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JCIC's Services and Assistance for Banks in the Implementation of Basel II—
The Application of JCIC Consumer Credit Score: Risk Segmentation and Quantification

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1. Introduction

Following the implementation of the New Basel Capital Accord (Basel II), banks have the options to adopt Standardized Approach or Internal Ratings Based Approach (IRB approach) to calculate their credit risk capital charge. In general, banks that plan to adopt the IRB approach for their consumer finance business which involves large number of transactions in small dollar amount need to complete three major tasks as described below:

(1) Meaningful risk segmentation: A bank should classify its asset portfolio into several segments or pools based on the risk characteristics or loss experience on their retail assets, so all individual exposures assigned to the same segment possess homogeneous risk characteristics or primary risk drivers. The bank then designs and implements different credit management policies for each risk segment, e.g. credit terms (e.g. approval authority, loan rate and line of credit), monitoring of credit quality (e.g. frequency of credit review, frequency of collateral valuation), and countermeasures (e.g. no renewal, freezing the line of credit, and collection efforts).

(2) Risk quantification: Risk segmentation entails only risk ranking and grading to learn the relative level of risk exposure. A bank must quantify the exposures based

Those credit data include loan data, credit card data, payment status data, check clearing data, and credit inquiries made on the individual, which are categorized into: **A. payment behavior; B. debt; C. new credit application; D. credit history; and E. credit type.** Using statistical techniques, a score for a consumer is generated based on the five categories of data to represent the probability of consumer performing his/her repayment obligation. The JCIC consumer credit scoring products possess the following features:

(1) Scores are provided online to reflect instant consumer credit status

The JCIC scoring system runs when an inquiry is made, where the latest data present in the Inquiry Operating System of JCIC database are extracted and computed by a designed algorithm to produce a score. Thus the credit score of a consumer may vary at different time points as credit data in the Inquiry Operating System of JCIC database constantly undergo update and change. However, the score produced reflects the current credit status of the inquired individual.

(2) The JCIC products are generic credit scores

The JCIC scoring model was developed based on all personal credit data in JCIC database and JCIC definitions of "default." It is not confined to a specific consumer finance business, and therefore, offers more flexible and broader applications. But if a member institution likes to use the JCIC score for a specific consumer finance business (e.g. mortgage loan, consumer loan, or credit card), or a specific phase of credit management (e.g. marketing, credit underwriting, pricing, monitoring, or collection), it might need to modify the score to render it more specific.

(3) The data used for scoring are consistent with the contents and disclosure periods of other online products

As described, the data used by the JCIC credit scoring model are real-time data in the "Inquiry Operating System" of JCIC database, which are consistent with the data used by standard JCIC products and data beyond the disclosure period are excluded.

(4) The content of score product includes score and underlying risk meaning

The JCIC score product provides a score derived from the scoring model and discloses the underlying risk meaning, including odds and percentile to help the data user get an idea about the risk it represents.

