

Research Article

The Impact of Basel II Regulations on Firms' Access To Credit: Empirical Evidence From Asian Countries

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Abstract

This study evaluates the impact of Basel II on corporate credit access based on credit ratings, using panel data of 1,295 firms across 17 Asian countries from 2004-2015. System GMM estimation results show that after Basel II implementation, firms with high credit risk (rated BB- and below) experienced a 19.94%-23.30% reduction in credit access compared to higher-rated firms. The study also finds that factors such as operating cash flow, financial leverage, and revenue size significantly impact firms' borrowing decisions in the Basel II context. Based on these findings, the author proposes policy implications including establishing a government credit guarantee system, adjusting risk weights appropriate to Asian market characteristics, reforming the credit rating system, and encouraging banks to develop internal risk assessment capabilities.

Keywords

Basel II, credit ratings, System GMM, corporate credit access

1. Introduction

Globally, the implementation of Basel II has created significant changes in bank lending behavior and corporate credit access, as evidenced by numerous empirical studies in developed economies. For instance, Hasan et al. (2015), using data from global banks across 52 countries, found that bank capital flows from G-10 countries became significantly more sensitive to credit rating changes after Basel II, with banks sharply reducing lending to customers with increasing risk levels. In European markets, Fraisse et al. (2020) discovered that a one percentage point increase in capital requirements reduced lending by 2.3% to 4.5% in France, while Benetton et al. (2021) confirmed that risk-weighted capital requirements

one point lower led to an average reduction in lending rates of 10-16 basis points in the United Kingdom.

International research also indicates that Basel II's impact extends beyond lending volume to deeply affect corporate financial structure and investment decisions. Gopalakrishnan et al. (2021), in their study of 52 countries, showed that low-rated firms faced a decline in debt financing ranging from 2.11% to 5.39% of total assets after Basel II, forcing them to reduce capital investment intensity by 2.17% to 7.22%. Similarly, according to a U.S. Chamber of Commerce survey, due to Basel II regulatory changes, most firms experienced financial difficulties and nearly one-fifth had to postpone or

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cancel planned investments. Even large companies like Noble Energy warned shareholders in their 2013 Annual Report that "traditional lending methods may change, leading to more limited access to capital or reduced ability to provide capital at favorable interest rates and terms."

Recent studies have highlighted the differential impacts of Basel II according to firm characteristics and market conditions. Hasan et al. (2021) found that banks responded to credit rating downgrades by reducing loan maturity and increasing collateral requirements, while Drago and Gallo (2017) showed that credit rating downgrades led to significant increases in lending spreads. In Bangladesh, Zheng et al. (2023) confirmed that Basel II had an inverse effect on credit risk with coefficients ranging from -0.002 to -0.016. This evidence suggests that Basel II has created a new mechanism in bank-firm relationships, where credit ratings have become a decisive factor in corporate access to capital.

This study is conducted to evaluate the impact of the Basel II Accord's credit rating regulations on corporate access to credit. Following the introduction, the theoretical foundation will be presented in Section 2. Section 3 will present the research methodology. Research results will be presented in Section 4. Finally, policy implications will be proposed by the author in Section 5.

2. Theoretical Foundation

Access to bank credit is one of the key factors determining a firm's ability to grow and develop, especially in Asian emerging economies where capital markets are not fully developed and firms rely heavily on bank financing (Allen et al., 2005). The implementation of Basel II, requiring banks to use credit rating systems in risk assessment and minimum capital calculation, has created fundamental changes in how banks make lending decisions. Information asymmetry theory (Akerlof, 1970; Stiglitz and Weiss, 1981) explains that in credit markets, banks do not have complete information about borrowers' true quality, leading to adverse selection and credit rationing. Credit ratings play an important role as a signal to reduce this information asymmetry by providing standardized assessments of firms' repayment capacity. With Basel II implementation, as credit ratings are directly linked to banks' capital requirements, their role as a screening mechanism becomes more important than ever. Firms with low ratings, reflecting high risk and poor information transparency, will therefore face greater difficulties in accessing bank credit.

