Risk Analysis and Strategies in anticipation of the Tokai Earthquake

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1. Overview of the Tokai Earthquake and Classification of Risk Management Strategies

Outline 1 of Potential Damage in Shizuoka Prefecture Caused by the Tokai Earthquake

<Hypothetical earthquake scenario>

- Strong vertical motions first, followed by a violent rolling motion

- Severe ground shaking may last for around one minute, mainly in areas of soft ground

□The Great Hanshin-Awaji Earthquake, an inland earthquake whose epicenter is directly below, lasted for only 15 or so seconds, whereas the Tokai Earthquake, a large ocean trench earthquake, is expected to last for about one minute (more than one minute in areas of soft ground)

Ground type	Anticipated intensity (Japanese seismic intensity scale)	Affected area	Ratio of the affected area
Soft ground (Mainly urban areas)	7	130.8 km^2	1.7%
	6 +	1,458.6 km^2	18.9%
Firm ground (Mainly mountain areas)	6 -	5,738.8 km^2	74.4%
	5 +	385.7 km^2	5.0%
Total		7,713.9 km^2	100.0%

Source: "3rd estimates of potential earthquake damage" Shizuoka Prefecture, May, 2001

Outline 2 of Potential Damage in Shizuoka Prefecture Caused by the Tokai Earthquake

<Potential human damage>

Affected population (Shizuoka Prefecture) 3,737,000 (Census, 1995)

(Unit: 1,000 persons, % shows the ratio to the total population)

Total population	3,737					
Damage classification	No prediction made					
	Winter morning		Daytime in Spring/Autumn		Winter evening	
Deaths	5.9	0.16%	3.7	0.10%	4.0	0.11%
Serious Injuries	18.7	0.50%	16.6	0.44%	16.3	0.44%
Minor injuries	85.7	2.29%	74.6	2.00%	73.1	1.96%
Damage classification	Prediction made					
	Winter morning		Daytime in Spring/Autumn		Winter evening	
Deaths	1.5	0.04%	0.8	0.02%	0.8	0.02%
Serious Injuries	3.1	0.08%	2.7	0.07%	2.5	0.07%
Minor injuries	17.6	0.47%	14.2	0.38%	13.4	0.36%

Source: "3rd estimates of potential earthquake damage" Shizuoka Prefecture, May, 2001

Outline 3 of Potential Damage in Shizuoka Prefecture Caused by the Tokai Earthquake

<Potential building damage>

No. of buildings
(Shizuoka Prefecture)
1,528,000
(As of Jan. 1998)

→

(Unit: 1,000 buildings, % shows the ratio to all buildings)

Total no. of buildings	1,528

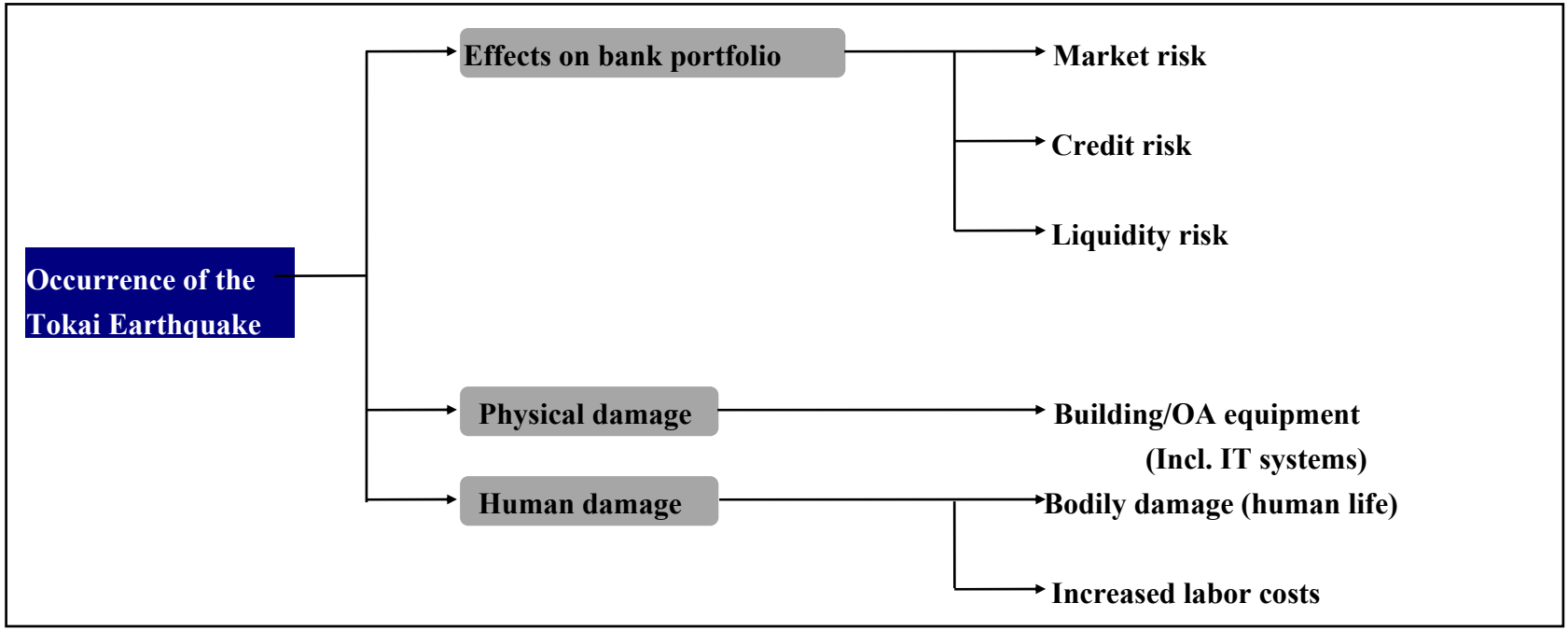
Damage classification	No prediction made					
	Winter morning		Daytime in Spring/Autumn		Winter evening	
Major	150	9.8%	155	10.2%	192	12.6%
Moderate	307	20.1%	305	20.0%	295	19.3%
Minor (Partial collapse)	289	18.9%	288	18.8%	279	18.3%

