June 26, 2015

Financial Services Agency

Field Tests of Economic Value-Based Solvency Regime

－Summary of the Results－

In June 2014 through January 2015 the Financial Services Agency (FSA) conducted the second field tests of the economic value-based solvency regime, targeting all insurance companies, following the first field tests, the results of which were announced in May 2011. The summary of the test results is as follows:

1. Background to the Field Tests

(1) Economic value-based solvency regime

An economic value-based solvency regime is a framework intended to appropriately recognize the financial conditions of insurance companies by consistently evaluating assets and liabilities based on economic value. The FSA has been continuously conducting studies in light of the results of the field tests that were carried out in 2010 through 2011 and in cooperation with professional organizations such as the Institute of Actuaries of Japan and the General Insurance Rating Organization of Japan.

In the previous field tests, practical issues toward the introduction of the regime were recognized. Accordingly, the FSA is currently considering the framework for an economic value-based solvency regime, as the FSA proclaims in its Financial Monitoring Policy for 2014–2015 that the FSA will continue to consider introducing an economic value-based solvency regime, taking into account trends in international discussions and the results of the field tests. In considering the framework for an economic value-based solvency regime, the FSA will review the use of internal risk models by insurance companies to measure associated risks, and start exploring possible supervisory measures, etc.

On the other hand, the IAIS (International Association of Insurance Supervisors) formulated the Basic Capital Requirement (BCR) covering G-SIIs (Global Systemically Important Insurers) in a form that is based on the calculation of assets and liabilities based on economic value, while it is also considering the calculation of assets and liabilities based on economic value in its examination of ICS (Insurance Capital Standard), covering IAIGs (Internationally Active Insurance Groups).

(2) Implementation of the field tests

In light of the circumstances described in (1), the FSA conducted the field tests, in which insurance companies calculated the economic value of insurance liabilities as well as the risk amount, upon reviewing the assumptions of the previous field tests and adding new calculation methods, in order to comprehend how prepared individual

insurance companies are for the calculation of economic value-based insurance liabilities, etc., practical issues, and the quantitative effects based on the specifications of the field tests with the aim of establishing an appropriate method for Japan.

2. Content of the field tests

The specifics of the implementation of the field tests are as follows:

(1) Summary

As in the previous tests, insurance companies were requested to calculate the amount of insurance liabilities based on economic value and interest rate risks on the asset and liability sides, etc. on a trial basis. They were also requested to report, in the form of replies to a questionnaire, on practical issues and challenges that they encountered in the process of calculation. Test period was June 2014 through January 2015.

(2) Insurance companies covered by the tests

All life insurance companies (43 companies) and non-life insurance companies (53 companies) in Japan were covered by the field tests.

(3) Method of calculating insurance liabilities, etc. in the field tests

The following methods of calculating economic value-based insurance liabilities and other items were adopted in the field tests.

(a) Base date of calculation

The base date was set as March 31, 2014.

(b) Insurance liabilities

The insurance liabilities as defined in the field tests comprise i) current estimate and ii) risk margin. The following assumptions were set for each component element:

i) Current estimate

- ○ It was requested that the present value of future cash flow[1], in consideration of the costs of options and guarantees[2] be the current estimate.
- ○ It was requested that the current estimate be calculated for each policy in

[1] Contrary to liabilities of the current system, it was required that the assumptions (occurrence rate of insurance events, etc.) in calculating future cash flow were neutral with no conservativeness, and market interest rates (government bonds) were used for the discount rate in calculating present value.

[2] Costs of options and guarantees refer to costs arising from the options and guarantee nature inherent in insurance contracts such as dynamic lapse, dividends, and minimum guarantee of variable products.

principle. However, contract groups with similar risk profiles were permitted to be calculated in group units.

- ○ It was requested that estimation be conducted by currencies in principle, and that estimates in foreign currencies be converted into yen at the exchange rate of the base date.
- ○ As for claim reserves, it was requested that a best estimate of future cash flow pertaining to incurred insurance events as of the base date be calculated and discounted by the discount rate in order to take the time value of money into consideration in the calculation in principle.

  However, for life insurances that do not separate the future cash flow of claims payments between future and incurred insurance events as of the base date, the claims payments for incurred insurance events as of the base date were requested to be included in future cash flow pertaining to the current estimate.

ii) Risk margin[3]

Methods including the cost of capital method, the quantile method, the discount rate method, and the basic rate adjustment method are known for calculating risk margins, and there is no established calculation method at this time.

In the field tests, the use of the cost of capital method[4] was adopted for calculating risk margins.

(c) Risk amount

A stress method with the risk amount as the amount of decrease in net assets as of the end of the following fiscal year when giving a shock equivalent to a 99.5% confidence level VaR (holding period one year) to the basic rate such as occurrence rates of insurance events was adopted. For market risks excluding interest rate risks, etc., however, other methods were adopted such as a factor method that multiplies the exposure by a prescribed coefficient. In addition, trial calculations were carried out for multiple methods or for methods that are adopted by individual companies.

It was requested that the risk categories for the calculations be “insurance underwriting risk,” “market risk,” “credit risk” and “operational risk.” Calculations of the amount of insurance underwriting risks were made for “surrender and lapse risk,” “mortality/longevity risk,” “insurance risks other than mortality/longevity risks,”

---

[3] The risk margin, which is a component element of insurance liabilities, refers to a margin against cash-flow uncertainty.