Basel II theory on bank credit establishes a framework in which capital requirements are calculated based on asset risk, with credit ratings playing a central role in determining risk weights (Basel Committee on Banking Supervision, 2006). Under these regulations, a loan to a highly-rated firm requires banks to maintain significantly less capital than a similar loan

to a low-rated firm, creating differential opportunity costs between loan types. Bank capital theory explains that when capital requirements increase, banks tend to adjust their asset portfolios toward risk reduction to optimize capital use rather than raise expensive additional capital. This leads to a "sorting effect" where banks concentrate credit on low-risk customers and restrict lending to firms with low credit ratings.

Empirical studies have provided strong evidence of Basel II's impact on credit access based on credit ratings. Gopalakrishnan et al. (2021), studying 3,129 firms across 52 countries, found that debt financing for low-rated firms (B+ and below) decreased by 2.11% to 5.39% of total assets after Basel II compared to highly-rated firms, while capital investment intensity for this group also decreased by 2.17% to 7.22%. Fraisse et al. (2020) in France demonstrated that when risk-weighted capital requirements increased by one percentage point, lending volume decreased by 2.3%-4.5%, leading to a 1.1% decrease in fixed assets, 2.7% decrease in investment expenses, and 0.8% decrease in employment at affected firms. Gropp et al. (2019), studying European banks, showed that banks handled higher capital requirements by reducing risk-weighted assets, leading to reduced lending to both firms and individual customers, causing firms heavily dependent on bank credit to have lower growth rates in assets, investment, and sales.

Based on information asymmetry theory, credit rating theory, Basel II regulatory theory, and bank capital theory, along with empirical evidence from developed and Asian markets, there is a solid foundation to expect that Basel II has created clear differentiation in credit access based on credit ratings. Low-rated firms are expected to face greater difficulties as banks must maintain higher capital for high-risk loans, creating incentives to restrict lending or apply stricter conditions to this group. Conversely, highly-rated firms benefit from improved access as banks actively seek quality customers to optimize capital use. Therefore, the author proposes the following hypothesis:

Hypothesis: Firms with higher credit risk have lower access to credit in the post-Basel II period compared to the pre-Basel II period, while firms with lower credit risk have higher access to credit in the post-Basel II period.

3. Research Methodology

3.1. Research Model

The author develops a model based on the studies of Gopalakrishnan et al. (2021). The specific model is as follows:

$$Y_{it} = \beta_0 + \beta_1 Post_Basel\ II_j * HCC\ firm_{it-1} + \sum_k \alpha_k \times X_{it,k} + \varepsilon_{it} \quad (1)$$

where i denotes country i , t denotes year t . $HCC\ firm_{(it-1)}$

is a dummy variable representing firm i's credit rating in the previous year (t-1), this variable takes the value of 1 for firms with Standard & Poor's credit ratings of BB- and lower, and 0 for firms with credit ratings from BB to AAA. Post_Basel II_j is a dummy variable taking the value of 1 for all years after firm j is subject to Basel II credit rating regulations, and 0 for remaining years. X represents control variables representing characteristics of sample firms.

To test the hypothesis, the author uses the dependent variable Y_{it} as the change in firms' debt-to-total-assets ratio Δ_{debt_it} . The impact of Basel II credit rating regulations on corporate access to credit is evaluated through coefficient β_1 . Specifically, if this coefficient is negative and statistically significant, then Basel II credit rating regulations will impact corporate access to credit. In this case, firms with higher credit risk (i.e., credit ratings at BB- and lower) will have more difficulty accessing bank loans than other firms after implementing Basel II credit rating regulations.

Other control variables and the basis for including these variables in the model are presented in the following table:

Table 1. Description of Control Variables in the Research Model

Variable Name	Measure ment	Variable Symbol	Basis for Including Variable
Total Revenue	Logarithm (Net Revenue)	log_sales	Gopalakrishnan et al. (2021)
Firm Size	Logarithm (Total Assets)	log_asset	
Operating Cash Flow to Total Assets	"Operating Cash Flow" / "Total Assets"	op_cashflow_asset	
Ratio of Total Liabilities to Book Value of Equity	"Total Liabilities" / "Book Value of Equity"	leverage	
Ratio of Market Value of Equity to Book Value of	"Market Value of Equity" / "Book Value of Equity"	m_b	

Equity			
Fixed Assets to Total Assets	"Fixed Assets" / "Total Assets"	tangibility	
EBITDA to Total Assets	"EBITDA" / "Total Assets"	ebitda_asset	