Damage classification	Prediction made	
Major	141	9.2%
Moderate	309	20.2%
Minor (Partial collapse)	292	19.1%

Source: "3rd estimates of potential earthquake damage" Shizuoka Prefecture, May, 2001

Potential damage caused by the Tokai Earthquake

- **We will suffer serious damage when the Tokai Earthquake occurs. Damage can be categorized as "effects on bank portfolio," "physical damage" and "human damage."**



"Qualitative risk management" in anticipation of the Tokai Earthquake (Risk management of tangible properties and relevant training)

- "Feasible risk management" is being performed mainly to reduce "physical damage" and "human damage."

Feasible risk management

→Realistic strategies developed taking account of actual human behavior (personnel) and actual assets (physical properties)

Ex. Disaster drill
Training regarding strategies for reducing liquidity risk (financing)
Introduction of seismic isolation/vibration damping systems
Establishment of backup systems

"Quantitative risk management" in anticipation of the Tokai Earthquake

"Quantitative risk management" is being performed to account for any damage caused by the Tokai Earthquake.

Quantitative risk management

→Virtual strategies based on numerical analysis and examination (statistical approach)

Ex. Allocation of risk capital
Stress testing
Hedge transactions for containing risk

2. Case studies of “Qualitative Risk Management” in anticipation of the Tokai Earthquake (risk management of tangible properties and relevant training)

Case 1: Disaster drill

- **All banks perform bi-annual disaster drills, which cover 30 training subjects.**

<Training subjects>

Communication
Convening of an "Emergency Task Force"
Roll-call/evacuation
Storing valuables in the safe
Reporting damage
Transmission
Delivering information by and responding to an employee safety confirmation system
Registering/reproducing disaster message dial-services
Training with respect to exchange business
Checking disaster-prevention equipment
Confirming the method for operating in-house power generation systems

Case 2: Training in strategies for reducing liquidity risk (financing)

- **As part of the contingency plan prepared for managing the effects of the Tokai Earthquake, "training relating to cash payment at branch counters" and "training relating to market sector financing" is being performed.**

<Training subjects relating to cash payment at branch counters>

Calculating the amount of cash required for payment
Extending counter business hours/ATM operation hours

<Training subjects relating to market sector financing >

Front office: Determining/reporting the amount required for the next week
Selecting/reporting available-for-sale bonds
Back office: Determining/reporting the day's cash flow

Case 3: Seismic improvements and rebuilding works for each predicted intensity

- **Seismic proof measures for earthquakes of predicted intensity level 6 were already taken in all branches.**
- **In addition, seismic proof measures for earthquakes of predicted intensity level 7 were already taken in branches where earthquakes of intensity level 7 are predicted.**

<Amendment of the "Building Standard Law" and Outline of the "Law Promoting Improvement in Earthquake Resistance">

(1) Amendment of the "Building Standard Law" (1981)

- New buildings shall be constructed using the "New Seismic Proof Design Law" prepared for earthquakes of intensity level 6.

(2) "Law promoting in earthquake resistance"(1995)

・Promoting seismic improvement of buildings constructed before May 31, 1981 so as to meet the present seismic proof standard (for earthquakes of predicted intensity level 6)

<Numbers of branches categorized by predicted intensity and date of construction >

Predicted intensity	Basis for determining intensity	Date of construction	
		Before May 1981	After May 1981
7	Areas of soft ground (Mainly urban areas)	Five offices (Priority 1st)	Twenty offices (Priority 2nd)
6 +		Twenty offices (Priority 3rd)	Sixty offices (Priority 4th)
6 -	Areas of firm ground (Mainly mountain areas)	Fifteen offices (Priority 5th)	Forty offices (Priority 6th)

*** No. of branches represent preliminary figures**

Case 4: Strategies for protecting IT systems

- **Strategies for protecting IT systems include those relating to "system protection by introducing seismic isolation/vibration damping systems" and "business continuity ensured by use of a backup system."**

Actions		Description
System protection	Establishment of computer center (Established in 1996)	- Seismic fireproof structure that ensures safety when hit by earthquakes at an intensity level of 7. □ Computer system shutdown avoided by seismic isolation/damping systems when hit by earthquake - Automatic operation by in-house power generation/storage cell if power failure occurs
Backup system	Joint backup center (Gunma Prefecture) (Started in 2000)	Coverage (1) Account activity, registration and reference of online items such as deposits, exchanges or loans by UBT (excl. some transactions, such as foreign currency deposits) (2) ATM transactions at domestic central and local branches
	Improvement of communication line for backup	· Duplex line construction for backup: basic line and ISDN · Satellite communication channel for major branches
	Distance maintenance of important backup data	· Covering important backup data such as online ledgers · Use a maintenance service provider
	Introduction of online backup vehicle systems for emergencies	· Vehicle equipped with ATM and counter operation devices □ To enable online operation for deposits, loans and exchanges

3. “Quantitative risk management” in anticipation of the Tokai Earthquake

(1) Risk capital allocation in relation to the Tokai Earthquake

"Emergency risk" and "peacetime risk"

