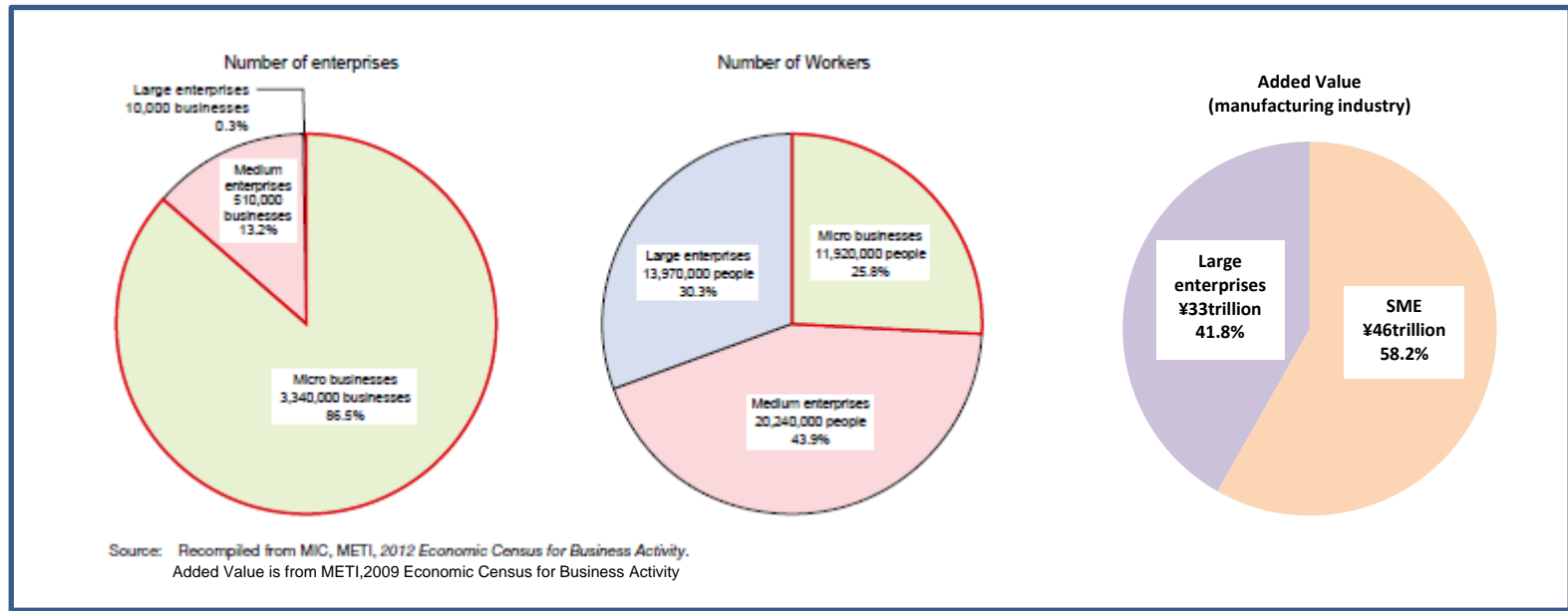# Credit Risk Database (CRD) for SME finance in Japan

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CRD Association, Japan

May, 2015

1. SME's Presence in Japan
2. Some problems in SME finance
3. Previous resolution of the problems
4. Collapse of bubble economy
5. Changes in SME finance
6. Credit bureaus and credit databases in Japan
7. CRD Association in Japan
8. Data content
9. Mechanism of CRD Database
10. CRD services for members
11. Practical usage of CRD database & scoring models
12. To maintain quality of CRD scoring models
13. Importance of validation
14. CRD keys to success
15. Possible contribution of CRD to other Asian countries

CRD Credit Risk Database

1. SME's Presence in Japan

Number of enterprises

- Large enterprises 10,000 businesses 0.3%
- Medium enterprises 510,000 businesses 13.2%
- Micro businesses 3,340,000 businesses 86.5%

Number of Workers

- Large enterprises 13,970,000 people 30.3%
- Micro businesses 11,920,000 people 25.8%
- Medium enterprises 20,240,000 people 43.9%

Added Value (manufacturing industry)

- Large enterprises ¥33trillion 41.8%
- SME ¥46trillion 58.2%

Source: Recompiled from MIC, METI, *2012 Economic Census for Business Activity*.
Added Value is from METI,2009 Economic Census for Business Activity

- SMEs account for about 99.7% of all enterprises
- SMEs account for about 69.7% of all workers
- SMEs account for about 58.2% of added value (in manufacturing industry)

SMEs play an important role in the economy, but tend to face difficulties in financing.

Credit Risk Database

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2. Some Problems in SME finance

- Asymmetric information

  ----information gap between borrowers(SMEs) and lenders(Financial Institution)

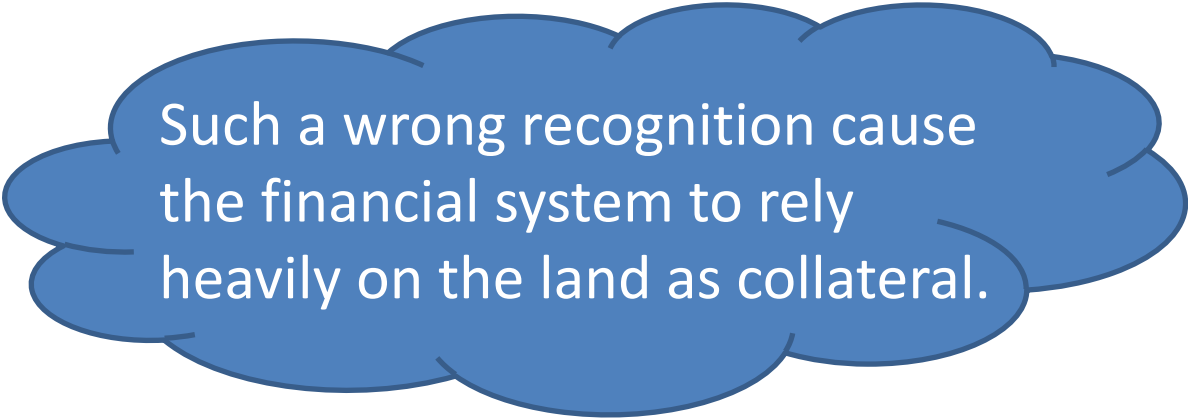- Fragility of SMEs to the change of business environment

