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RISKINESS OF BRIC BANKS IN A RISKY WORLD

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I.
INTRODUCTION

The ongoing global financial crisis has caused great turmoil in the banking sector worldwide and risk in this sector has increased significantly. A number of famous banks, once considered safe, either collapsed (e.g., Lehman Brothers) or restructured (e.g., CITI Group and the Royal Bank of Scotland) as a result of the severe macroeconomic downturn and these banks' excessive risk-taking in the years before the crisis. Undoubtedly, the failure of a major bank adds greatly to the risk in a financial market and causes serious consequences for an economy. Therefore, it has become a critical issue to thoroughly assess the riskiness of the world's major banks.

The most dramatic change in the worldwide banking industry in the post-crisis era is the rise of the emerging market (EM) banks. While most of the developed world is still struggling to recover from the global banking crisis, the banking sector in the EMs, represented by Brazil, Russia, India, and China (BRIC), was relatively less affected and so fewer cases of major bank failures have occurred in BRIC than in the developed world. Consequently, the importance of the EM banks in the global banking system has been increasing rapidly. Among the top 100 banks globally, 44% were EM banks in 2011, while the corresponding numbers were 21% and 30% in 2002 and 2007, respectively, according to Bloomberg. Historically speaking, however, EMs were more vulnerable to a banking crisis and their banks were riskier than those in the developed countries. In the 40 years until 2008, more than 95% of the banking crises occurred in EMs (Laeven & Valencia, 2008). Interestingly, a systemic banking crisis has not happened in BRIC in the past 10 years and their major banks have performed relatively well during the global financial crises (Qu, 2011).

Have the major BRIC banks become safer in the recent years? What are the major factors that explain the riskiness of these banks? Looking ahead, how can the BRIC banks become more stable in a risky world? This study aims to shed some light on these important questions. In the next section, we focus on the systemically important banks in each BRIC country and closely examine their risk profile from 2003 to 2010. In the third section, we expand our sample to include 142 major BRIC banks and investigate the impact of macroeconomic conditions (e.g., economic growth, financial development, etc.) and bank characteristics (e.g., size, capital structure, etc.) on the risk-taking of these banks. We offer our conclusion in Section 4.

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II.
RISKINESS
OF THE TOP BRIC
LENDERS

In the banking system of a country, some banks are deemed systemically important since their failure could cause serious consequences for the economy. To gauge the systemic importance of a bank in a banking system, size is obviously a key measure since a large bank's failure is more likely to damage the overall economy and the financial system as that bank engages in a large number of financial activities that may not be easily replaced by other financial institutions.

We rank the BRIC banks according to their total assets and single out the banks with a market share of more than 10% in each country. We then combine these banks with the list of systemically important banks proposed by the Basel Committee on Banking Supervision in a consultative document in 2011.[1] This results in a list of 12 BRIC banks (three from Brazil, two from Russia, three from India, and four from China) that are systemically important. In this section, we examine the riskiness of these 12 top BRIC lenders and focus on their risk profile from 2003 to 2010.

Generally speaking, a bank faces various risks (e.g., interest rate, market, credit, liquidity, etc.), and these risks can be measured in different ways. Our analysis emphasizes assessing the banks' insolvency risk since it is the outcome of many other aspects of a bank's risks and thus a comprehensive measure of a bank's riskiness. In addition for some simple indicators of risk (e.g., non-performing loan (NPL) ratio, loan loss reserves, capital adequacy, etc.), we use the Z-score as the primary measure of a bank's insolvency risk. As a well-established and widely used measure,[2] the Z-score shows the distance to default for a bank and is calculated as the number of standard deviations that a bank's rate return on assets (ROA) has to fall for the bank to become insolvent. Specifically, Z-score = $(ROA+CAR)/\sigma(ROA)$, where ROA is the mean rate of return on assets and CAR is the mean equity-to-assets ratio. $\sigma(ROA)$ is the standard deviation of ROA. A higher Z-score implies more stability and lower insolvency risk.