- **Possible damage caused by the Tokai Earthquake cannot be properly captured using the maximum damage values provided by VaR models (peacetime risk).**

  (→"Emergency risk" is setup and managed as one of the stress scenarios)

<Peacetime risk>

- **Risks identified in VaR models(Value-at-Risk)**

  □ **VaR is the maximum damage calculated at a confidence level of 99% from changes or losses in market values that have occurred over a certain time period.**

<Emergency risk>

- **Risks that will occur beyond those that can be predicted by VaR models**

  □ **Risks that are not incorporated in VaR models**

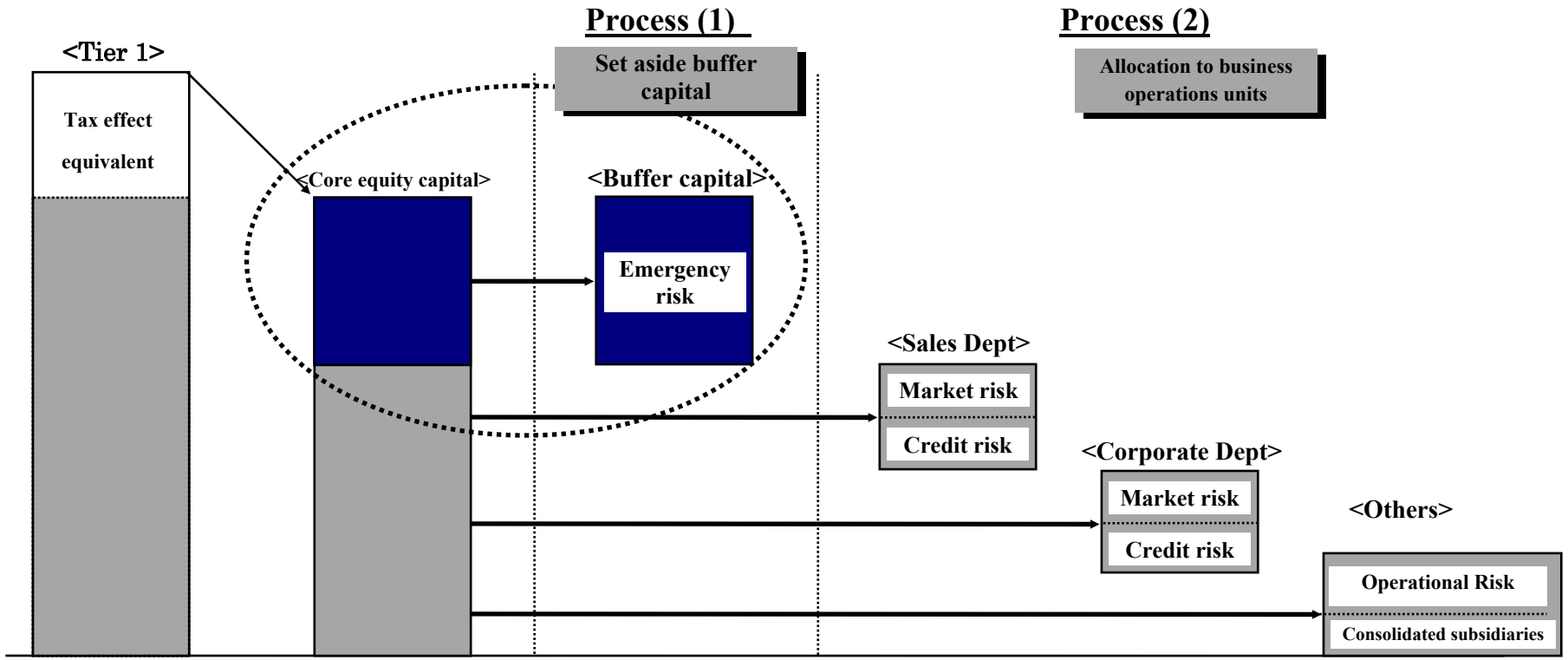
Details of risk capital allocation

- **Risk capital is allocated bi-annually with consolidated core equity capital (Tier 1 – tax effect equivalent) being made available as a resource.**