Continuous monitoring borrowers cost lenders a great deal

CRD **Credit Risk Database**
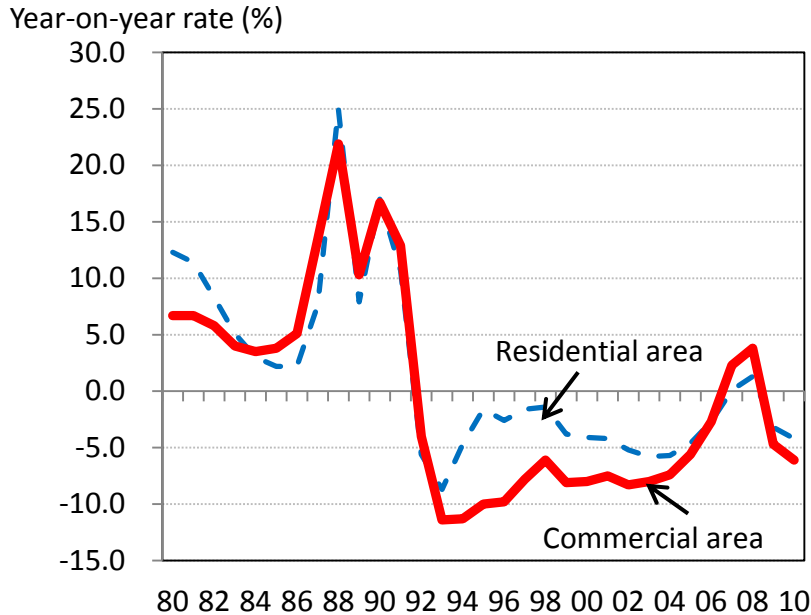
3. Previous resolution of the problems

- Previous resolution of the problems is to utilize the land as collateral.

- In Japan, there was the land myth at the bubble economy period.

  ----The land price never fall after all.

Such a wrong recognition cause the financial system to rely heavily on the land as collateral.

CRD **Credit Risk Database**

4. Collapse of bubble economy

Year-on-year rate (%)

Residential area

Commercial area

Source: Ministry of Land, Infrastructure and Transport

- People perceived that land price did not continue to rise any more.

  ----The price of land was keeping decline and the population in Japan was heading to diminish.

Before

After Bubble Burst

If the land price will go down more, ···

- The excessive amount of collateral or heavy burden of guarantee was required for financing.

Credit Risk Database

5. Changes in SME finance

The exit from excessive reliance on land collateral and the introduction of rigorous evaluation tool for credit risk

- Both Financial Institutions and SMEs recognized loans with excessive reliance on collateral and guarantee had not been any more maintainable
- Financial Institutions needed to improve the quality of risk management and SMEs hoped to get better access to finance
- Both of them gave an incentive for the introduction of more rigorous evaluation of credit risks

To create credit risk information

6. Credit bureaus and credit databases in Japan (1/2)

There are two types of organization that deal with credit risk information: Credit bureau (Credit research company & Designated credit bureaus) & Credit databases

	Credit bureau (Credit research company & Designated credit bureaus)	Credit databases
Information	Personally identifiable information ---Information of individual borrowers	Anonymous information ---An average borrower in the group with same attributes (statistical information)
Discipline to the borrowers	Direct To acquire good financial record("reputation collateral") To avoid being blacklisted	Indirect To belong to higher credit rating group To improve financial condition
Promoting competition in financial market	Direct To reduce information monopoly	Indirect To reduce overestimated risk-premium by improving predictability

Constraint come from privacy problems	Tight constraints
	— Contents(depth) of information
	  — Tight constraints affect the depth and length of database
	— Preservation period
	— Accuracy of data
	  —Needs for correction of self-information
		No constraints
		— It is comparatively easy to develop deep and rich database enabling more value-add services.

6. Credit bureaus and credit databases in Japan (2/2)

| | Credit bureaus | | | | | Credit databases | | | |
| | Credit research company | | Designated credit bureaus | | | | | | | |
	Ⓐ	Ⓑ	Ⓒ	Ⓓ	Ⓔ	Ⓕ	CRD	Ⓖ	Ⓗ
Established	1892	1900	1986	1988	1984	2000	2001	2004	2004
Member Institutions	n.a.	n.a.	1,436	1,216	967	65	180	64	279
Credit information	2.4 million	3.1 million	19.5 million*	n.a.	11.68 million*	725,000	2.1 million	679,000	684,000
Default data*	n.a.	n.a.	n.a.	n.a.	n.a.	251,000	333,000	n.a.	n.a.

* Personal credit information.
* * The data for Ⓐ, Ⓑ and Ⓕ were as of the end of August 2012 and the data for Ⓒ, Ⓓ and Ⓔ were as of the end of March 2015. The data for CRD was as of the end of September 2014. The data for Ⓖ and Ⓗ were taken from The Research Report, Spring 2008, the Center for Financial Industry Information Systems.
* * * The methods to collect data by Credit research company are very unique. They collect data from borrowers by interviewing directly.

CRD **Credit Risk Database**

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7. CRD Association in Japan(1/2)

- To deal with the requirements of excessive collateral in SME financing (To cope with the collapse of the financial system relied heavily on the collaterals)
- To manage the requirements of sophisticated risk management corresponding to Basel Ⅱ

⬇

> The Leading user conference was organized by SME Agency.

⬇

> CRD management Council was founded in March,2001.

*CRD Management Council renamed itself CRD Association in April, 2005.

- 58members attended.
- Scoring Model (CRD Model 1 ver.1) was released.

【Missions of CRD】

  a) Facilitating the fund provision of SMEs in Japan
  b) Improving the quality of risk management in finance
  c) Managing the database in a fair manner