[4] In the cost of capital method, the present value of future cash flow to be obtained based on a prescribed change in assumptions related to insurance underwriting (99.5% confidence level VaR in the field tests) is calculated and the increase in the amount compared with the present value to be obtained based on no change in assumptions is deemed to be the required capital. The total of the each year’s required capital multiplied by a prescribed coefficient (cost of capital ratio) and then discounted by the discount rate is deemed to be the risk margin.

"third-sector risk," "renewal risk," "catastrophe risk," "expense risk" and "claim reserve risk," and calculations of the amount of market risks were made for "interest rate risk," "equity risk," "currency risk," "property risk" and "derivatives risk."[5] Furthermore, integration of risks between categories was made using the correlation coefficient designated by the supervisory authorities.

These field tests also adopted a method for measuring the risks of each risk category by calculating process risks and parameter risks[6] for a part of the insurance underwriting risks and integrating them.

(d) Risk measurement method for each risk category

i) Insurance underwriting risk

It was requested that insurance liabilities be recalculated for cases where a shock equivalent to a 99.5% confidence level VaR (holding period one year) was given to basic rates such as accident rates and that the resulting decrease in net assets as of the end of the following fiscal year be the risk amount. However, for expense risks, several specific risk scenarios were assumed and the changes in net assets based on the scenarios were calculated.

ii) Market risk

It was requested that interest rate risk be measured in the following four methods:

[Method 1] Measuring the risk as the impact to be produced on the present value of cash flow by interest rate changes that occur over the whole of the insured period.[7]

[Method 2] Measuring the risk with consideration given to the correlation between grid points.[8]

[Method 3] Measuring the risk based on a shock scenario method using principal component analysis[9]

---

5 Although minimum guarantee risks for variable products were included in insurance underwriting risk in the previous field tests, they were calculated in each category of market risk such as equity risk, in consideration of the actual situation of the risk in the current field tests.

6 Process risk as defined in the current field tests refers to the risk of damage being incurred due to upward or downward swings of the actual value from the expected value, and parameter risk refers to the risk of damage being incurred due to future changes in assumptions that were used in the estimation of occurrence rates of insurance events, etc.

7 In this method, the difference between the present value of cash flow (regarding liabilities minus assets) and the present value of cash flow to be obtained if the discount rate rises or declines for the whole of the future insured period based on 99.5% confidence level VaR is deemed to be the risk.

8 In this method, the sum of the present values of cash flow that are consolidated to a grid point set at multiple times in the future insured period after taking into account the correlation between volatilities of discount factors is deemed to be the risk.

9 In this method, the changes in present value due to the yield curve derived from the shock scenario of each element to which the changes in interest rates are reduced using the principal component analysis is

[Method 4] Measuring the risk based on a Monte Carlo simulation.[10]

The amounts of equity risk, currency risk, property risk and derivatives risk were measured by multiplying the amount of assets subject to risk by a prescribed risk factor.

iii) Credit risk

Credit risk was measured by multiplying the amount of assets in possession by a risk factor determined by the ratings, etc. of the assets.

iv) Operational risk

Operational risk was measured by multiplying the amount of other integrated risks by a prescribed risk factor.

(4) Questionnaire concerning risk management

In the questionnaire concerning the field tests, the FSA asked qualitative questions about the key points of risk management methods used by insurance companies according to the risk type and about their internal models (only in cases where internal models are voluntarily used for risk measurement) in addition to questions about practical problems identified during the trial calculation.

(5) Major changes from the previous field tests

[Liability calculation]

- Hyper-long-term discount rates (over 40 years for yen; over 30 years for US dollars, euro and Australia dollars) with no track record of market transaction were calculated with the method of using the forward rate of the final year for the subsequent years, in addition to the method of setting an ultimate rate for forward rates, which converge to the ultimate rate in ten years.
- The claim reserves were changed from the amount calculated according to the current regime to the amount of the best estimate of future cash flow pertaining to incurred life insurance events discounted.
- The minimum guaranteed yields for products with variable prospective yields were included in the calculation of the costs of options and guarantees in addition to surrender option, policyholders' dividend and minimum guarantees for variable products. Furthermore, only companies that could conduct the calculations were subject to the calculation in the previous field tests, while in these field tests all companies were subject to the calculation.

---

deemed to be the risk.

[10] In this method (the so-called Monte Carlo method), a number of yield curves are generated and the risk amount is calculated in light of the distribution of the present value of cash flow based on each yield curve.

○ The inflation rate, which is the economic assumption, was changed from 0.0% to 1.6%.

[Risk amount calculation]

○ The confidence level was changed from 95% VaR in principle to 99.5% VaR.

○ Claim reserves were added to the range of risks subject to insurance underwriting risk.

○ Interest rate risks were measured using the shock scenario method using principal component analysis (Method 3) in addition to the shock scenario by maturity period method (Method 1), the variance-covariance method (Method 2), the Monte-Carlo method (Method 4).

○ Correlation coefficients pertaining to risk integration were partially changed.

3. Calculation results

(1) Insurance liability

We show the comparison between the amount of economic value-based insurance liabilities estimated as a result of the field tests and the amount of insurance liabilities calculated based on the current regulatory requirements in Figures 1 and 2 (Figure 1 represents insurance liabilities for all life insurance companies and Figure 2 represents those for all non-life insurance companies). For reference, since the amount of insurance liabilities, etc. is estimated by several calculation methods in the field tests, all of the results indicate the maximum and minimum values of the results of each calculation method (the same applies to the risk amount, etc.).