(5) Score products with "no scoring performed" or "poor score" are

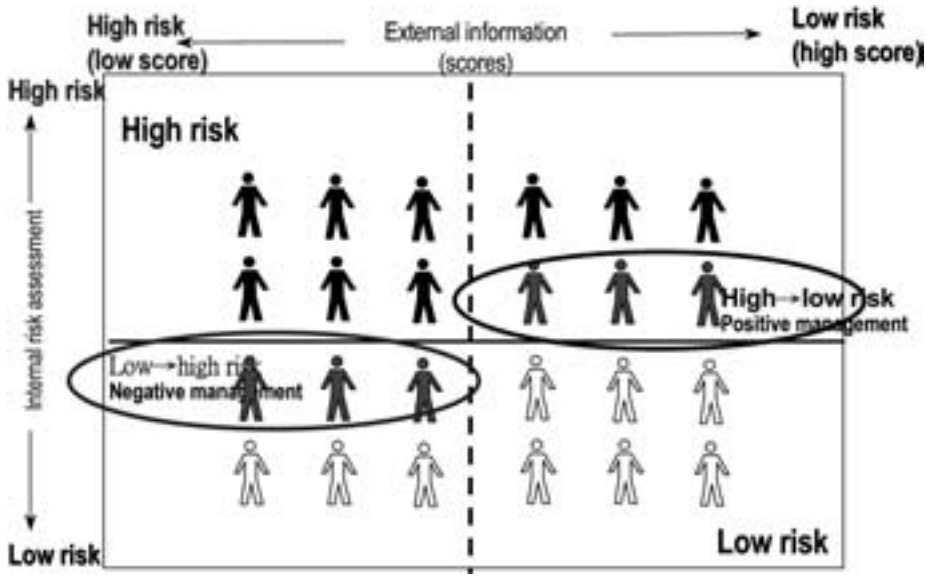

Fig. 1 Comparison of Risk Assessments based on External and Internal Data

As shown in Fig. 1, if a bank groups all of its retail banking customers into high risk and low risk based on its internal risk assessment, the bank can only adopt a relatively unsophisticated risk management system. But if the bank also makes use of external data (or scores) to classify its customers into high risk and low risk groups, the bank will have four groups of customers for risk management purpose. Such grouping approach carries two meanings:

(1) Customers with scoring results free of discrepancy: For bank's customers in high risk or low risk groups that are reaffirmed by the external information (or scores), the bank can simplify its credit decision process to lower the manpower and time costs and enhance decision making efficiency and effectiveness.

(2) Customers with scoring results with discrepancy: For bank's customers in high risk or low risk groups that are contradicted by the external scores, the bank might want to allocate more resources and time and design different risk management strategies.

- "**Negative management**" group: For customers that are ranked as low-risk by the bank, but higher risk by the external information (or scores) (at lower left segment of Fig. 1), the bank should step up negative management, that is, bolster the monitoring of those

customers to **curtail possible losses.**

- **"Positive management" group:** For customers that are ranked as high-risk by the bank, but lower risk by the external information (or scores), the bank should step up positive management to turn those "good" customers with other banks into good customers of the bank **who make greater contribution to bank's profits.**

As analyzed above, external information helps improve data intactness, and thereby, identify the part of internal risk assessment results that needs adjustment, for which, the bank should formulate management priority, guidelines and focuses to refine its risk management system. If the external institution on its part can transform the enormous and diverse credit data into simple and objective scores, i.e. credit scores, it will render the applications of external credit information more efficient and effective.

The JCIC consumer credit scoring system offers generic credit scores. Its application is broad and not confined to a specific consumer finance business or certain credit management activity (e.g. marketing, credit underwriting, pricing, monitoring, or collection). To illustrate the applications of JCIC credit score to risk segmentation, we will discuss a practical example on "pricing" below.

4. The application of JCIC consumer credit scores: risk segmentation

For banks that have not yet developed credit scoring model or are in the process of constructing a model to formulate a differentiated pricing strategy, they can incorporate JCIC consumer credit scores into the internal database and risk assessment system so as to undertake more refined risk segmentation.

(1) Two-dimension or multi-dimension risk segmentation with the addition of JCIC scores

Assuming Bank A decides to apply five interest rates to its cash card customers, and following risk assessment, decides to use "debt multiple" which is defined as total debt of customer to monthly income of customer as basis for rate differentiation, the differentiated pricing structure adopted by Bank A is shown in Table 1 below.

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It is clearly shown in Table 2 that the horizontal grading structure Table 1 evolves into a more risk-meaningful stepped structure with the addition of JCIC scores. For example, customers to whom grade 3 interest rate applies (with debt multiple of 12 ~ 16) are further segmented into three subgroups to whom grade 4, grade 3, and grade 2 interest rates apply respectively. In contrast, for consumers with JCIC scores ranging from 600 to 750, grades 1 ~ 5 interest rates apply based on the bank's own risk assessment. In other words, customers with same JCIC scores might be subject to considerably different rates at the same bank.

If Bank A determines that certain attribute of cash card customers also provides the effect of risk segmentation and decides to add a customer attribute dimension to the aforesaid two-dimension metrics, the differentiated pricing structure of Bank A then further evolves as shown in Figure 2.