7. CRD Association in Japan(2/2)

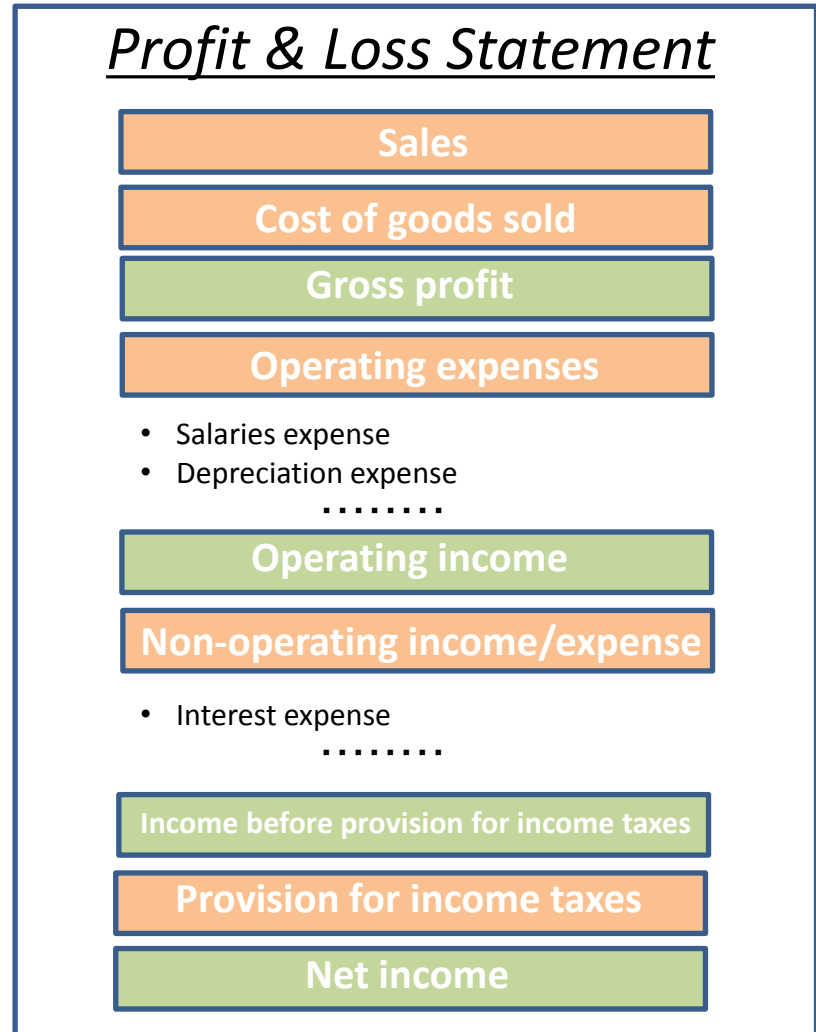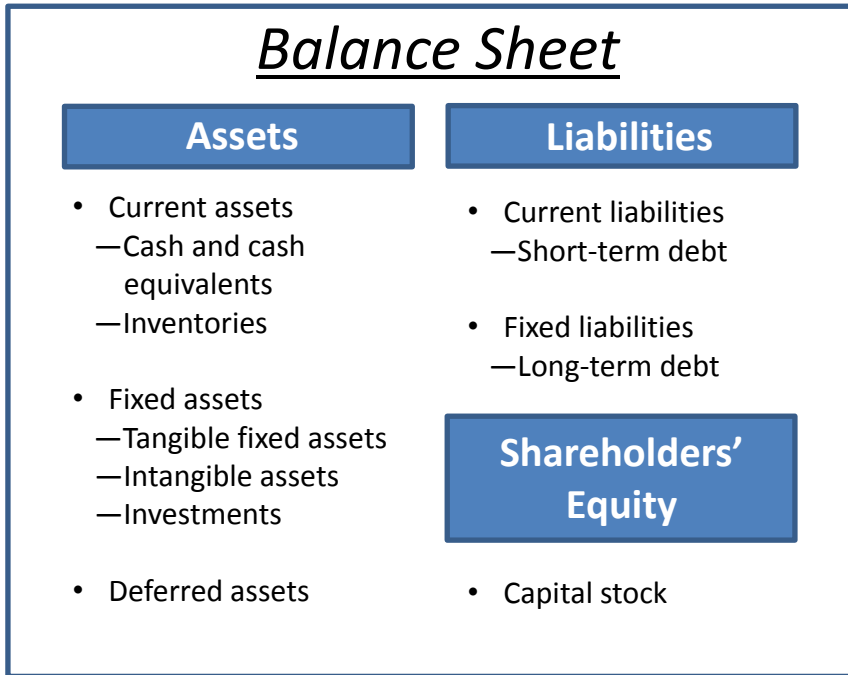## Members institutions and data increased dramatically.

	End March 2001	End March 2015
CGCs	52	51
Public financial institutions	2	3
Private financial institutions	4	116
Rating companies, etc.	--	4
Total	58	174

* All of the CGCs join CRD Association legally.

	Corporations		Sole proprietors	
	Number of corporations	Number of statements	Number of sole proprietors	Number of statements
End March 2002	853	2,480	253	497
End March 2015	2,210	16,644	1,099	4,519

CRD **Credit Risk Database**

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8. Data content (1/3)

- Financial data (B/S, P/L)

Balance Sheet

Assets

- Current assets
  —Cash and cash equivalents
  —Inventories

- Fixed assets
  —Tangible fixed assets
  —Intangible assets
  —Investments

- Deferred assets

Liabilities

- Current liabilities
  —Short-term debt

- Fixed liabilities
  —Long-term debt

Shareholders' Equity

- Capital stock

Financial Indexes

- Capital-to-asset ratio
- Degree of borrowing on lending
- Ratio of interest-bearing liabilities
- Ratio of current profits to assets
- ....

Profit & Loss Statement

Sales

Cost of goods sold

Gross profit

Operating expenses

- Salaries expense
- Depreciation expense
- ....

Operating income

Non-operating income/expense

- Interest expense
- ....

Income before provision for income taxes

Provision for income taxes

Net income

CRD Credit Risk Database

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8. Data content (2/3)

- ## Non-financial data (Qualitative items)

  - (a) Owning or not owning real estate; (b) Successor or no successor; and (c) Birth year of CEO.

- ## Default data

  - (a) 3 months or more arrears; (b) de facto bankruptcy; (c) bankruptcy;   and (d) subrogation (applicable for credit guarantee corporations).

  - (e) substandard and (f) potentially bankruptcy were added as correspondence to Basel Ⅱ since April 2003.

* Attributes (for consolidation purpose)
(a) First Japanese character of company's name; (b) Date of establishment; and (c) Postal code.

8. Data content (3/3)

The submitted data are cleaned and consolidated.

Data cleansing is conducted twice.

- 1st cleansing <BASIC CLEANSING >

— When the CRD receives the data from member institutions

— After checking elementarily, we create every each member's database.

- 2nd cleansing <MORE RIGOROUS CLEANSING >

— Before the CRD consolidate member's data

— To unify each member's database into one database, this process is more rigorous than former one.

Consolidation
- The database needs to consolidate the data of the same borrowers.

These process enable to create high quality database and we monitor the quality of data continuously.