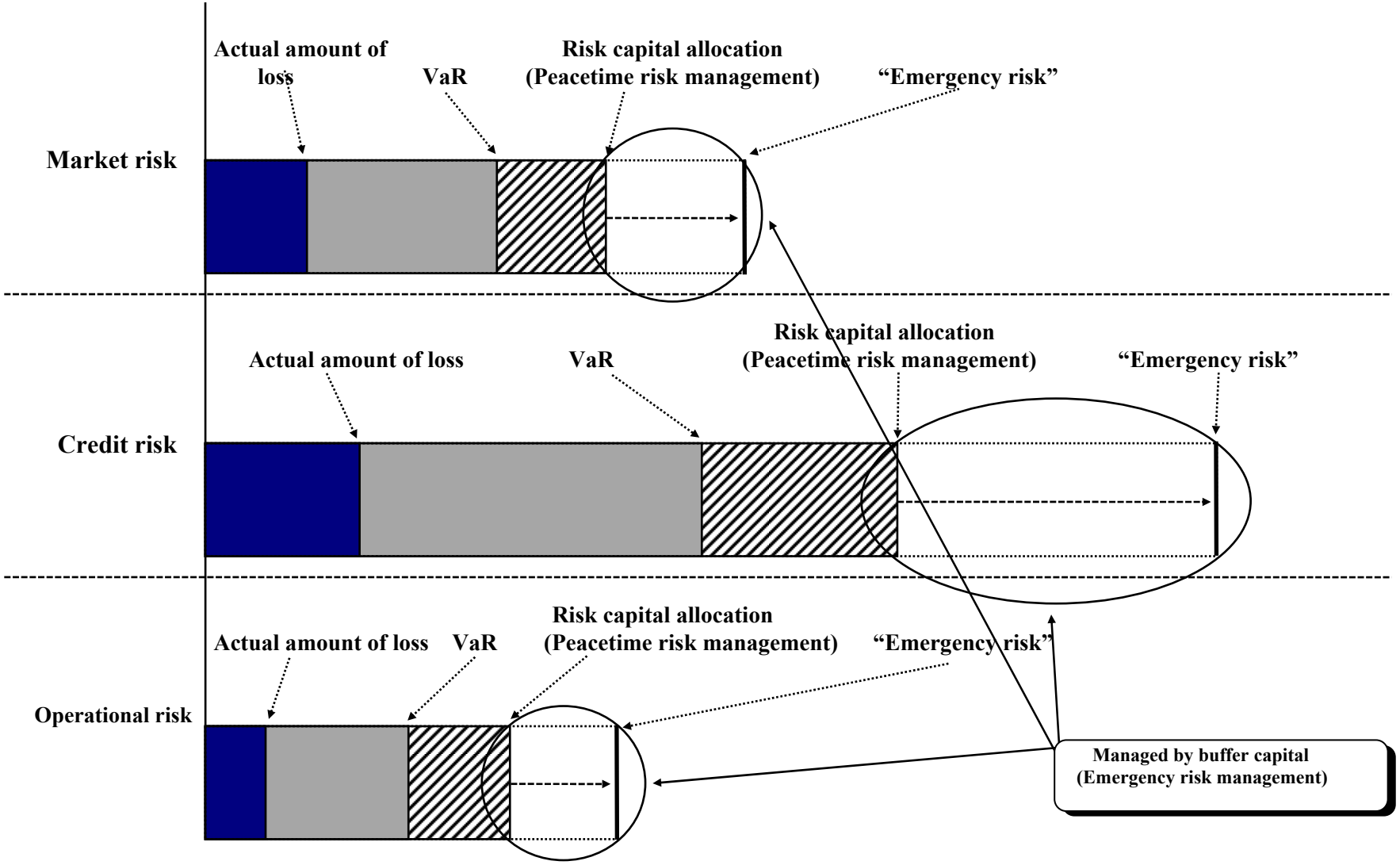
- **In the capital allocation process, "buffer capital" is first set aside to cover "emergency risk" situations and the remaining capital is allocated to departments, transactions and consolidated subsidiaries of each branch.**

  □ **Allocation of risk capital**
  Risk management to keep bank risks within the range of their own equity capital (financial strength) and to ensure bank soundness

Process of risk capital allocation



”Peacetime risk management” and “Emergency risk management” in terms of risk capital allocation



3. “Quantitative risk management in anticipation of the Tokai Earthquake

(2) Stress testing in anticipation of the Tokai Earthquake

Objectives of stress testing

- **To simulate "emergency risks" in stress testing and to utilize the results as a basis for evaluating the amount of buffer capital required.**

- **"Emergency risks" relating to the Tokai Earthquake are categorized into the five types outlined below. Stress tests are performed for each category and the results are used as a basis for evaluating the amount of buffer capital required.**

Method of stress testing: Market risk

- **This test assumes that stock prices in the domestic markets will fall.**

- **It uses the range of price falls observed (largest fall: 14.6%) on the Nikkei Average following the Hanshin-Awaji Earthquake in January 1995 to simulate the loss (gain) resulting from the revaluation of capital holdings and investment trusts.**

<Market situation after the Hanshin-Awaji Earthquake>

Stock market

・Nikkei Average dropped due to an increasingly uncertain economic future

□ Largest drop of 2,876 yen in the two months following the earthquake (Jan.4: 19,684 yen →Feb.27: 16,808 yen)