Source: Author's compilation

3.2. Estimation Method

In this study, the author first estimates model (1) using the fixed effects method. Then, the author tests for endogeneity among variables in the model. In the case of endogeneity, the author continues using the System Generalized Method of Moments (SGMM) developed by Blundell and Bond (1998) to estimate the model. The SGMM method is one of the advanced and popular estimation methods in corporate finance research when working with dynamic panel data. The study employs the System Generalized Method of Moments (SGMM) developed by Blundell and Bond (1998) to estimate the model. The SGMM method is one of the most advanced and widely adopted estimation techniques in corporate finance research when working with dynamic panel data. This method effectively addresses potential endogeneity problems arising from the correlation between explanatory variables and the error term, as well as unobserved heterogeneity across firms. SGMM combines both difference and level equations, utilizing lagged levels of variables as instruments for the differenced equations and lagged differences as instruments for the level equations, thereby improving estimation efficiency compared to the traditional difference GMM approach.

The SGMM estimator is particularly suitable for this research context for several important reasons. First, it allows us to control for firm-specific fixed effects that may be correlated with the explanatory variables, which is crucial when examining corporate financing decisions. Second, the method effectively handles the dynamic nature of trade credit decisions, as current financing choices are likely influenced by past financing patterns. Third, SGMM performs well in panel datasets with a large number of firms ($N=1,295$) and a relatively short time dimension ($T=12$ years), which characterizes the sample structure. Finally, the validity of the SGMM estimation can be rigorously tested through standard diagnostic tests including the Arellano-Bond test for serial correlation and Hansen's J-test for overidentifying restrictions.

3.3. Research Data

The study limits corporate borrowing activities to borrowing from commercial banks. Additionally, the study uses panel data of 1,295 firms across 17 Asian countries including Indonesia, Thailand, Philippines, Singapore, Malaysia, India, China, Hong Kong, Japan, Sri Lanka, Taiwan, Turkey, Saudi Arabia, United Arab Emirates, Israel, Kuwait, and Oman. In reality, the author filtered data from firms in 45 Asian countries from Thomson Reuters' Worldscope database. However, due to limited disclosure of firm rating data, the author could only collect data from the 17 aforementioned countries. Nevertheless, with 1,295 firms, the research sample size is sufficiently large with 9,423 observations.

4. Results and Discussions

4.1. Descriptive Statistics

The study uses panel data of 1,295 firms across 17 Asian countries including Indonesia, Thailand, Philippines, Singapore, Malaysia, India, China, Hong Kong, Japan, Sri Lanka, Taiwan, Turkey, Saudi Arabia, United Arab Emirates, Israel, Kuwait, and Oman. Descriptive statistics results are presented in Table 2 below.

Table 2. Descriptive Statistics

Variables	Observations	Mean	Std. Dev.	Minimum	Maximum
m_b	9,423	1.807	5.168	-105.686	380.895
log_sales	9,423	14.465	1.612	8.492	19.444
log_asset	9,423	14.878	1.492	9.547	20.142
op_cashflow_asset	9,423	0.071	0.055	-1.313	1.165
ebitda_asset	9,423	0.048	0.088	-4.677	1.013
interest_cost	9,404	0.033	0.133	0.000	9.585
accounts_receivable_assets	9,423	0.107	0.089	0.000	0.725
accounts_payable_assets	9,423	0.273	0.331	0.000	15.584
leverage	9,423	0.956	1.443	-61.254	65.955
tangibility	9,423	0.331	0.206	0.000	0.937

Source: Calculated from STATA 18.0 software

Descriptive statistics results show that the research sample has diversity in size and financial characteristics of firms. The mean value of accounts payable to total assets (accounts_payable_assets) is 0.273 (equivalent to 27.3%), with a fairly high standard deviation of 0.331, indicating significant differences in the use of trade credit among firms. Accounts receivable to total assets (accounts_receivable_assets) has a mean value of 0.107 (equivalent to 10.7%), lower than accounts payable, indicating that on average, sample firms are net beneficiaries of trade credit.

The average financial leverage of sample firms is 0.956, indicating that total liabilities are nearly equal to the book value of equity. The market-to-book ratio (m_b) has a mean value of 1.807, above 1, indicating that the market values sample firms higher than their book value. Operating cash flow to total assets (op_cashflow_asset) averages 0.071 (7.1%), indicating moderate cash generation capacity from business operations.