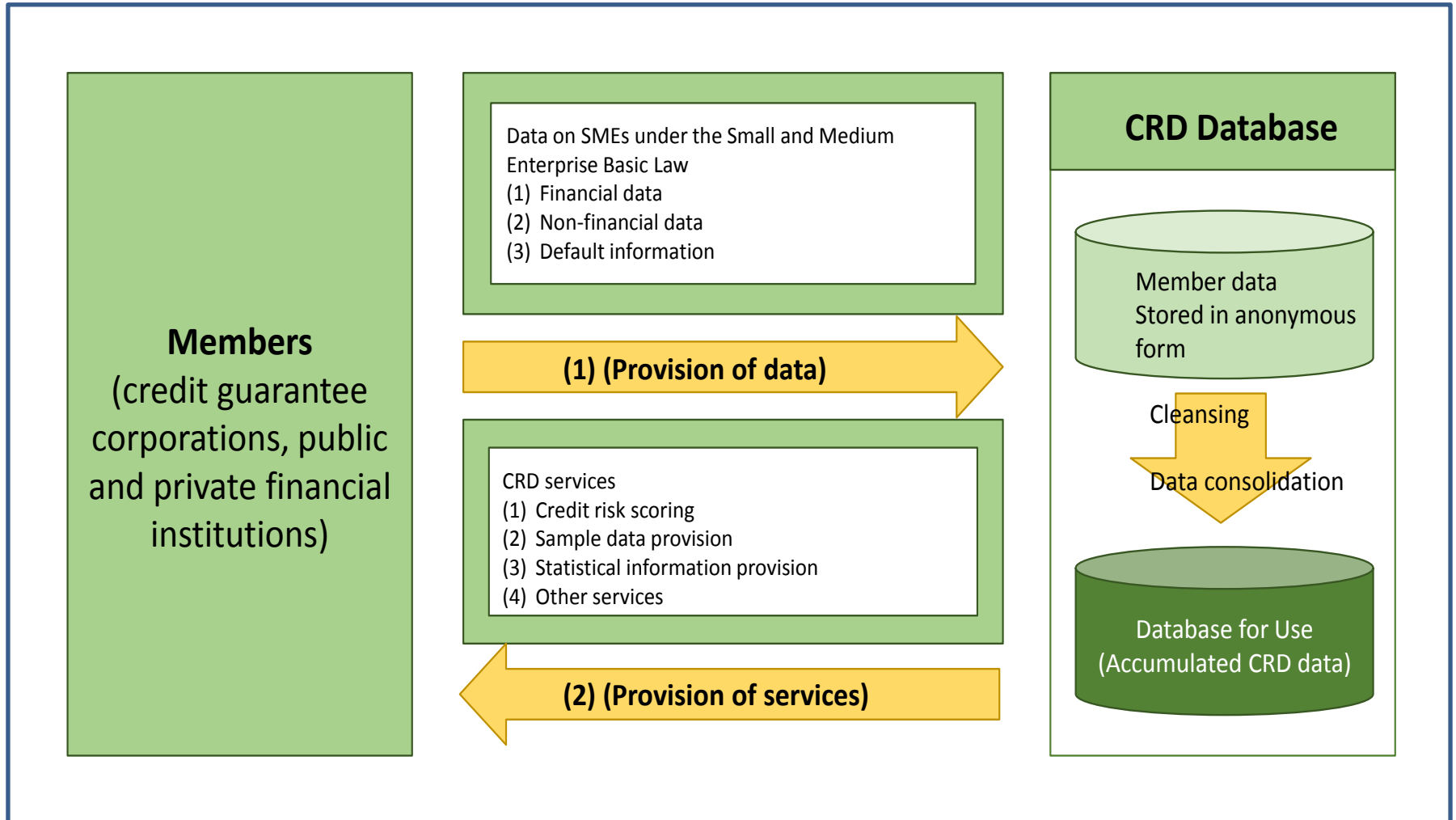| An example: 1st cleansing |
| --- |
| Check the condition as follows |
| • Current assets ≤ Assets
• Fixed assets ≤ Assets |

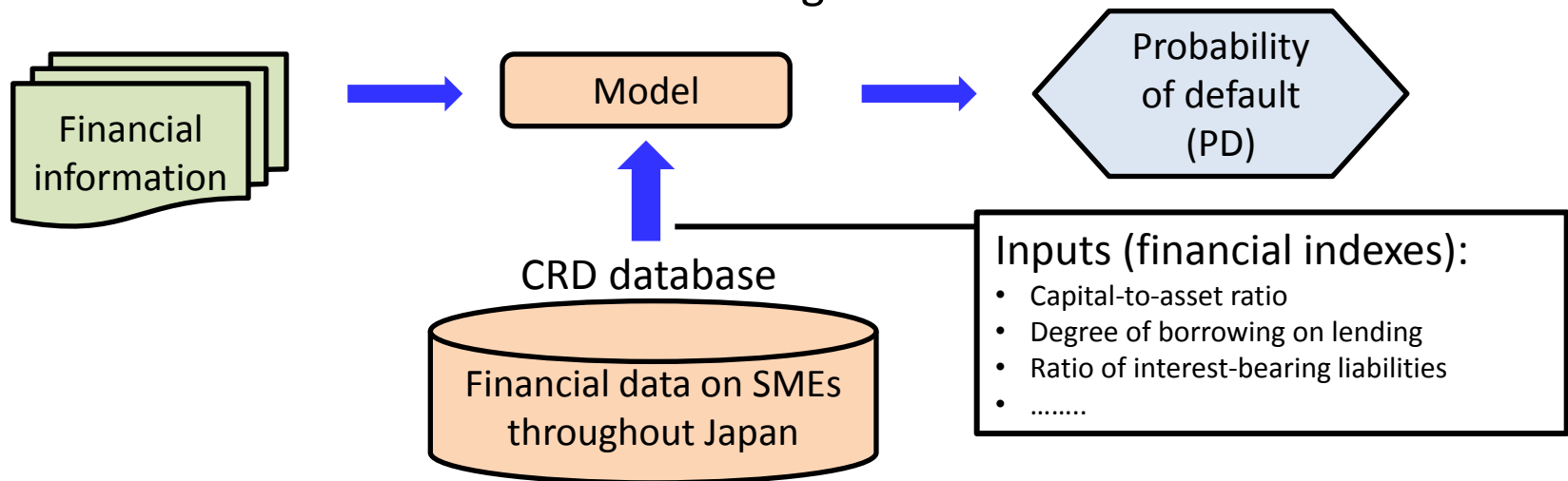| An example: 2nd Cleansing |
| --- |
| Check the condition as follows |
| • Assets≒Currents assets
 +Fixed assets + Deferred assets
summing up details (making little allowances) |

9. Mechanism of CRD Database

Members
(credit guarantee corporations, public and private financial institutions)

Data on SMEs under the Small and Medium Enterprise Basic Law
(1) Financial data
(2) Non-financial data
(3) Default information

(1) (Provision of data)

CRD services
(1) Credit risk scoring
(2) Sample data provision
(3) Statistical information provision
(4) Other services

(2) (Provision of services)

CRD Database

Member data
Stored in anonymous form

Cleansing

Data consolidation

Database for Use
(Accumulated CRD data)

10. CRD services for members (1/3)

- ## Basic services

  ### i. Scoring service

  - Members can use CRD scoring models and evaluate credit risk of borrowers and potential borrowers in following ways.
  — By installing the model program directly to members' internal rating systems or by installing the model application to PCs in members' office.
  — By accessing CRD members' website via the internet or by requesting to return submitted data with scoring results.

| Financial information | → | Model | → | Probability of default (PD) |

CRD database

Financial data on SMEs throughout Japan

Inputs (financial indexes):
- Capital-to-asset ratio
- Degree of borrowing on lending
- Ratio of interest-bearing liabilities
- ....