Domestic financial market

・Stable

US financial market

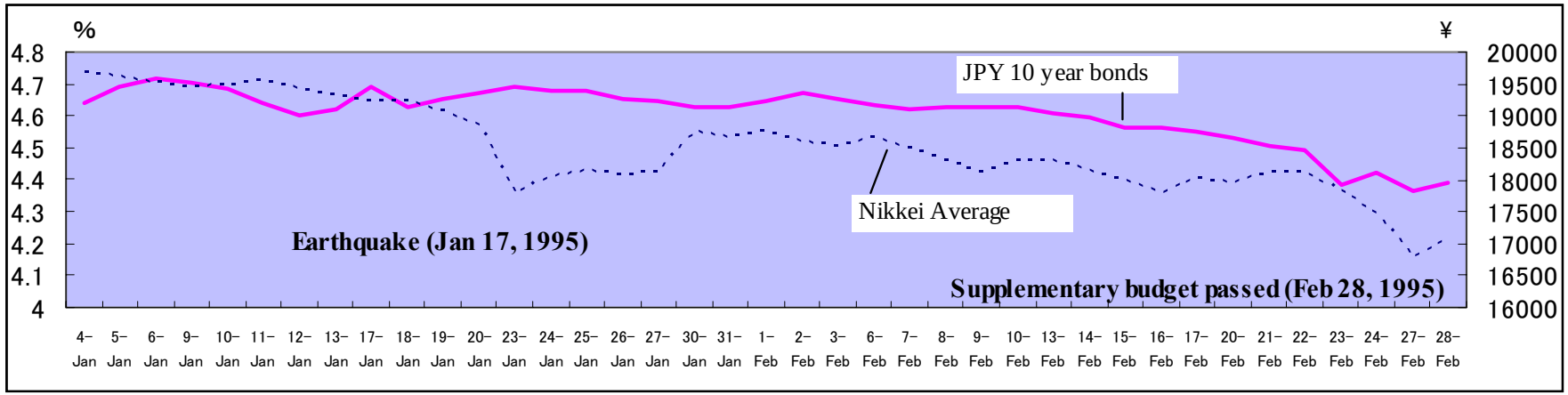
・No effect

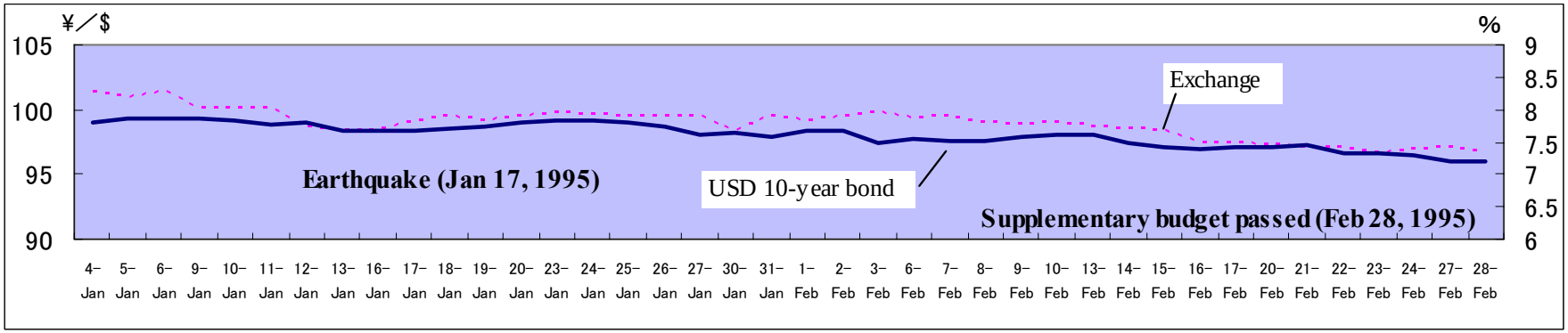
Exchange market

・Stable

Method of stress testing: Market risk

<Market trends before and after the Hanshin-Awaji Earthquake (Jan 1995 to Feb 1995)>





Method of stress testing: Credit risk

• This test assumes that default rates will increase and the coverage ratio will decrease.

In simulating the cost increases in the credit portfolio, the test assumes that the default rate will be 1.2 times higher (based on the range of upward deviation from the national average level of bankruptcy in Hyogo Prefecture from 1995 to 1998 following the Hanshin-Awaji Earthquake and that the amount of loss at the time of default will be 1.3 times larger due to a "decreased coverage ratio."

Method of stress testing: Liquidity risk

- **This test assumes that the costs associated with financing will increase.**

- **The test simulates the costs incurred when all deposits that are not covered by deposit insurance (those greater than JPY 10 million, except for interest-free deposits for settlement) are withdrawn and the same amount is financed from the interbank market at "1M TIBOR + 0.30%".**

Method of stress testing: Damaged buildings/OA equipment (Incl. IT Systems)

- **This test simulates the effects of decreased book value on the P/L and accounts for the investment required for restoration.**

- **Branches are classified into those located in potential areas of intensity level 7 and 6 earthquakes; the amount of loss is simulated as the decreased book value of buildings and OA equipment and includes construction costs (investment required for restoration).**

	Local branch	Central branch
Area of intensity level 7	New construction due to total collapse - Record decreased book value as loss - New construction of JPY 300 mil/branches	New construction due to total collapse - Record decreased book value as loss Calculate new construction costs
Area of intensity level 6	Repair work due to partial collapse - Record part of decreased book value as loss - Repair cost of JPY 100 mil/branches	

Method of stress testing: Human damage

• This test simulates consolation payments for death and serious injury and overtime work.

• The number of deaths and serious injuries was calculated using the rate of occurrence (*) in the "3rd estimates of predicted earthquake damage" report prepared by Shizuoka Prefecture in May 2001 and by assuming that overtime work would increase 10 hours per day per person for the three months following the Tokai Earthquake.

□ In the case of the earthquake occurring on a "winter morning" with "no forewarning"

Death rate: 0.16%

Rate of seriously injured persons: 0.50%

4. Study of strategies for mitigating the effects of the Tokai Earthquake

Priority of strategies

- **Stress testing is used to simulate losses based on certain assumptions. Actually the size of and damages caused by the earthquake and the time of occurrence are uncertain. It is therefore necessary to use proper business judgment from multiple viewpoints as well as from the results of stress testing to prioritize strategies due to limited resources (capital and costs).**

Viewpoint 1 for prioritization: Stakeholders

- **Importance of risks varies among stakeholders.**

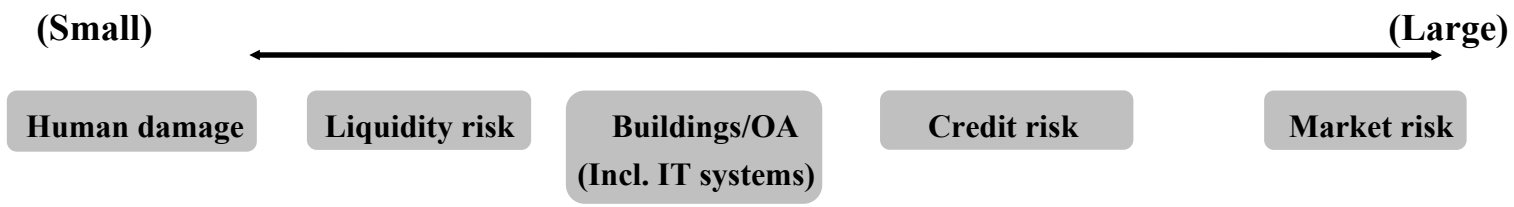
<Important risks of the Tokai Earthquake for major stakeholders>

