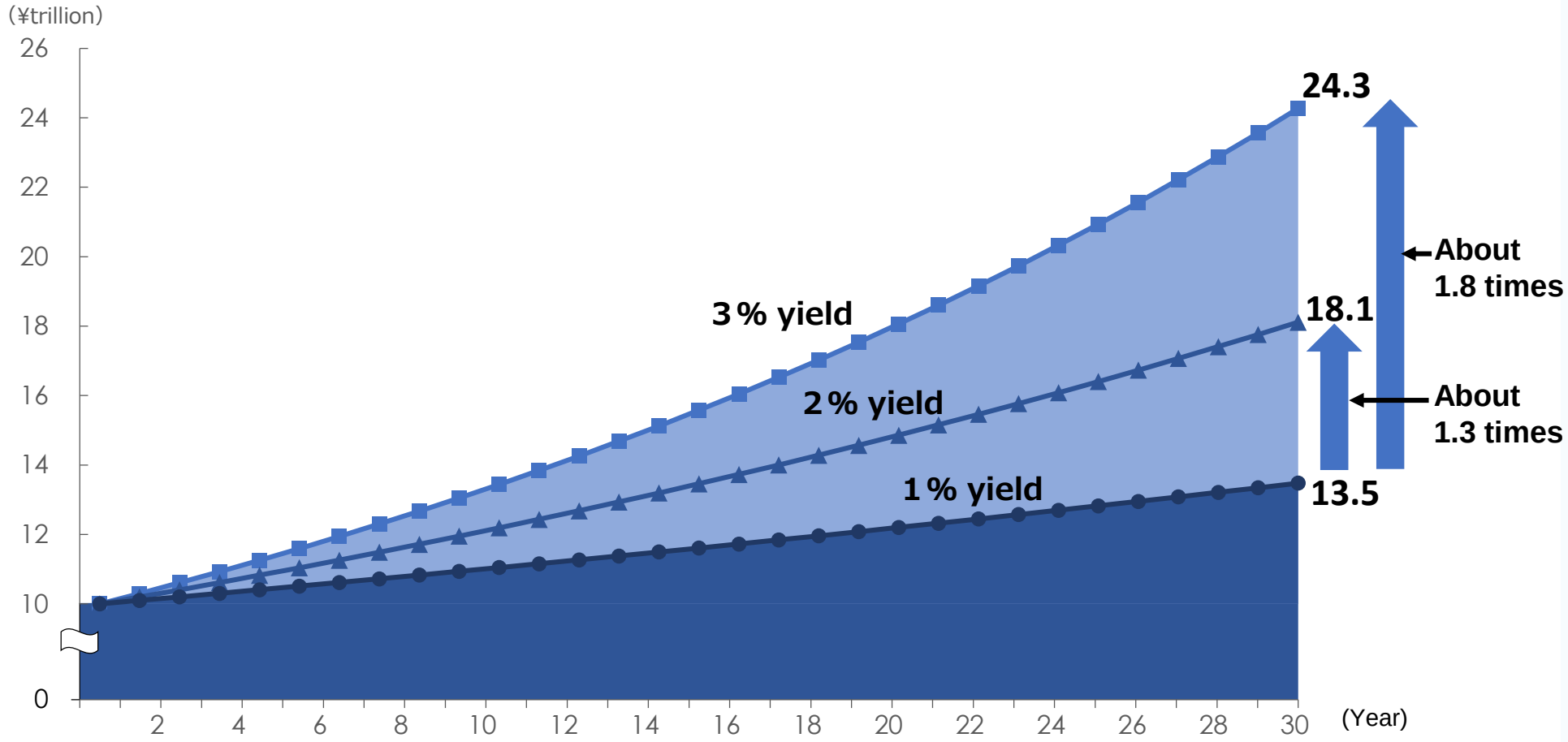


【Dividends yield, TOPIX & Global】



Accumulation effect through cross generational investments

○ A difference in yields can make big difference in the long run. 3% yield make assets 2.4 times in thirty years, while 1% yield make assets 1.3 times in the same period.



(note) Starting from JPY 10 trillion and assuming 3%, 2%, 1% yield in each case.