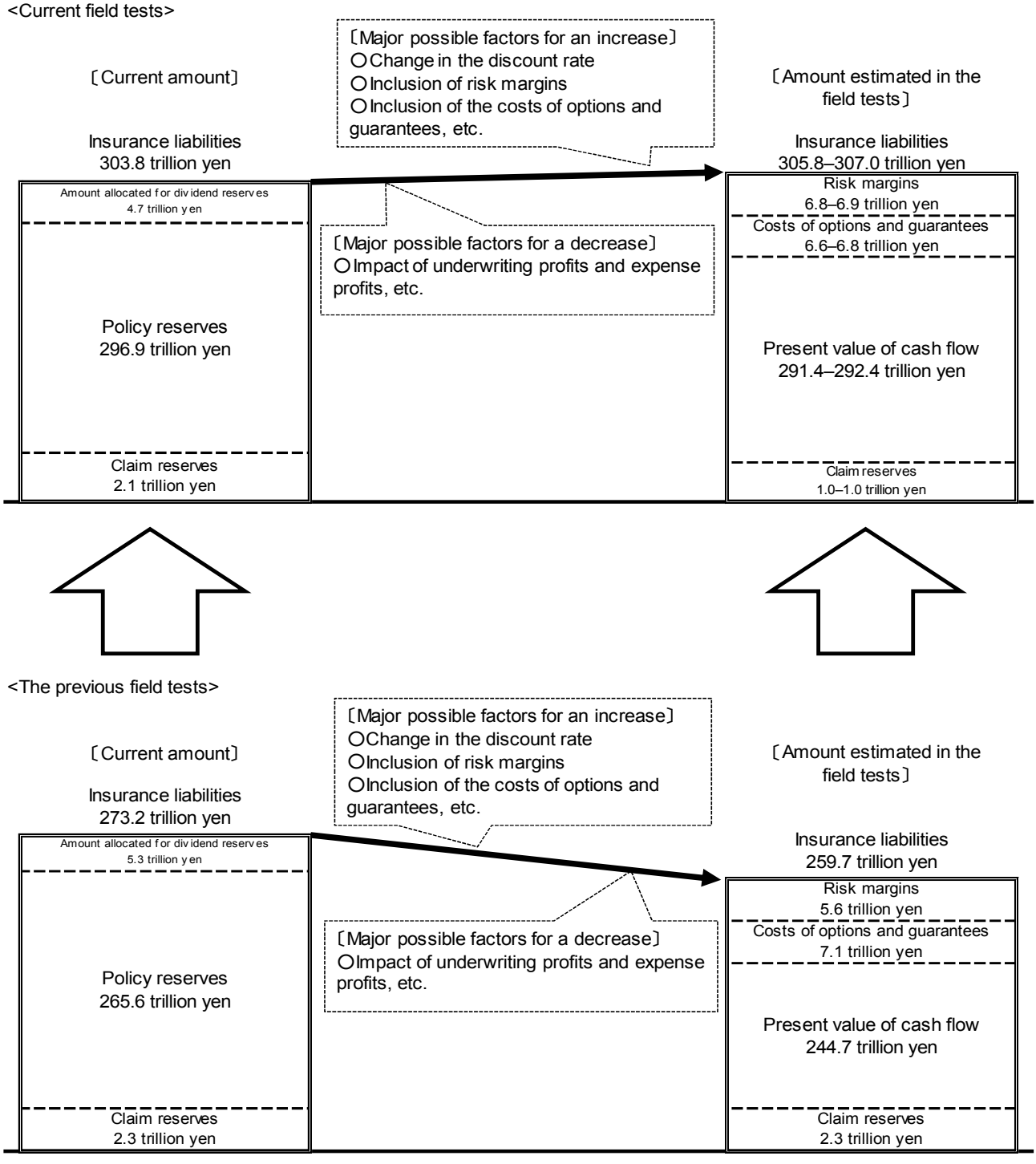
The results of the tests show the tendency that the amount of economic value-based insurance liabilities are slightly larger than the amount of insurance liabilities calculated based on the current regulatory requirements for life insurance companies, and roughly the same for non-life insurance companies.

The reasons why economic value-based insurance liabilities are only slightly larger than insurance liabilities based on the current regulatory requirements among life insurance companies even under a low-interest rate environment include a general drop in the assumed yield of insurance policies and occurrence rates of insurance events of individual companies remaining within the safe rate that is incorporated in insurance rates.

In addition, the increase or decrease in insurance liabilities depends on the structure of insurance policies in force at each company. Among life insurance companies with a large number of long-term policies, the increase of insurance liabilities tends to be greater at companies with many savings-type insurance policies that were effected in the past (due to recalculating policy reserves that were calculated with high assumed yields in the past with the current discount rate), while insurance liabilities tend to decrease at companies with a large number of the relatively new third-sector policies

(due to relatively low assumed yields). Furthermore, although insurance liabilities tend to decrease at most non-life insurance companies that generally have a large number of short-term policies, insurance liabilities increase at some companies with many savings-type policies in force.