	Shareholders	Clients (depositors)	Clients (borrowers)	Employees	Government
Important risk	Credit risk	Deposit service Liquidity risk System risk	Borrowing service Liquidity risk System risk	Building property	Credit risk
Reasons	Keep stock prices stable □ Focus on the credit risk with the largest amount of expected loss	Ensure withdrawal	Ensure financing	Ensure bodily safety	Limit public spending □ Focus on the credit risk with the largest amount of expected loss

Viewpoint 1 for prioritization: Largest risk

- **In stress testing, market risk produces the largest loss, but securities are easy to sell in the market. On the other hand, credit risk, which is expected to produce the second largest loss, is hard to adjust for the amount outstanding and thus requires extensive preparation.**
- **Since hedge transactions for limiting credit risk, such as credit derivatives at the portfolio level, have developed rapidly, credit risk can be effectively reduced with these measures.**

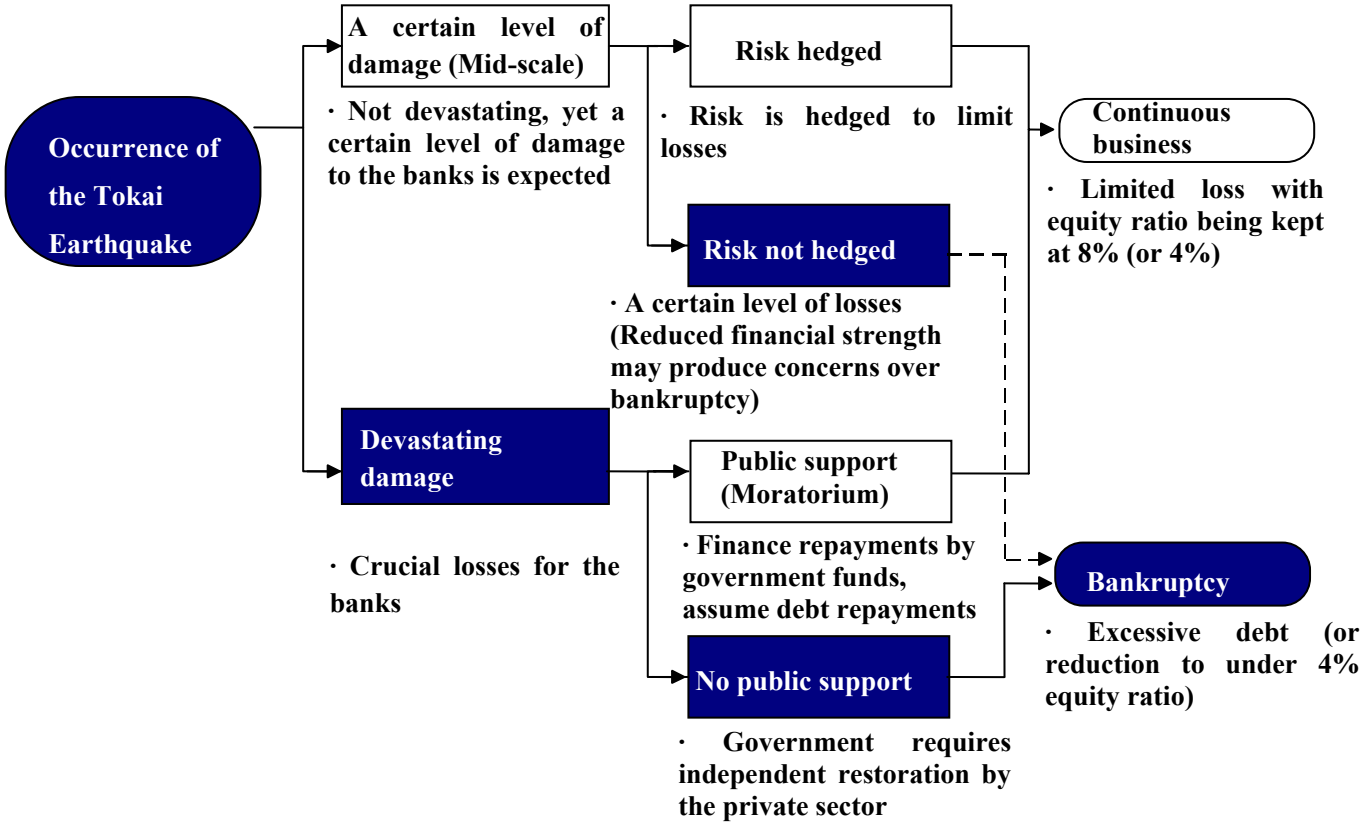
<Loss caused by the Tokai Earthquake>



□ **Although "human damage" can be rather small in financial terms, it could produce a large rumor risk. In light of the company's social responsibility, this could be the most important risk.**