4.2. Hypothesis Testing Results

The author estimates the model with the dependent variable being the change in firms' debt-to-total-assets ratio (Delta_debt_it). Fixed effects estimation results are presented in Table 3. Column (1) presents estimation results with only one independent variable, Post_Basel II_j $\times$ HCC firm_(it-1), during the period 2 years before and 2 years after Basel II implementation. The regression coefficient for this variable is -0.0311 and is statistically significant at the 1% level, meaning that after implementing Basel II regulations, high-risk firms will experience a reduction in their debt-to-total-assets ratio. Column (2) presents model estimation results with control variables included. Specifically, with control variables included, the regression coefficient for Post_Basel II_j $\times$ HCC firm_(it-1) is adjusted down to -0.0163 and is statistically significant at the 5% level. Next, the author estimates the model with the full sample from 2004 to 2015. Estimation results are presented in column (3), where the regression coefficient for Post_Basel II_j $\times$ HCC firm_(it-1) remains negative at -0.0204 and is statistically significant at the 1% level.

Table 3. Model Estimation with Dependent Variable: Change in Firms' Debt-to-Total-Assets Ratio

Variables	Sample from (t-2) to t+2		Full Sample
	(1)	(2)	(3)

Post_Basel II_j × HCC firm_(it-1)	-0.0311***	-0.0163**	-0.0204***
log_sales		-0.0400***	-0.0782***
log_asset		0.2178***	0.1317***
leverage		0.0036**	0.0031**
op_cashflow_asset		-0.4817***	-0.2784***
m_b		0.0092***	-0.0007**
tangibility		-0.3643***	0.0040
ebitda_asset		0.0645**	0.2580***
Constant	0.0247***	-2.5107***	-0.7981***
Year Fixed Effects	Yes	Yes	Yes
Firm Fixed Effects	Yes	Yes	Yes
Observations	3,555	3,555	7,545

***, **, * correspond to significance levels of 1%, 5%, and 10%

Source: Calculated from STATA 18.0 software

Next, the author tests for endogeneity of variables in the model. Test results are presented in the following table:

Table 4. Endogeneity Test

Variable	Durbin	p_value
Post_Basel II_j × HCC firm_(it-1)	1.08981	0.2965
log_sales	462.059	0.0000
log_asset	3477.13	0.0000
leverage	67.8769	0.0000
op_cashflow_asset	216.781	0.0000
m_b	45.1003	0.0000
tangibility	2.77839	0.0955
ebitda_asset	0.198989	0.6555

Source: Calculated from STATA 18.0 software

Table 4 shows that log_sales, log_asset, leverage, op_cashflow_asset, and m_b are endogenous variables at the 1% significance level. Therefore, to address endogeneity, the author continues using the SGMM estimation method. Estimation results are presented in the table below:

Table 5. Model Estimation with Dependent Variable: Change in Firms' Debt-to-Total-Assets Ratio Using SGMM Method

Dependent Variable	Delta_debt	
	Sample from (t-2) to t+2	Full Sample
Post_Basel II_j × HCC firm_(it-1)	-0.1994***	-0.2330*
log_sales	-0.3077*	-0.1826***
log_asset	0.0383	0.0704
leverage	-0.0136**	-0.0107*
op_cashflow_asset	-1.8359***	-1.5476***
m_b	-0.0286	-0.0037***
tangibility	-0.1606	-1.6042**
ebitda_asset	1.2523***	0.9655**
Constant	4.1382*	2.2725*
F-test p-value	0.000	0.000
AR(1) p_value	0.000	0.000
AR(2) p_value	0.810	0.858
Hansen's Test p-value	0.772	0.693
Number of groups	881	1,246
Number of instruments	11	11

Symbols *, **, *** correspond to significance levels of 10%, 5%, 1%.

Source: Calculated from STATA 18.0 software

Model estimation results in Table 5 show that F-test p-values are less than the 1% statistical significance level, indicating that all models are appropriate. AR(1) tests for all models have p-values less than the 1% statistical significance level, meaning all instrumental variables are correlated with the instrumented variables. AR(2) tests for all models have p-values greater than the 10% statistical significance level, meaning instrumental variables are not correlated with residuals. Additionally, Hansen tests for all models have p-values greater than the 10% statistical significance level, meaning instrumental variables are not excessively used. Finally, the number of instrumental variables in all models is

less than the number of groups. Thus, parameter estimates using the SGMM method ensure reliability.