[Figure 1] Changes in the amount of insurance liabilities (The amount of economic value-based insurance liabilities estimated as a result of the field tests and the amount of insurance liabilities calculated based on the current regulatory requirements. Total for all life insurance companies)

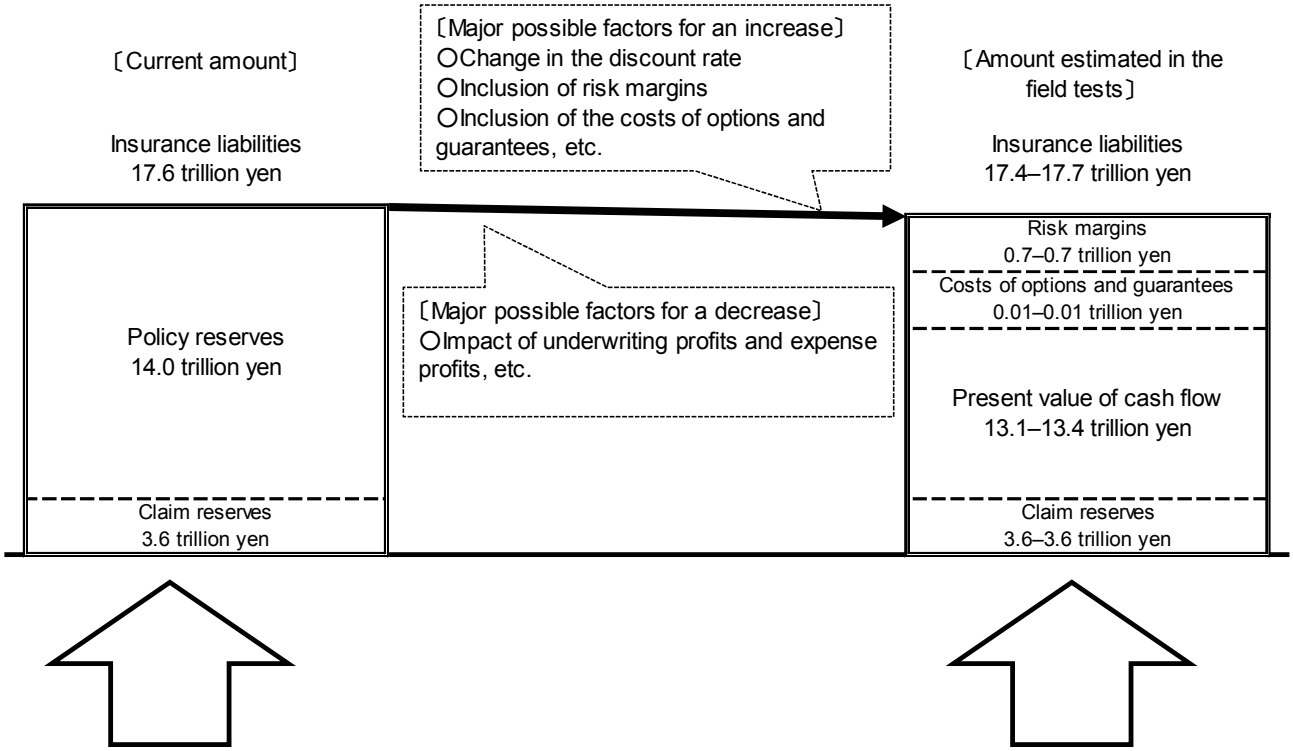


Note 1: In the previous field tests, the costs of options and guarantees included are those of companies that calculated the costs. (In the current field tests, all companies calculated the costs.)

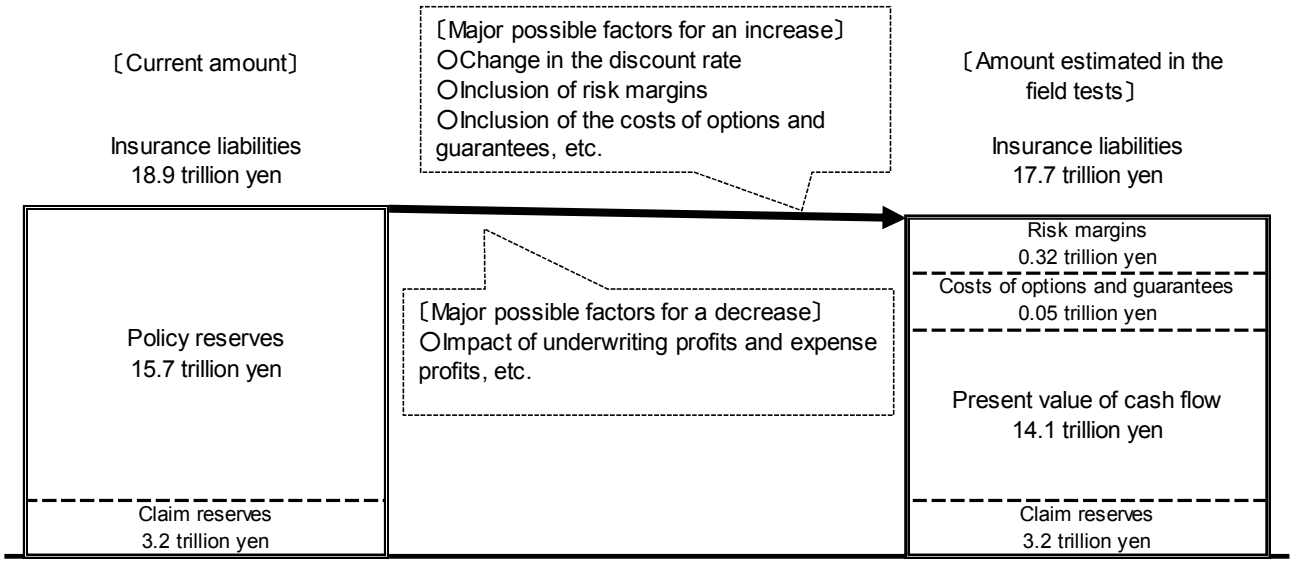
Note 2: Possible factors for an increase or a decrease may produce opposite effects depending on the characteristics of individual insurance policies of individual companies.