10. CRD services for members (2/3)

ii. Sample data provision

- Members can use random sampling data from CRD database.

- Some examples of utilization are as follows.
— To complete insufficient data for creating members' internal scoring model
— To validate members' internal scoring model
— To develop financial products in new area

iii. Statistical information provision

- Members can use statistical information such as the financial indexes.

- Some examples of utilization are as follows.
— To compare the financial statistics based on each member's customers with those of CRD database for improving the credit risk management
— To develop customer oriented marketing strategy and new financing services

CRD **Credit Risk Database**

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10. CRD services for members (3/3)

- Additional services

Management consulting support system ("McSS")

- "McSS" is a consulting tool constructed of CRD scoring model and CRD data analysis.

- It can indicate the relative position of each borrower compared with the average borrower of group having same attributes.

- It can evaluate the current position and the future simulation of borrowers.

- Members can advice their borrowers for the improvement of management and financial situation using McSS analysis.

11. Practical usage of CRD database & scoring models (1/4)

Some examples using CRD database and scoring models are as follows.

i. Using same scoring models

- The Credit Guarantee Corporations of all over Japan and the member financial Institutions can evaluate SME borrowers using same scoring models.

【Credit Guarantee Fee Rate Classification】

(Unit: annual rate %)

Classification	1	2	3	4	5	6	7	8	9
Credit Gurantee fee rate	2.20	2.00	1.80	1.60	1.35	1.10	0.90	0.70	0.50

【Credit Insurance System】
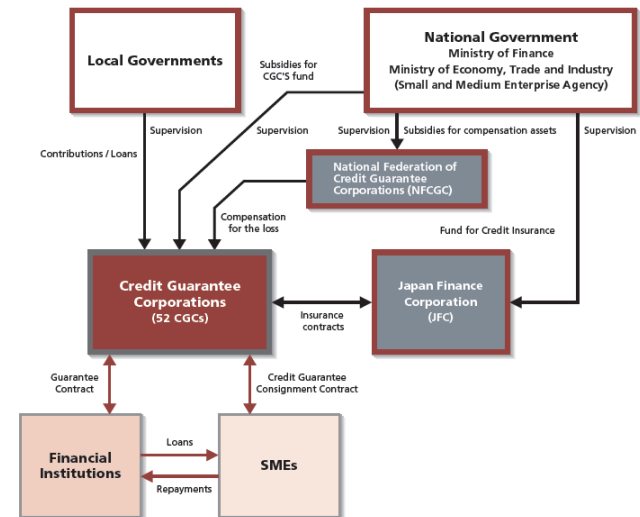
11. Practical usage of CRD database & scoring models (2/4)

ii. Validating own scoring models

- In comparison to CRD model scoring, member can validate their internal scoring models.

	Low	CRD scoring (PD)	High

Own scoring (PD) — Low / High

➢ coincidence of evaluation <u>Low risk zone</u>	➢ Different evaluation <u>CRD scoring – High</u> <u>Internal scoring – Low</u>
➢ Different evaluation <u>CRD scoring – Low</u> <u>Internal scoring – High</u>	➢ coincidence of evaluation <u>High risk zone</u>

- Focus on the difference
- Specify the cause of the difference

Credit Risk Database
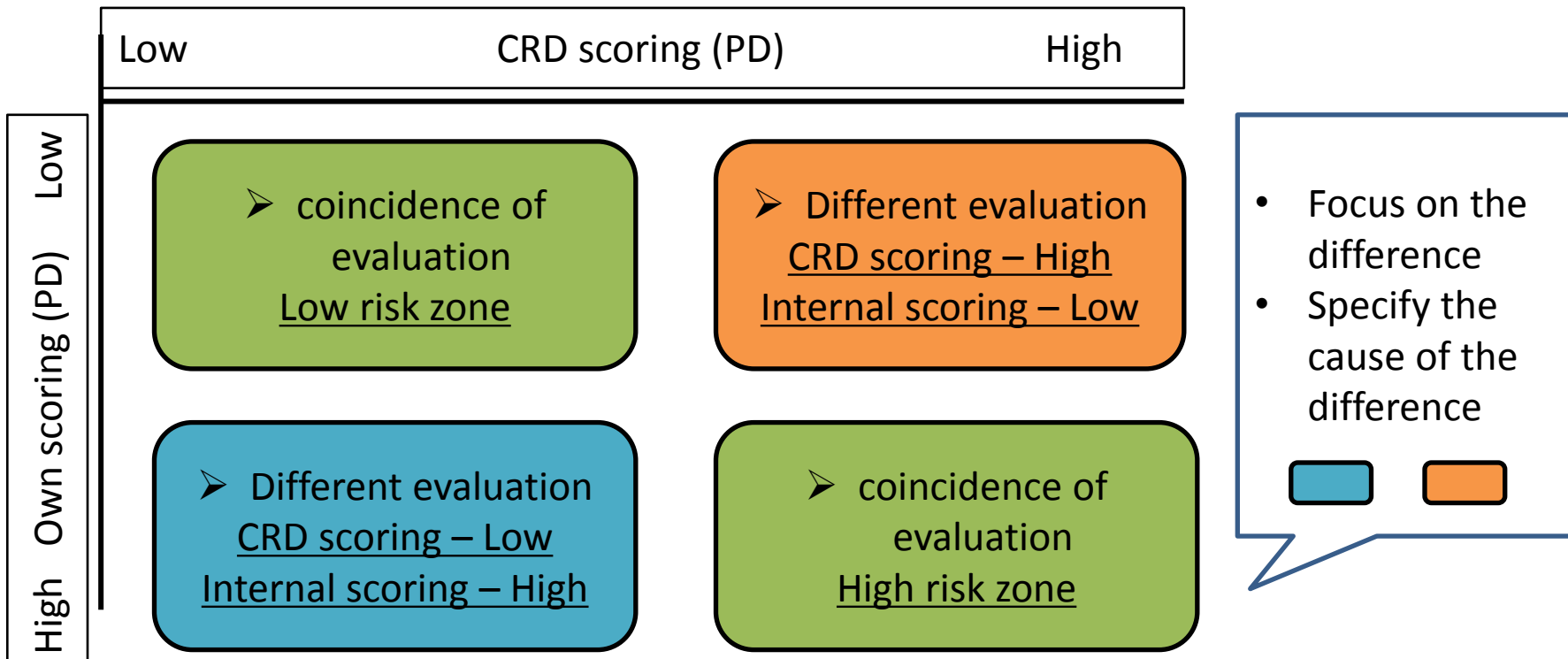
11. Practical usage of CRD database & scoring models (3/4)