Model estimation results for the period 2 years before and 2 years after Basel II implementation show that the regression coefficient for $\text{Post_Basel II}_j \times \text{HCC firm}_{(it-1)}$ is -0.1994 and is statistically significant at the 1% level. Additionally, for the full sample from 2004-2015, the regression coefficient for $\text{Post_Basel II}_j \times \text{HCC firm}_{(it-1)}$ is -0.2330 and is statistically significant at the 10% level. Thus, SGMM method estimation results show that after implementing Basel II regulations, high-risk firms experience a reduction in their debt-to-total-assets ratio. This result supports hypothesis H1. Moreover, this result is consistent with findings in recent studies by Fraisse et al. (2020) and Gropp et al. (2019).

Additionally, firm revenue size ($\log_sales$) has a negative coefficient with statistical significance in both models: $\beta = -0.3077$ ($p < 0.10$) in the restricted sample and $\beta = -0.1826$ ($p < 0.01$) in the full sample. This result indicates that firms with larger revenue size tend to reduce their debt ratio. Specifically, when revenue size (measured in natural logarithm) increases by one unit, the change in debt ratio decreases by an average of 0.1826 to 0.3077 units, depending on the research sample. This finding can be explained by the fact that larger firms typically have more abundant retained earnings and better internal cash flow generation capacity, therefore less need to increase bank borrowing. This is consistent with pecking order theory, where firms prioritize using internal capital before seeking external financing (Myers, 1984). Furthermore, large firms have better access to direct capital markets (issuing bonds, stocks), reducing dependence on traditional bank credit.

Asset size ($\log_asset$) has a positive coefficient but is not statistically significant in both models ($\beta = 0.0383$, $p = 0.688$ and $\beta = 0.0704$, $p = 0.406$). This indicates that when controlling for other factors, asset size does not have a clear impact on firms' debt changes. The difference in impact between $\log_sales$ and $\log_asset$ suggests that revenue generation capacity (measuring business operations and cash flow) is more important than static asset size in determining firms' debt policy.

Financial leverage has a negative coefficient with statistical significance: $\beta = -0.0136$ ($p < 0.05$) in the restricted sample and $\beta = -0.0107$ ($p < 0.10$) in the full sample. This result shows that firms with higher debt-to-asset ratios tend to reduce the rate of debt increase in the future. Specifically, when leverage increases by one unit, the change in debt ratio decreases by approximately 0.0136 to 0.0107 units. This finding reflects two important mechanisms: First, highly leveraged firms have approached their debt capacity limit, making it difficult to continue increasing debt without degrading credit ratings or increasing capital costs. This is consistent with trade-off theory, where firms balance the benefits of tax shields from debt and financial distress costs.

Second, banks may apply more cautious policies toward highly leveraged firms, especially in the Basel II context requiring stricter credit risk assessment.

Operating cash flow to assets ($op_cashflow_asset$) has a negative coefficient with very high statistical significance: $\beta = -1.8359$ ($p < 0.01$) in the restricted sample and $\beta = -1.5476$ ($p < 0.01$) in the full sample. This variable has the strongest impact magnitude in the model. Results show that firms with better operating cash flow tend to significantly reduce new borrowing. Specifically, when operating cash flow to assets increases by one unit (equivalent to 100 percentage points), the change in debt ratio decreases from 1.5476 to 1.8359 units. This finding is completely consistent with pecking order theory, where firms prioritize using internal capital (cash flow from business operations) before seeking external debt financing due to lower information asymmetry costs (Myers and Majluf, 1984). Firms with abundant internal cash flow do not need to rely on bank borrowing to finance operations and investments, thus reducing the rate of debt increase.

Operating profit to assets ($ebitda_asset$), conversely, has a positive coefficient with statistical significance: $\beta = 1.2523$ ($p < 0.01$) in the restricted sample and $\beta = 0.9655$ ($p < 0.05$) in the full sample. This result shows that firms with higher profitability (measured by EBITDA) tend to increase borrowing more. This result seems contradictory to the negative impact of operating cash flow. However, this difference can be explained as follows: EBITDA reflects potential profitability and operational efficiency of firms, while operating cash flow reflects actual available cash. Firms with high EBITDA show good business prospects and strong debt repayment capacity, making it easier to obtain bank loan approvals and proactively increase leverage to finance growth opportunities. Conversely, firms with high actual cash flow can self-finance without additional borrowing. This result is also consistent with research by Frank and Goyal (2003), showing that profitability can have a two-way impact on capital structure: on one hand reducing external financing needs (pecking order effect), on the other hand increasing borrowing capacity and motivation to use tax shields (trade-off effect).