[Figure 2] Changes in the amount of insurance liabilities (The amount of economic value-based insurance liabilities estimated as a result of the field tests and the amount of insurance liabilities calculated based on the current regulatory requirements. Total for all non-life insurance companies)

<Current field tests>



<The previous field tests>



Note 1: In the previous field tests, the costs of options and guarantees included are those of companies that calculated the costs. (In the current field tests, all companies calculated the costs.)

Note 2: Possible factors for an increase or a decrease may produce opposite effects depending on the characteristics of individual insurance policies of individual companies.

(2) Risk amount

Table 1 shows the risk amount obtained from the field tests. While a simple comparison cannot be made in these field tests due to the 99.5% confidence level VaR

and the differences in the risks that are subject to measurement as well as risk integration methods, the risk amount has increased compared to the risk amount calculated based on the current regulatory requirements.

Table 1 Risk amount estimated as a result of the field tests

(Total of all life insurance companies)

	Field tests	Current regime[11]
Integrated risk amount	22.7–27.9 trillion yen	8.6 trillion yen
Insurance underwriting risk	7.8–11.0 trillion yen	1.4 trillion yen
Market risk	15.2–21.1 trillion yen	7.3 trillion yen
Credit risk	4.3–4.5 trillion yen	0.9 trillion yen
Operational risk	0.5–0.6 trillion yen	0.2 trillion yen

(Total of all non-life insurance companies)

	Field tests	Current regime
Integrated risk amount	5.4–6.1 trillion yen	3.3 trillion yen
Insurance underwriting risk	3.0–4.0 trillion yen	1.6 trillion yen
Market risk	3.2–3.3 trillion yen	2.0 trillion yen
Credit risk	0.4–0.4 trillion yen	0.1 trillion yen
Operational risk	0.1–0.1 trillion yen	0.1 trillion yen

Market risk stands out among life insurance companies. This is since they possess many long-term insurance liabilities and assets. This trend is similar to the structure of risk amount under the current regulatory requirements. As for insurance underwriting risk, the difference with the current regime is large due to differences in confidence levels and calculation methods[12].

Non-life insurance companies also show a tendency of increasing insurance underwriting risk due to the same reason, resulting in greater insurance underwriting risk than market risk.

(3) Capital/risk ratio

"Capital/risk ratio (=margin/risk amount)" obtained by a simple estimation of economic value-based net assets for all life insurance companies and all non-life

11 Here, the sum of insurance risk, third-sector insurance risk and catastrophe risk represents "insurance underwriting risk," the sum of assumed yield risk, minimum guarantee risk, price change risk, subsidiary risk and derivatives trading risk represents "market risk," the sum of credit risk, credit spread risk, reinsurance risk and reinsurance recovery risk represents "credit risk" and business management risk represents "operational risk."

12 While the risk amount is calculated collectively under the factor method for each insurance line under the current regime, it is calculated under the stress method in the field tests after breaking down the risks into elements such as mortality, surrender and renewal.

insurance companies, calculated by margins under the current solvency regime and insurance liabilities based on the results of field test and other factors, exceeded 100% at both life insurance companies and non-life insurance companies, with around 150–190% for all life insurance companies in total and around 190–220% for all non-life insurance companies in total, although the figures fluctuate depending on the calculation method[13].

4. Discussion points, etc. recognized in the field tests

(1) Comments, issues and challenges raised by individual companies

The comments and challenges most widely raised by individual companies concerning the field tests in general were related to securing sufficient preparation time among life insurance companies, followed by the acceptance of the use of simplified calculation methods and internal models, and clarification of the schedule.

The comments and challenges most widely raised by non-life insurance companies were related to the development of a platform, followed by the acceptance of the use of simplified calculation methods and internal models, and the acknowledgement of the company's situation and issues.

Major specific replies related to each comment and challenge are as follows:

i) Regarding the securing of sufficient preparation time, many companies suggested that sufficient preparation time was necessary since the work load is large.

ii) Regarding the acceptance of the use of simplified calculation methods and internal models, while some companies mentioned that the number of items that are allowed the use of internal models should be increased, some companies suggested that only risk factor methods should be adopted for comparison between companies.

iii) Regarding the clarification of schedule, many companies stated that preparation was necessary for dealing with challenges and that a schedule or roadmap toward the introduction of an economic value-based solvency regime was required.

iv) Regarding the development of a platform, some companies commented that the development of infrastructure such as data management and advanced

[13] 100% based on the field tests corresponds to 200% under the current regime, since the denominator (risk amount) is not multiplied by 1/2, in contrast to the current regime.
For reference, the level in Europe, which is based on Solvency II with the same confidence level of 99.5% VaR, is a SCR ratio of 165% (total of all companies), according to the Quantitative Impact Study (QIS5) that EIOPA conducted in 2011 to study the impact of the introduction of Solvency II.

calculating systems was necessary and that securing and fostering personnel with knowledge and expertise were also required.

v) Regarding acknowledgement of the company's situation and issues, many companies mentioned that the impact and issues of introducing an economic value-based solvency regime were recognized. Furthermore, some companies commented that these tests provided a good opportunity for preparing for the future.