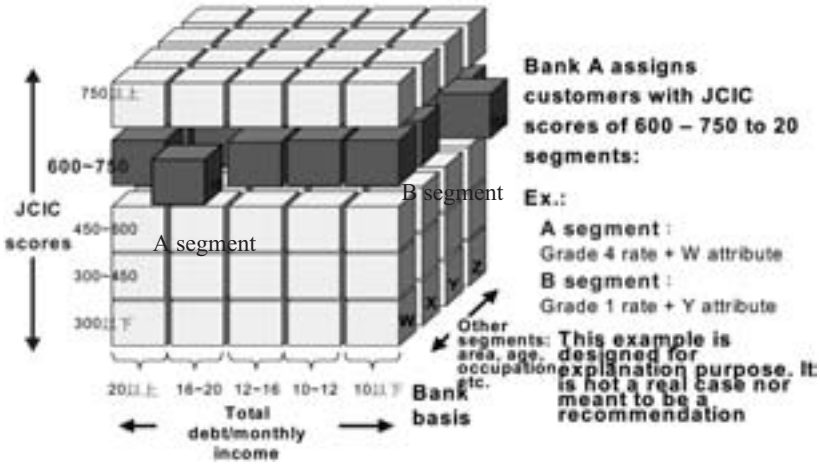

Fig. 2 Multi-dimension Differentiated Pricing

The two examples above point out what a bank should pay attention to when it decides to use the JCIC scores:

- A bank should develop a basis for risk judgment and assessment in congruence with its own characteristics.
- A bank should evaluate the usefulness and practicality of JCIC credit scores before incorporating the JCIC scores into its existing risk assessment basis to enhance risk segmentation.
- JCIC scores have inherent limitations, for example, they do not consider customer's income or use customer's

basic data, such as age, gender, education, residence or occupation. Banks are not advised to use the JCIC credit score as the sole basis for making credit decision.

(2) Using JCIC score or score variable as an explanatory variable of internal credit scoring model

For banks that intend to develop their own credit scoring model, it is necessary for them to supplement their internal data with external data to add to the data integrity and relevance and enhance the predictability of their model. JCIC offers more than one hundred credit information products based on its cross-bank credit database. Banks however will have a hard time picking the most relevant products without missing a few essential ones. Even if a bank could identify exactly the types of information it needs, it will still take considerable time and manpower to process, compile and compute those data that come in multiple types and span over multiple time horizons. Such algorithm runs counter to the idea of automated review

Table 3 Internal Scoring Model Incorporated with JCIC Scores - An Example

	Domain 1	Domain 2	Domain 3	Domain 4	Domain 5	Domain 6
	Score	Score	Score	Score	Score	Score
Age	20~<25	25~<33	33~<40	40~<50	>50	No data
	10	15	21	26	30	18
Marital status	Single	Married	Divorced	Others	No data	
	20	28	16	10	18	
Type of residence	Self-owned	Rental	Owned by parents or relatives	No data		
	36	17	30	21		
Occupa						

5. The application of JCIC consumer credit scores: risk quantification

For banks that have already developed their scoring model, the approach to formulating differentiated pricing strategy differs from the risk segmentation and pricing method described above. On the basis of quantification, the bank can estimate costs and actual exposure more accurately and formulate more refined interest rate or pricing strategy which is risk-based. A risk-based pricing structure as shown in Figure 3 should include the following accurately estimated components:

(1) Cost of funds: This is the price a bank has to pay for using the money. The cost of funds might vary depending on the fund situation of the bank. Thus a bank should establish a fund transfer pricing (FTP) system to reflect reasonably the cost of funds.

(2) Operating cost: This is the cost incurred from engaging in credit activities. To estimate accurately the operating cost of each activity undertaken by a department or a staff, a bank should establish a activity-based cost (ABC) system.