iii. Using the financial indexes of CRD in regional comprehensive strategy

The Abe administration established the Regional Revitalization Headquarter Office (RRHO) and asked local governments to establish the Regional Comprehensive Strategy (RCS).

The RCS aims preventing depopulation and revitalizing local areas. Regional governments are asked to set the targets after 5years in its strategy. They have to choose Key Performance Indicator (KPI) as those targets that are possible to be verified. Regional governments have to promote the RCS by utilizing the PDCA cycle.

CRD provides statistical indexes concerning SME management as KPI candidates.

Schematic views

Credit Risk Database
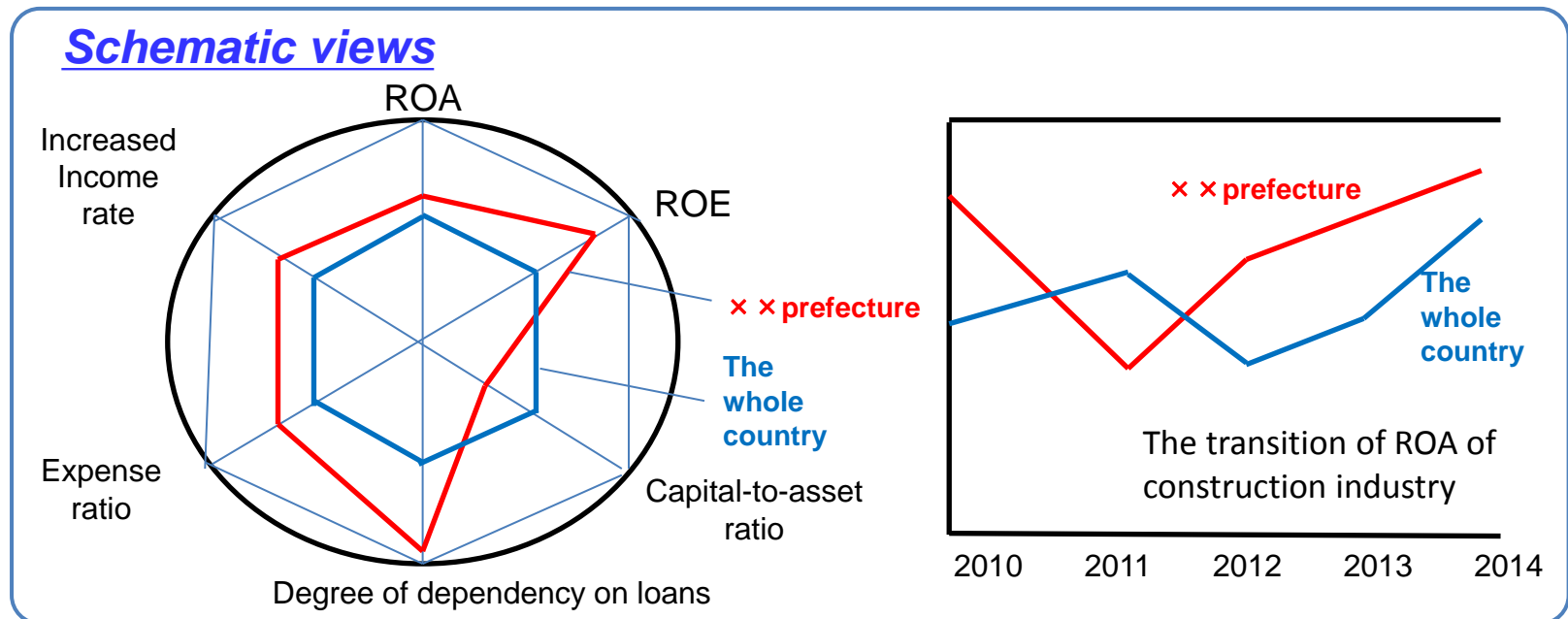
11. Practical usage of CRD database & scoring models (4/4)

iv. Others

- SME Agency
— To use CRD data and scoring result of CRD models for Policy making and monitoring policy effect (e.g. Credit Guarantee system)

- Bank of Japan
— To analyze and to examine the situation of SMEs

  (check the distribution of credit risk and financing situation of SMEs, etc.)

- FSA
— To check the level of each financial institution's credit risk rating

  (We are recognized by FSA as a third-party evaluation)

12. To maintain quality of CRD scoring models (1/2)

We created the system that evaluated CRD models objectively in order to maintain the quality of the models and to acquire the reliance on our services.

(1) Model quality management guidelines

- We established the guideline in 2007 on the model development, model operation & validation.

- In accordance with the guideline, we organized the Third-Party Evaluation Committee for CRD scoring models.

12. To maintain quality of CRD scoring models (2/2)

(2) Regular Validation & its Assessment

- We validate CRD models annually in line with the guideline and the regulation under the Small and Medium-sized Enterprise Credit Insurance Act and FSA notification.
    - To check the transition of actual data as compared with the data which the current models are based on
    - To check Accuracy ratio (AR) of the models
    - To compare PD with actual default rate
    - To check the stability of the model
    - To check the explanatory ability of the variables to detect default
- The Third-Party Evaluation Committee for CRD scoring models assesses the result of validation.

(3) Disclosure of assessment by the Third-Party Evaluation Committee
 Annual Report by Third-Party Evaluation Committee is delivered to the members and the summary of the assessments are disclosed to public on CRD website.

13. Importance of validation (1/3)

The accuracy of scoring models tend to deteriorate with the lapse of time. We need to validate scoring models in order to maintain the quality of scoring models. We show 3cases of our validation and reaction to those as follows.