Market-to-book ratio (m_b) has a negative coefficient: $\beta = -0.0286$ (not statistically significant, $p = 0.364$) in the restricted sample and $\beta = -0.0037$ ($p < 0.01$) in the full sample. In the full sample, statistically significant results show that firms with high m_b ratios (valued highly by the market relative to book value) tend to slightly reduce the rate of debt increase. This may reflect the fact that firms with high growth potential (high m_b) prioritize using equity capital over debt to avoid financial constraints and maintain investment flexibility.

Fixed assets to total assets (tangibility) has a negative coefficient: $\beta = -0.1606$ (not statistically significant, $p = 0.836$) in the restricted sample and $\beta = -1.6042$ ($p < 0.05$) in the full

sample. Results in the full sample show that firms with more tangible assets tend to reduce the rate of debt increase. This is contrary to traditional theoretical expectations that high tangible assets facilitate borrowing because they can be used as collateral. However, the negative result can be explained by the specificity of Asian economies, where firms with many fixed assets (typically traditional manufacturing firms) had high debt levels in the past to invest in fixed assets, so during the research period they are in a debt repayment cycle and reducing leverage. Conversely, firms with few tangible assets (services, technology) may be in a growth phase and need more borrowing. This result is consistent with some recent studies on emerging markets.

5. Policy Implications

Based on empirical research results showing that Basel II has created significant impacts on Asian firms' credit access - especially high credit risk firms experiencing a 19.94%-23.30% reduction in credit access. Based on research results, the author proposes important policy implications aimed at minimizing negative impacts and increasing firms' capital access in the context of implementing international bank risk management and capital standards.

First, regulatory agencies need to consider establishing a government credit guarantee system to mitigate bank risk when lending to firms with low credit ratings or without official ratings. A National Credit Guarantee Fund should be established to partially guarantee risk for loans to small and medium enterprises, startups, and firms in priority development sectors. The guarantee mechanism can cover 50% to 70% of loan value, helping reduce Basel II risk weights from 100-150% to 50-75%, thereby significantly reducing bank capital requirements and creating lending incentives. Guarantee fees should be partially subsidized by the state budget to ensure overall costs remain competitive and do not excessively increase the financial burden on firms struggling with credit access.

Parallel to developing the guarantee system, policymakers need to study adjusting risk weights appropriate to Asian market characteristics, where many firms have good quality, stable revenue, and good payment history but lack official credit ratings due to immature rating systems. Central banks can propose to the Basel Committee flexible risk weights for small and medium enterprise groups meeting specific criteria such as stable revenue over the past three years, low non-performing loan ratios, and adequate collateral assets. Building a simplified risk classification system based on actual transaction data rather than relying solely on formal credit ratings will more accurately reflect actual risk and facilitate small firms' credit access.

Another important priority is comprehensive reform of the

credit rating system, as research results show that most credit access problems stem from lacking official ratings or having low ratings. Asian countries should consider mandatory credit rating for medium-sized and larger firms, similar to current independent audit requirements. The state can financially support 50% to 70% of rating costs for firms undergoing first-time rating with reputable organizations, to encourage and facilitate firm access to this service. Simultaneously, it is necessary to build and recognize a national credit rating system led by state agencies with standardized, transparent methodology applicable broadly to all firms borrowing from banks. Encouraging development of domestic rating organizations through favorable licensing procedures, supporting high-quality human resource training, and promoting cooperation with international rating organizations for technology transfer is a sustainable direction to improve credit rating service quality and coverage.

Finally, commercial banks need to proactively invest in developing internal risk assessment capabilities and gradually transition from standardized approaches to advanced internal rating approaches to more accurately differentiate risk among customers. Applying internal rating methods allows banks to leverage information advantages from long-term customer relationships, assess risk based on actual data on cash flows, transaction history, and industry understanding, thereby applying lower risk weights to good quality customers even without official external ratings. However, building internal rating systems requires large investments in technology, data, and human resources, so small banks can consider cooperating or using common technology solutions developed by banking associations or central banks.

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