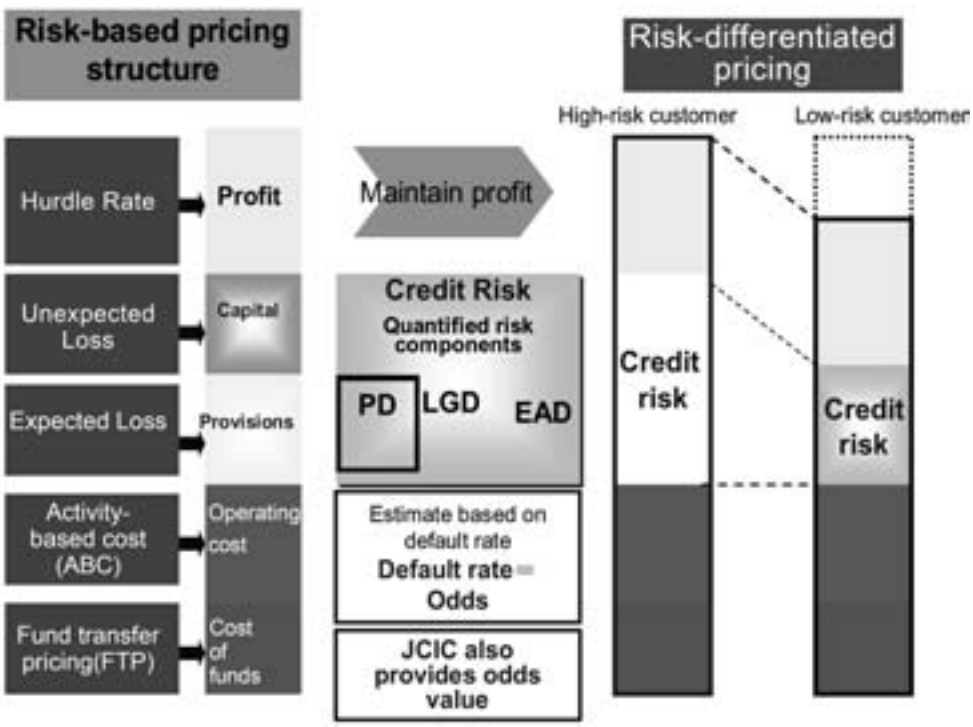

Figure 3 Risk-based Pricing and Risk-differentialted Pricing

(3) **Provisions and capital: Provisions** is the money set aside for the expected loss (EL) of a credit exposure, which is treated as the cost of a credit transaction; capital is the fund used to pay for expected loss (UL) so as to maintain the bank's operational stability. Loss reserve and capital are termed collectively credit risk.

(4) **Expected return:** This is the expected return on a credit transaction. For banks that use risk-based pricing, the expected return should at least exceed the risk-adjusted hurdle rate.

As shown in Fig. 3, the major factor determining the rate charge is the level of credit exposure (including expected loss, i.e. provisions, and unexpected loss, i.e. capital). That is, with other costs and profit level unchanged, the rate charge for a low-risk customer should be substantially lower than that for a high-risk customer. Estimation of credit exposure entails the estimation of three risk components - PD, LGD, and EAD. For PD, the "odds" provided in the JCIC scoring results is another form of probability of default.

Banks that have constructed their scoring model should have also quantified the PD for each grade or segment based on their own segmentation and loss experience. If the results of an external model are also taken into consideration (including method for segmentation and PD for the segment), the quantification of PD will be more accurate. The "odds" provided by the JCIC scoring model differs somewhat different from the "long-run average of one-year realized default rates" as required by Basel II. But in actual application, banks can use it as a reference for adjusting the odds output by their own scoring model as shown in Table 5.

Applying the same application principles as depicted in Fig. 1, if the odds output by a bank's own scoring model (horizontal) is added with the JCIC odds output (vertical) and undergoes grading, joint odds corresponding to each grade are generated. The bank can utilize these JCIC score-adjusted odds to undertake more precise pricing.

The generation of joint odds requires more discussion and closer collaboration between the bank and JCIC. JCIC also offers a Data Research Service Platform for actual data comparison and testing or further collaboration.

Table. 5 Application of JCIC Score : Risk-based Pricing
Quantification of risk exposure incorporated with JCIC score-
Joint Odds

Example JCIC Score

Bank Score

	300以下	301–380	381–460	461–540	541–620	621–700	701–780	780以上
300以下	15	21	29	35	41	42	48	50
301-380	22	29	34	65	75	80	95	201
381-460	31	35	68	89	99	151	169	235
461-540	52	68	97	121	142	168	181	256
541-620	72	89	111	135	149	189	214	278
621-700	101	123	130	157	171	191	253	281
701-780	121	135	147	168	189	198	261	289
780以上	137	142	149	188	202	251	185	290

This example is designed for explanation purpose. It is not a real case, nor a recommendation or containing real figures.

6. Conclusion

JCIC's consumer credit score aims to enhance the transparency of credit information as well as the efficiency of data acquisition and use so as to promote the mutual benefits and benign interaction between credit providers and credit recipients. With the JCIC consumer credit score, member institutions can undertake:

(1) Risk management: To reduce loss and increase profit

- For all banks: The JCIC score can be used as a tool for risk segmentation and grading for the reference of loan approval, pricing, asset quality management and monitoring.
- For banks with internal model: Aside from the fu

developed their own internal rating system, the availability of external information helps them carry out risk segmentation and risk management to a certain extent. That is, banks that adopt Standardized Approach by the criteria of the supervisor is more akin to IRB in actual practice, while IRB banks can become more precise in risk segmentation and risk quantification, and carry out benchmarking for the validation of their internal model. To sum up, the credit scoring product furnished by JCIC as an external information provider should be an indispensable and effective tool for bank's risk management.