(2) Status of liabilities and future challenges

(a) Expenses

Regarding future cash flow, we assumed an inflation rate of 1.6%, as we incorporated future inflation in expenses in the field tests[14]. We believe that sufficient discussions will be necessary in the future regarding the appropriate method of forecasting hyper-long-term inflation and what data would be appropriate to be used for that purpose[15], since the assumption of inflation has a large impact on life insurance companies with long-term liability cash flow.

(b) Discount rate

Hyper-long-term discount rates with no track record of market transactions were calculated using the following two methods: i) method of using the forward rate of the final year for the subsequent years, and ii) method of setting a ultimate rate for forward rates, which converge to the ultimate rate in ten years. Among life insurance companies (total of all companies), insurance liabilities measured with method ii) were approximately 0.4% less than those calculated with method i), while among non-life insurance companies, insurance liabilities measured with method ii) were approximately 0.7% more than measured with method i). Although the impact on these field tests was small, various methods for creating yield curves are being discussed internationally, and it is considered necessary to continue examinations while referring to such trends.

(c) Costs of options and guarantees

It was requested that the costs of options and guarantees be calculated as the difference between the present value of insurance liabilities measured under a single economic scenario and the average of present values of insurance liabilities

14 The field tests used the average rate of increase in the consumer price index of the economic revitalization case for FY2023 (final year of the projections) of the "Economic and Fiscal Projections for Medium to Long Term Analysis" (January 2014) by the Cabinet Office and the reference case.

15 In Japan, it is extremely difficult to estimate future expected inflation from market data since the liquidity of inflation-linked bonds is small.

calculated under multiple economic scenarios. The economic scenarios (mainly interest rate scenarios) used in this calculation were the following two:

i) A risk-neutral economic scenario that is market-consistent, if each company can generate such a scenario (internal model method)

ii) An interest rate scenario generated by each company based on the method designated by the supervisory authorities, if the scenario in i) cannot be generated (simplified model method)

Since the results of the field tests revealed that there was a considerable difference between the level of the internal models that each company owns and that of the model designated by the supervisory authorities, it is expected that examinations will be necessary regarding the method of considering options and guarantees that can be easily applied at all companies, in light of the level of each company's internal model and from the perspective of securing comparability.

(3) Status of calculation of risk amount and future challenges

(a) Confidence level

It is necessary to pay careful attention to the confidence level when examining the calculation results of risk amount. A solvency regime is meant to examine whether sufficient capital is reserved against risks that exceed the usually predictable range. The confidence level indicates the "usually predictable range." Under the current regulatory requirements, the confidence level of price fluctuation risks for example, is 95% confidence level VaR, which is a level that may be able to cover losses of a size that would only occur once in twenty years. The higher the confidence level, the greater the risk will be when losses exceed that level. Therefore, the risk amount generally increases as the confidence level rises. While it can be said that the safety level is higher if there is enough reserve of capital to cover the risk amount that corresponds to the high confidence level, if the required confidence level is too high, it will lead to deterioration of capital efficiency since excess capital will be required of the company.

(b) Insurance underwriting risk

Basically, a method of calculating the risk amount based on each company's past data, etc. was deemed to be the standard method, with the reporting of risk amount measured by the following methods also requested as needed.

- Risk factor method: The risk amount for cases where the authorities assumes an average company, to which the standard method is applied. The method assumes cases where calculation by the standard method is not possible due to lack of past data.
- Each company's method: Calculation by the method deemed appropriate by each company (where possible).

The results of the calculation of risk amounts were different between the standard method, the risk factor method and each company's method. It is necessary to consider how the methods should be sorted in the future, in light of the framework of the standard method and approving internal models. It is also necessary to hold specific discussions based on the results of the field tests.

As mentioned above, a method of calculating and integrating process risk (one year only) and parameter risk (whole of the insured period) was taken in the standard method and the risk factor method except for some, in order to grasp the risk amount in more detail. It is necessary to continue consideration of what kind of method is appropriate, while taking into consideration feasibility and comparability.

The outline of each risk is as follows:

i) Surrender/lapse risk

In addition to the standard method, the risk amount was calculated based on the risk factor method (life insurance companies only) and each company's method (where possible).

The risk amounts for the both the rise and drop in surrender rates have been integrated in an uncorrelated manner. Nine companies did not calculate with the standard method due to lack of own company data, etc. In addition, 19 companies calculated the risk amount by their company's method.

The risk amounts that were calculated by each company's method showed various magnitude relationships with those calculated by the standard method varied, with some companies showing a large divergence from the standard method.

In general, the measurement methods and results for this risk category showed significant dispersion; therefore, it is necessary to hold wide-ranging and deep discussions regarding how to measure the risk systematically.

ii) Mortality/longevity risk

(The statement on this risk is for life insurance only since the risk does not exist or exists but has only a minor impact for non-life insurance.)

In addition to the standard method, the risk amount was calculated based on the risk factor method and each company's method (where possible).