- **CASE1 after Lehman shock**

  We modified the scoring model to correspond with the situation after Lehman shock.

default rate in CRD database

accounting period

The distribution of SMEs

Low ← ← PD → → High
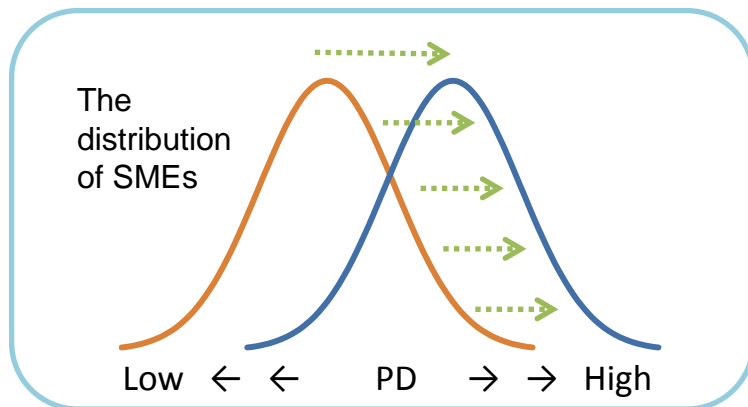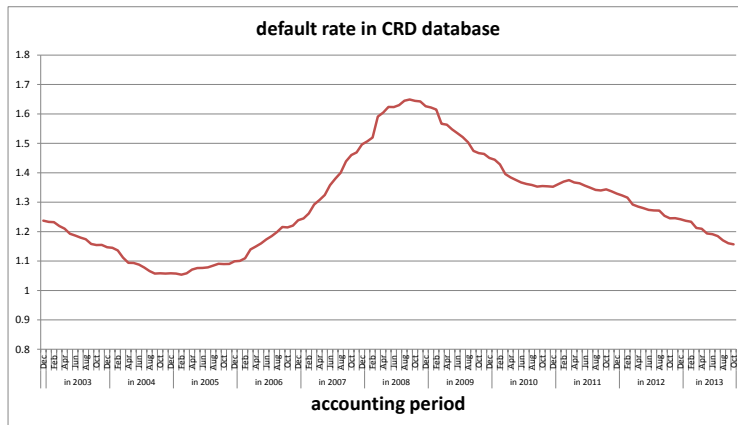
◆ Many SMEs' bankruptcies were triggered by Lehman shock.

◆ Then Default rate ($\fallingdotseq$ bankruptcy ratio among SMEs) in CRD database rised rapidly. Actual default rate is higher than PD of scoring model.

◆ The probability of SME bankrupt heightened after Lehman shock.

◆ The shape of distribution curve was not drastically changed. We could keep high AR just by changing parameter values.

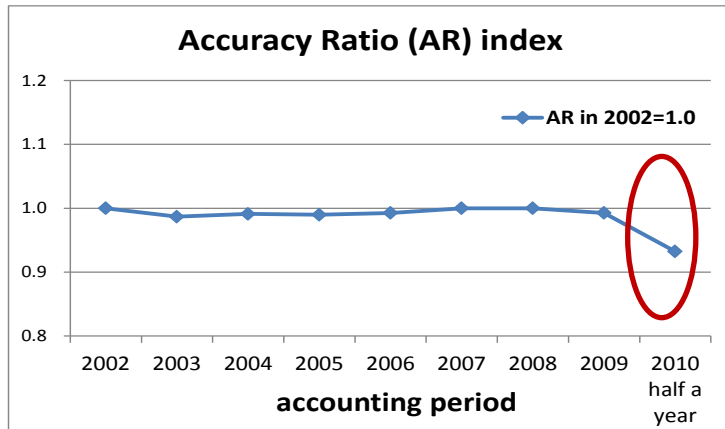$$PD = \frac{1}{1 + \exp(-Z)} \qquad Z = \alpha + \beta \times X^{\gamma}$$

α, β, γ: parameters

X: general assessment of financial indexes

Adjusting α, mainly

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13. Importance of validation (2/3)

- **CASE2 The Great East Japan Earthquake**

Accuracy Ratio (AR) index

The accuracy ratio of scoring model which was very stable until 2009 suddenly declined in the first half year of 2010(accounting period).

◆ We thought that the sudden decline of AR was affected by the Great East Japan Earthquake.

◆ We explored the background of the sudden AR decline on the validation of scoring models' in following way.

— We calculated AR excluding the data of heavily devastated area (Fukushima prefecture, Miyagi prefecture and Iwate prefecture).

— We specified industries damaged badly.

— We calculated AR by the data set shifting one month by one month in order to identify when it declined.

We figured out that the decline of AR occurred at the same time as the earthquake, deeply in devastated area and considerably in manufacturing industry caused by the supply chain troubles and the electric power supply shortage.
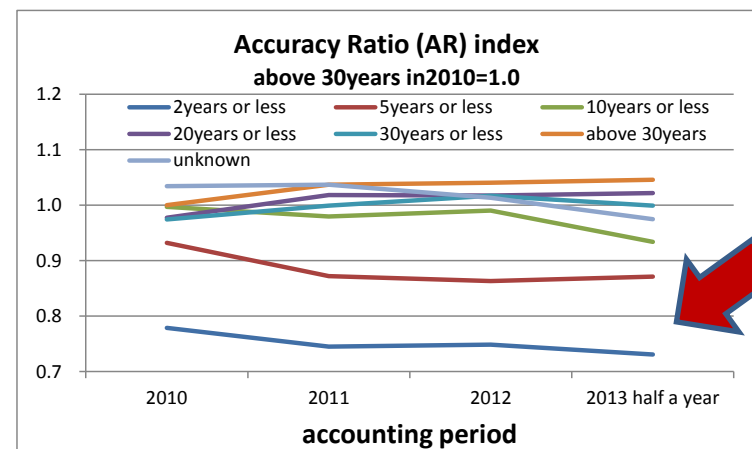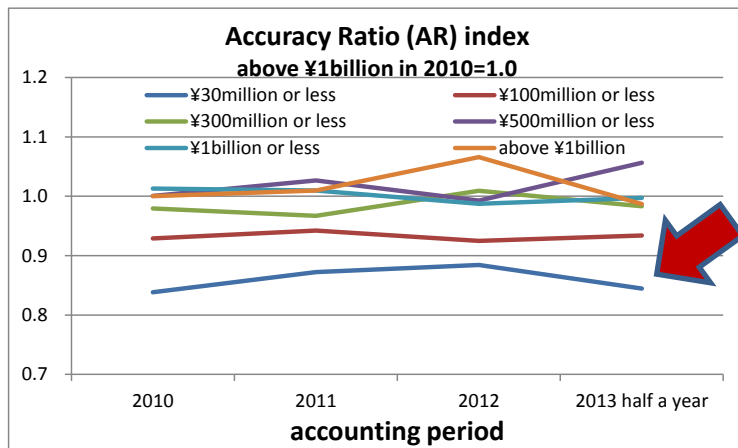
We decide to maintain the current scoring models and notified specified areas and industries where the accuracy of scoring model predictability was undermined, accompanied with the degree of damage in each area and industry.