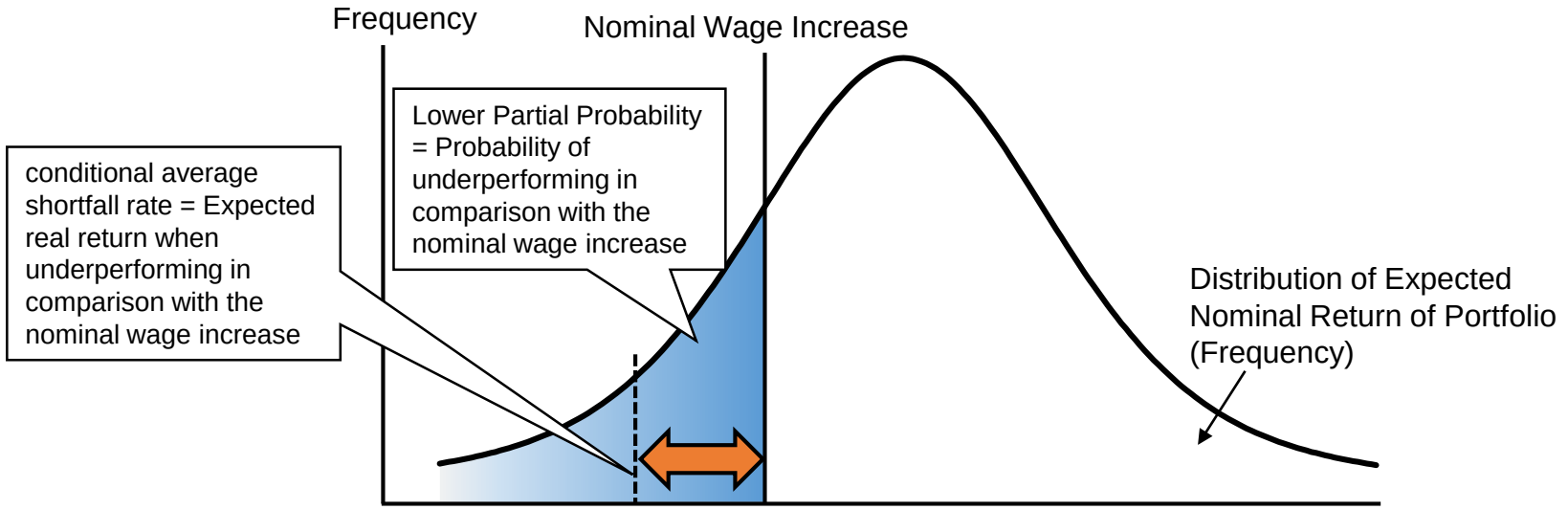
Policy Benchmarks and Lower Partial Probability

[Policy Benchmarks]

- GPIF defines benchmarks used to formulate a policy portfolio as “Policy Benchmarks.” We used following benchmarks to examine the new policy portfolio.

Asset Class	Policy Benchmark
Domestic bonds	NOMURA-BPI (excluding ABS)
Foreign bonds	FTSE World Government Bond Index (excluding Japan, yen-denominated basis)
Domestic equities	TOPIX (including dividends)
Foreign equities	MSCI ACWI (excluding Japan, yen-denominated basis, including dividends)

[Lower Partial Probability and conditional average shortfall rate]



Outline of Deliberations at the Board of Governors

- GPIF has conducted a review on its policy portfolio for the fourth medium-term plan, which starts from FY2020 and lasts for five years. This review has taken place for the first time since the integration of the Employee's Pension Schemes and the foundation of the Board of Governors. GPIF has determined the new policy portfolio after having deliberations by the Board of Governors at 13 meetings held since September 2018.
- In a bid to conduct deliberations efficiently, a working sub-committee, which consists of economics and finance professionals, was formed under the Board of Governors. The committee held discussions 32 times on matters related to the policy portfolio, from multi-dimensional, comprehensive and technical perspectives.

Meeting date	Consecutive numbers	Description
September 18, 2018	14th	Report of the examination of the New policy portfolio
January 21, 2019	18th	Same as above
March 29, 2019	21st	Same as above
April 11, 2019	22nd	Same as above
May 16, 2019	23rd	Same as above
August 27, 2019	27th	Same as above
September 30, 2019	28th	Same as above, Consideration of ESG in the New policy portfolio (1)
October 24, 2019	32nd	Same as above, Consideration of ESG in the New policy portfolio (2)
November 18, 2019	33rd	Same as above, Consideration of ESG in the New policy portfolio (3)
December 2, 2019	34th	Deliberation on the examination of the New policy portfolio: Consideration of ESG in the New policy portfolio (4)
January 9, 2020	36th	Deliberation on the examination of the Model Portfolio: Consideration of ESG in the New policy portfolio (5)
February 6, 2020	37th	Deliberation on the examination of the New policy portfolio
March 9, 2020	38th	Resolution on the Model Portfolio and the New policy portfolio