Regarding this risk,

- A group of the insured with a rise in mortality rate as a risk and a group of the insured with a drop in mortality rate as a risk were separated, and the respective risk amounts due to the rise and drop in stress were calculated and integrated under a negative correlation (correlation coefficient: -0.25).
- In addition to process risk and parameter risk, trend risk (the risk of

mortality rate gradually rising or falling over the future) was included in the object.

It is necessary to continue considering what kind of method of calculating risk is appropriate systematically, partly because this risk category showed a large gap of calculation method and result between each company's method and the standard method.

iii) Insurance risks other than mortality/longevity risks (excluding third-sector risk and catastrophe risk: non-life insurance companies only)

The risk amount was calculated based on the standard method and the risk factor method by insurance line of fire, accident, automobile, hull, cargo and others. Reporting on the risk amount calculated by each company's method was also requested where possible.

The risk amount was measured based on the standard method at almost all companies except for three companies that did not do so on the grounds of lack of own company data. Many companies showed a greater risk amount than the risk factor method.

Possible reasons include the fact that the difference between the results of the risk factor method and those of the standard method became greater since the factor of the risk factor method is calculated based on data submitted by the General Insurance Rating Organization (GIRO), while with the standard method the risk amount is calculated using individual companies' data.

iv) Third-sector risk

In addition to the standard method, the risk amount was calculated based on each company's method where possible.

Among life insurance companies, all companies calculated the risk amount based on the standard method except for eight companies that did not do so on the grounds of having no relevant policy. Furthermore, nearly half of the companies—19 companies—calculated the risk amount based on each company's method.

The risk amount was generally larger when calculated using each company's method than when using the standard method. It is necessary to consider taking into consideration the impact of future changes in the environment for the standard method also.

v) Renewal risk

This risk arises when the renewal rate differs from the expectation upon automatic renewal of personal insurance. The risk amount was calculated by

the standard method.

Many non-life insurance companies did not have any relevant products, and even where they did, the impact was minor.

The risk was not significant at life insurance companies either.

vi) Catastrophe risk

For non-life insurance, calculation based on the GIRO model was deemed to be the standard method, with reporting as each company's method requested if calculation was made by other than the GIRO model.

There were reports from 38 companies excluding 15 companies that did not calculate this risk. The breakdown is as follows:

- Calculation by both the GIRO model and each company's method: 9 companies
- Calculation by the GIRO model only: 25 companies
- Calculation by each company's model only: 4 companies

Individual company methods ranged from a model by an external vendor to a proprietary model and a combination of vendor model and proprietary model. The risk amounts were generally less than the standard method (from 50% to about the same amount).

vii) Expense risk

The risk amount due to increase in expenses (excludes those caused by inflation) and to the rise in inflation rate was calculated.

Although it is difficult to consider a theoretical calculation method of expense risk based on a certain confidence level, it is necessary to continue considerations in light of international trends since the risk has a relatively large impact on life insurance products, whose insured periods are long-term.

viii) Claim reserves risk

For incurred insurance events, the amount of risk that the final payment of insurance differs from the currently assumed claim reserves (including IBNR reserves) was calculated based on the standard method using the least-squares method, as well as each company's method where possible.

There were reports by all companies except for nine companies that did not do so on the grounds of lack of own company data, etc. Nine companies also calculated by each company's method. The risk amount calculated by each company's method was less than that by the standard method at all companies.

Most life insurance companies included this risk in mortality/longevity risk, etc. and did not measure the amount of this risk except for two companies.

(c) Interest rate risk

It was requested that interest rate risk be calculated based on the following four methods, which consist of three methods from the previous field tests and a method that uses a principal component analysis:

i) Shock scenario by maturity period method

ii) Variance-covariance method

iii) Shock scenario method using a principal component analysis

iv) Monte-Carlo method

Methods ii) and iv) can be considered to be appropriate methods for use as internal models, and calculations were made for each method in these field tests in order to compare the results of methods ii) and iv) with the results of methods i) and iii).

As a result, when taking the interest rate risk amount measured by iv) the Monte-Carlo method as a base of 100 (total of all companies), the results for methods i), ii) and iii) were 122, 94 and 84, respectively. The results for methods ii) and iv) were relatively close. On the other hand, the magnitude relationship was the opposite when comparing methods i) and iii) with method iv). In considering internal models and the standard method, there is a view that the risk amount measured by internal models, which can reflect the actual situation better than the standard method, should be smaller. An issue for this perspective is that although the risk amount is the greatest when measured by method i), this method cannot reflect the correlation by each maturity period; therefore it is considered necessary to continue considering the most appropriate method.

(d) Other risks and risk integration

i) Market risk other than interest rate risk, credit risk and operational risk

Equity risk, currency risk, property risk, derivatives risk (that does not belong to other market risk), credit risk and operational risk were measured based on a method that multiplies the above risks by the prescribed risk factor.

It is necessary to continue consideration of the method of calculating the risk factor of each risk and the level of risk factor, in light of international trends.

ii) Risk integration

In these field tests, risks were integrated by the following methods:

a) Integrate surrender/lapse risk, mortality/longevity risk, insurance risks other than mortality/longevity risk, third-sector risk, renewal risk, catastrophe risk, expense risk and claim reserves risk into insurance underwriting risk using the prescribed method

b) Integrate interest rate risk, equity risk, currency risk, property risk and derivatives risk into market risk using the prescribed method

c) After integrating the above insurance underwriting risk, market risk and credit risk using the prescribed method, add up operational risk

In each integration process, the realization of a diversifying effect was sought by setting a correlation coefficient.