13. Importance of validation (3/3)

- ## CASE3 From the recent validation

We explore continuously factors deteriorating performance of scoring models on the validation. The acquired knowledge on the validation enhances the operation know-how of the scoring models and is helpful in designing new scoring models in a practical way.

We identified categories the level of the AR of which are continuously low.

Accuracy Ratio (AR) index
above ¥1billion in 2010=1.0

Accuracy Ratio (AR) index
above 30years in2010=1.0

- ◆ We calculated the level of AR at each category of sales volume.
- ◆ We calculated the level of AR at each category of the period of doing business.

- ◆ The categories of lesser sales volume and younger SMEs get lower AR continuously.
- ◆ We supposed the sales volume and the period of doing business is dependent each other to some extent.
- ◆ We conclude the short period of business practice is a more fundamental factor through the investigation of farther segmented group data.
- ◆ We notified the detail of the investigation to members and utilize the knowledge for designing new scoring models.

CRD **Credit Risk Database**

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14. CRD keys to success

❷ Very reliable scoring models

- Creating CRD models with high quality & incomparable big database

Scoring models

❸ maintenance of the quality

- Validation regularly
- Coping with the deterioration of the quality of models
- Creating new models

Validation

Credit Risk Database (CRD)

Services

Data & Fees

CRD Members

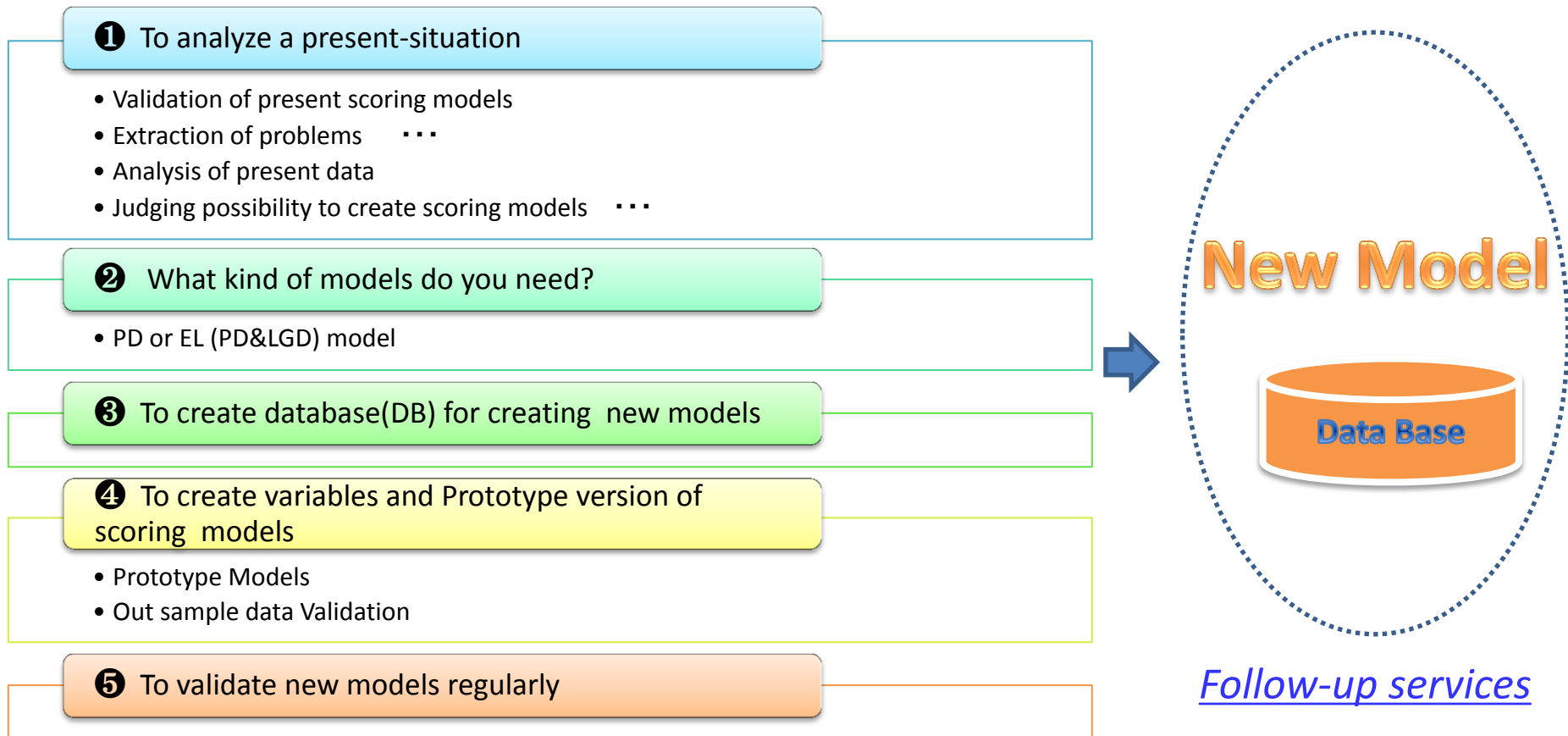**❶ Data-collecting system**

- Free from the constraints caused from privacy problem
- Easy to encourage members to send data with few free-rider problems

❹ New services

- As well as improving accuracy of scoring models, providing members with other new valued-add services like the risk management for housing and apartment loans

15. Possible contribution of CRD to other Asian countries

Based on the experience of CRD service provision in Japan, we can support to establish and improve the similar service provision systems in Asian countries. Particularly we can provide consulting services in constructing and improving scoring models. The procedure of the consultation is as follows.

❶ To analyze a present-situation

- Validation of present scoring models
- Extraction of problems · · ·
- Analysis of present data
- Judging possibility to create scoring models · · ·

❷ What kind of models do you need?

- PD or EL (PD&LGD) model

❸ To create database(DB) for creating new models

❹ To create variables and Prototype version of scoring models

- Prototype Models
- Out sample data Validation

❺ To validate new models regularly

New Model

Data Base

Follow-up services

CRD **Credit Risk Database**

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THANK YOU
FOR YOUR KIND ATTENTION!

CRD **Credit Risk Database**