Examination of credit risk limitation strategies

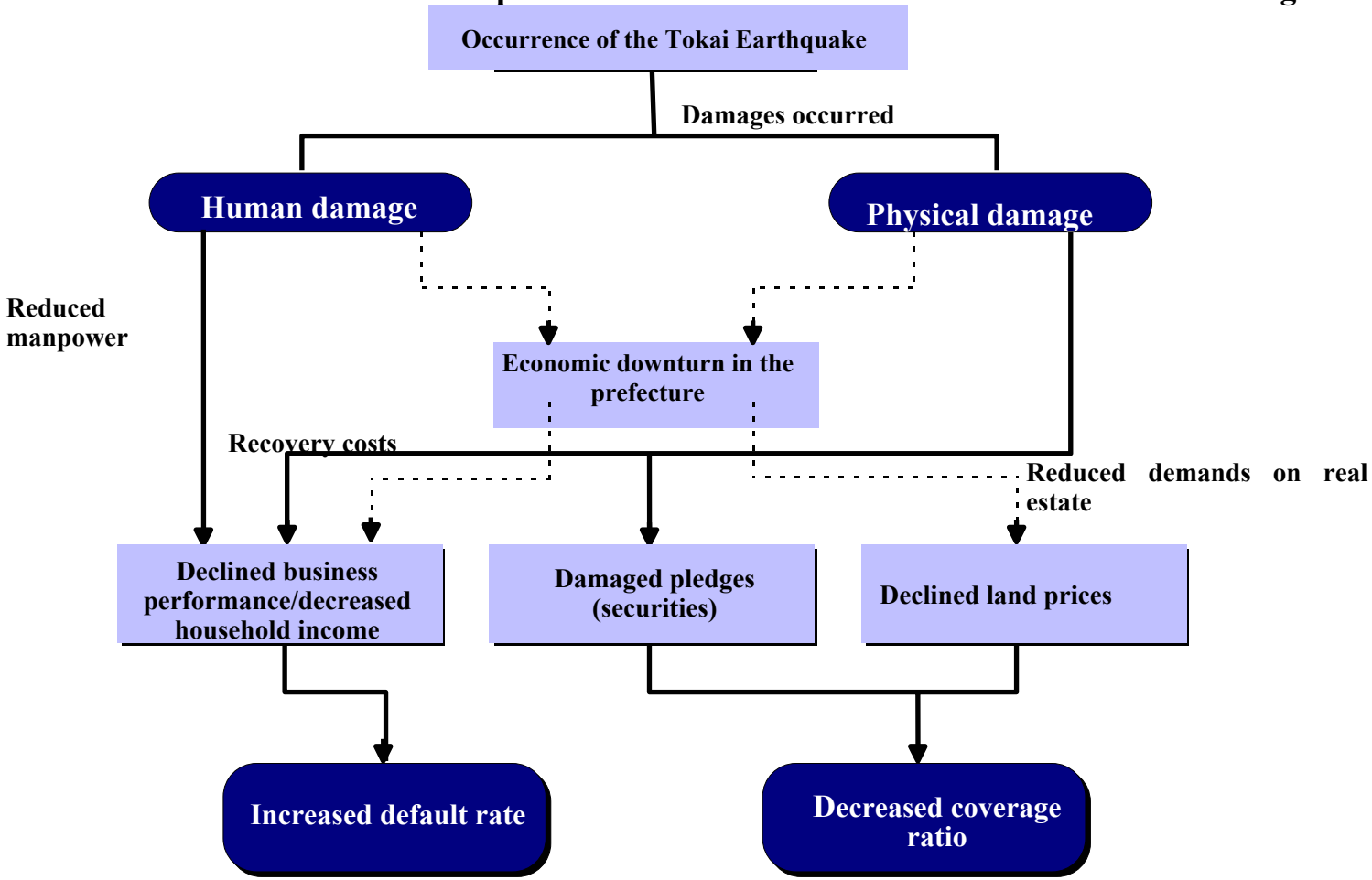
- **The scenario outlined below is expected when the Tokai Earthquake actually occurs. Credit risk hedging is expected to demonstrate a certain effect to maintain bank's business continuity.**



* The contents will vary depending on "how to predict the damage caused by the Tokai Earthquake" and "approach to public spending".

Process of credit risk elicitation

• **Credit risks will be elicited in two respects: "increased default rate" and "decreased coverage ratio."**



Credit risk limitation strategies by segment/Major segment 1: Large companies

(1) Effects of Tokai Earthquake

<Possibility of increased default rates>

· Since many companies decentralize their purchasing, manufacturing and distribution functions and even make their own plans for coping with emergencies, the default rate will only increase to a limited extent.

<Possibility of decreased coverage ratio>

· Credit-based lending reliant on collateral (land, buildings and others) comprises a relatively smaller percentage of total lending than that for "medium sized companies and sole proprietors," "housing loans," and "apartment loans."

(2) Content and effects of the strategies (hedge transactions for reducing credit risks and others)

· Hedge transactions for reducing credit risks using credit derivatives of individual stocks

□ Highly ranked listed brands could be hedged with lower costs. Other brands may face higher costs or may not be hedged.