As an example, the integration of c) is as follows, as shown in Table 1:

- At life insurance companies, while a simple sum of each risk amounts to 29.4–35.5 trillion yen, the amount of integrated risk is 22.3–27.9 trillion yen, with a reduction of approximately 21.4–23.6% due to a diversifying effect.
- At non-life insurance companies, while a simple sum of each risk amounts to 6.8–7.7 trillion yen, the amount of integrated risk is 5.4–6.1 trillion yen, with a reduction of approximately 20.6–20.9% due to a diversifying effect.

It is necessary to continue consideration, as there is currently no established method/order of integration or an established correlation coefficient between risks that can be used upon integration.

(4) Status of use of internal models

Following the previous tests, in the field tests, a survey on the use of internal models was also conducted. This survey found that the ratio of insurance companies that use internal models for risk management according to the risks as categorized in the field tests are as shown in Table 2.

In all risk categories, there were more companies that used internal models compared to the previous field tests, suggesting that the use of internal models for risk management has further accelerated over the past several years.

Table 2　Ratios of companies using internal models by risk category (Unit: %)

	Life		Non-Life	
	Ratio	(weighted-average)	Ratio	(weighted-average)
Surrender/lapse risk	55.8	(91.5)	7.5	(31.9)
Mortality/longevity risks	65.1	(95.4)	3.8	(2.0)
Insurance risks other than mortality/longevity risks	0.0	(0.0)	28.3	(89.5)
Third-sector risk	58.1	(94.5)	17.0	(54.1)
Renewal risk	25.6	(74.6)	0.0	(0.0)
Catastrophe risk	32.6	(31.3)	34.0	(89.5)
Expense risk	46.5	(88.8)	7.5	(30.0)
Claim reserves risk	0.0	(2.4)	17.0	(86.4)
Interest rate risk	74.4	(99.1)	37.7	(97.5)
Equity risk	67.4	(97.6)	28.3	(90.3)
Currency risk	60.5	(97.0)	24.5	(95.9)
Property risk	46.5	(95.8)	18.9	(89.0)
Derivatives risk	32.6	(50.2)	13.2	(78.7)
Minimum guarantee risk	39.5	(64.5)	1.9	(1.9)
Credit risk	72.1	(99.1)	30.2	(96.3)
Operational risk	53.5	(44.1)	18.9	(86.2)

Note: The weighted average ratio is the ratio weight-averaged according to the current total amount of risks.

5. Conclusion

[Summary]

○ Although the field tests were more wide-ranging with inclusion of calculations by multiple methods than the previous test, all the companies targeted replied regarding the results of the calculations. In addition, it was recognized that interests in the economic value-based solvency regime and risk management remain strong among insurance companies and that they are making progress in developing systems for such calculation.

○ On the other hand, the questionnaire results from individual companies suggested that sufficient preparation time would be necessary for the actual introduction of the regime, and that there are many issues to be solved from the perspectives of system establishment and burdens on practical operations, etc. Furthermore, some companies requested the development of a scheme that takes into consideration the differences in the corresponding systems of each company, etc., including the use of internal models.

[The economic value-based calculation of insurance liabilities]

- The economic value-based insurance liabilities were not significantly divergent from insurance liabilities based on the current regulatory requirements, even under the current low-interest rate environment. However, there were different trends between companies due to differences in the structure of insurance policies in force, etc. Therefore, it is necessary to continue to fully examine the impact of the method of establishing discount rates, etc. on insurance liabilities in the future.

- All companies were requested to calculate the costs of options and guarantees. It was recognized that comparability would become a major issue especially when using an internal model approach, due to reasons such as the use of a stochastic method as well as the complexity of the method of generating interest rate scenarios. It is considered necessary to examine matters such as what kind of methods will be appropriate in the future.

[The risk amount]

- In the field tests, a 99.5% confidence level VaR was used. However, it is necessary to continue examining issues such as the following:
  - ✓ The appropriateness of 99.5% confidence level VaR
  - ✓ Comparison with methods other than VaR such as TVaR

- Regarding the method of measuring risk, the “measurement of the amount of risk in light of actual conditions such as each company’s product details, portfolio held and risk management methods” and “simplicity and comparability” are often in a trade-off relationship. Therefore, how to strike a balance between the two, including the treatment of internal models, continues to be a matter for consideration.

[Direction of future examination]

- As described above, a variety of issues and challenges were recognized in the field tests, as in the previous tests. Based on the results, it is necessary for the FSA to conduct further examination toward the establishment of a specific framework concerning the economic value-based solvency regime[16].

- Debate on the economic value-based solvency regime has been proceeding internationally too. For example, the IAIS is conducting ICS field tests, and preparation for the introduction of “Solvency II” is under way in Europe. Furthermore, in the accounting system, the International Accounting Standards Board (IASB) is

[16] In future considerations, it is necessary to consider the range and quality of capital with ability to absorb losses, in addition to insurance liabilities and risk assessment methods.

examining IFRS 4 “Insurance Contracts.” Under such circumstances and while paying attention to the nature of the Japanese insurance market, it is considered important to establish a regulatory framework that is suited to our country.

○ The introduction of the economic value-based solvency regime requires corresponding revisions to the business management and risk management methods that have until now been used by insurance companies. Therefore, the FSA will make steady efforts to establish a new framework through dialogue with relevant parties in various situations, so as to ensure a smooth introduction.