Credit risk limitation strategies by segment/Major segment 2: Medium-sized companies/sole proprietors

(1) Effects of Tokai Earthquake

<Possibility of increased default rates>

- **Although there are some differences between industries, many companies concentrate their purchasing, manufacturing and distribution functions in Shizuoka Prefecture. In addition, many do not make their own financial preparations for combating earthquake-induced losses. If a large earthquake were to occur, their default rates would rise sharply.**

<Possibility of decreased coverage ratio>

- **Credit-lending for such companies is heavily dependent on collateral (land and buildings), more so than is the case for "large companies". This collateral may suffer significant damage, depending on the size of earthquake.**

(2) Content and effects of the strategies (hedge transactions for reducing credit risks and others)

- **Direct measures, such as credit derivatives, are difficult to implement due to high costs.**
- **Indirect measures, such as providing clients with guidance and consulting on possible strategies for managing earthquake-induced losses, may be more effective in this segment:**

<Case study of the manufacturing industry (ex.)>

- **The manufacturing industry may be hit harder by the Tokai Earthquake than the non-manufacturing industry due to its nature i.e. it is a device-based industry.**

Example of individual guidance/consulting

1. **Switching to lease assets (to avoid financial burdens from property scrapping and disposition)**
2. **Establishing a backup system (to ensure business continuity)**
3. **Making seismic improvements to buildings and facilities**
4. **Decentralization of manufacturing bases**
5. **Development of insurance and derivatives to cover decreased profits**

Credit risk limitation strategies by segment/Major segment 3: Housing/apartment loans

(1) Effects of Tokai Earthquake

<Possibility of increased default rates>

(Housing loans)

- **Since salaries are the primary source of payments, the earthquake may have a secondary spillover effect on companies, leading to an increase in the default rate.**

(Apartment loans)

- **Since rental income is the primary source of payments, the default rate is likely to increase sharply when buildings are destroyed or damaged by a large earthquake.**

<Possibility of decreased coverage ratio>

- **Since much credit-based lending is dependent on collateral (lands and buildings), a decreased coverage ratio may increase losses at the time of default.**

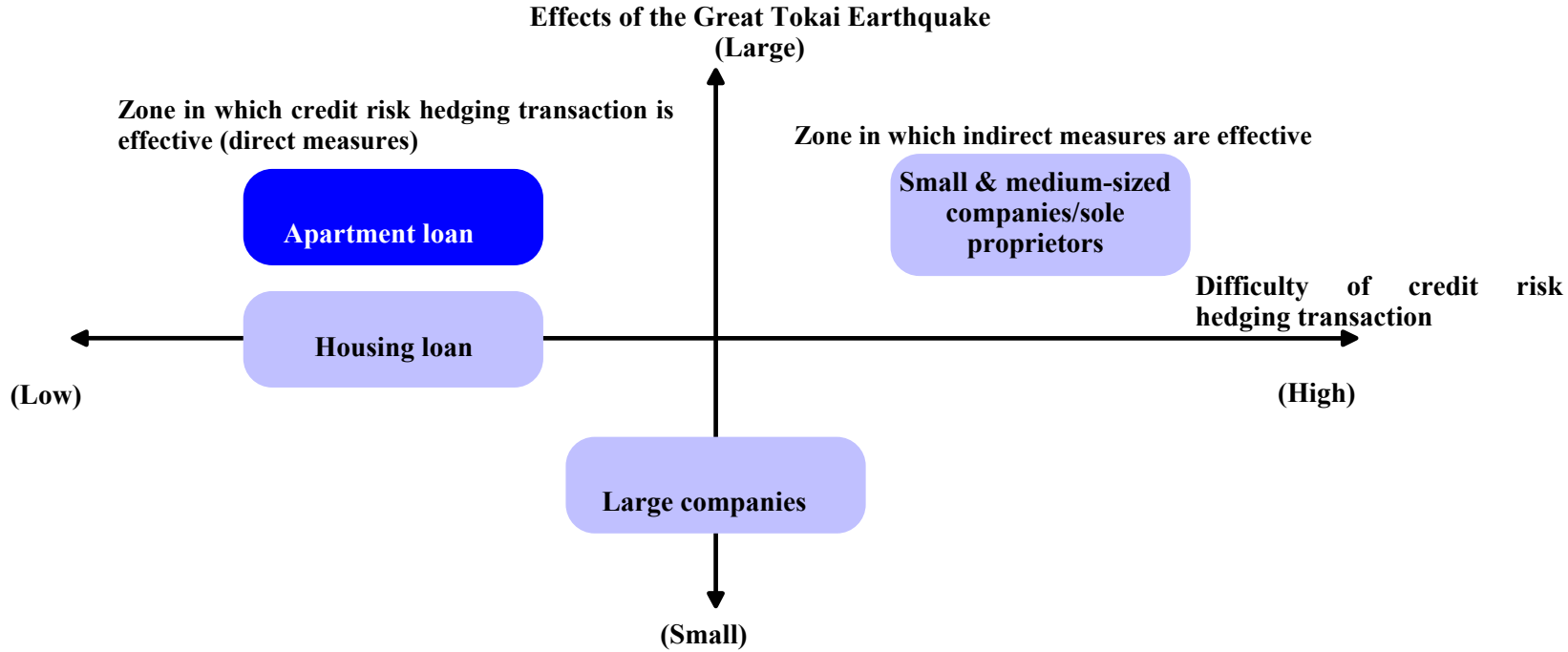
(2) Content and effects of the strategies (hedge transactions for reducing credit risks and others)

- **Hedge transactions for reducing credit risk using portfolio-type credit derivatives**
- **Elimination of interest and credit risks by securitization (by way of bona-fide assignment)**
- **Examination of earthquake-themed new products**
  Ex. "Seismic improvement loan" "low-interest loan for earthquake insurance"

Credit risk limitation strategies by segment (Summary)

• **Risk hedge transactions for the segment of apartment loans will work most effectively.**

• **On the other hand from the points of the importance in the regional bank management, the "small & medium-sized companies/sole proprietors" is the segment in which some countermeasures are most needed. This segment makes up the largest part of the portfolio, especially in local banks, and may result in devastating damage for the banks, depending on the size of earthquake. In this segment, since some indirect measures are required due to high risk hedge costs, it is necessary to develop comprehensive and political strategies, including company-based measures, to counter these possible effects.**



<Questions & Answers>

Note)

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