TOP LENDERS IN BRAZIL

Brazil's three systemically important banks are Banco do Brasil, Itau Unibanco Holdings, and Banco Bradesco with market shares (by asset holdings) of 10.44%, 9.72%, and 8.2%, respectively. In general, these three Brazilian lenders have had strong financial performances in the recent years with a return on average equity (ROAE) of 20.15%, 22.31%, and 21.39%, respectively in 2010. All three banks are well capitalized with tier one capital ratios well above the minimum regulatory requirement (11%, 11.8%, and 13.1%, respectively).

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[1] The assessment of the systemic importance of a bank by the Basel Committee on Banking Supervision is based on five categories of indicators: cross-jurisdictional activities, size, interconnectedness, substitutability, and complexity, with equal weight on each category.
[2] Refer to Laeven and Levine (2009), Demirguc-Kunt and Huizinga (2010), and Houston et al. (2010) for a detailed discussion of the Z-score measure.

Table 1 presents the basic risk indicators for these banks in 2010. In terms of the loan quality (credit risk) and the overall insolvency risk as measured by the Z-score, Banco do Brasil stands out as the safest bank among the group with the lowest NPL ratio (3.66%), the highest loan loss reserves relative to NPLs (1.39), and the highest Z-score value. The trend of the bank's Z-score during the past five years is plotted in Figure 1, showing low insolvency risk and increased stability over time. In September 2008, the state-owned bank absorbed Banco do Estado de Santa Catarina, which made it the largest lender in Brazil. One warning signal from examining its risk profile, though, is the rapid expansion of its loan portfolio. In the past seven years, the size of its loan portfolio increased 25.5% annually. While this rapid expansion of loans helped to deliver a relatively high average return to equity of 22.53% per annum for the bank in the past eight years, it is likely that the quality of its loan portfolio and its financial performance will decline in the next few years since rapid credit expansion is usually associated with worsening loan quality (Foos et al., 2010). For instance, the bank's residential mortgage loans more than doubled in 2010 on the basis of 2009, which subjects the bank to the increased credit risk exposure to the real estate sector. The annual growth rate of its consumer loans (and other retail loans) was as high as 39.8% from 2005 to 2010. However, at the same time, consumer defaults hit a 12-month high in June 2011, according to a Bloomberg report.

Similar to Banco do Brasil, Itau Unibanco Holdings and Banco Bradesco have had strong financial performances in the recent years. Their av-

| TABLE 1. RISK INDICATORS OF THE TOP BRAZILIAN LENDERS (2010)				
		Banco do Brasil	Itau Unibanco Holdings	Banco Bradesco
Credit quality	NPL ratio	0.0366	0.1056	0.0754
	Loan loss reserves/ NPLs	1.3858	0.7129	0.937
	Growth rate of total loans (average 2008–2010)	0.3142	0.1209	0.2063
Liquidity	Deposits & short term funding /total asset	0.6786	0.5817	0.6059
	Loans/deposits & short term funding	0.6180	0.6254	0.5549
Bank solvency	Tier one capital ratio	0.11	0.118	0.131
	Z-score (natural log)	4.09	3.00	3.51
Whether systemically important bank as identified by the Basel Committee (consultative document in 2011)		Yes	Yes	Yes

NOTE: NPL (Non-performing loan); Tier one capital ratio is the ratio of a bank's core equity capital to its total risk-weighted assets (RWA); Z-score is a measure of a bank's insolvency risk and is calculated as: Z-score = (ROA+CAR)/σ(ROA), where ROA is the mean rate of return on assets and CAR is the mean equity-to-assets ratio. σ(ROA) is the standard deviation of ROA. SOURCE: Bankscope and author's calculations.

erage annual ROAE was 26.44% and 22.79%, respectively, since 2003. The growth rates of their asset portfolios (34.3% and 20.59% per annum, respectively) was even faster than that of Banco do Brasil, and their loans to consumers (and other retail loans) grew annually by 40.6% and 29.46%, respectively, during the same period.

Unlike the state-owned Banco do Brasil, both Itau Unibanco Holdings and Banco Bradesco are privately owned banks and their stability measures were consistently below that of the Banco do Brasil from 2006 to 2010 (Figure 1), especially in the case of Itau Unibanco Holdings, which has a Z-score value (natural log) at about 75% of that of the Banco do Brasil. The reason is primarily the greater concerns about the quality of their asset portfolios (and therefore their future financial performance). The ratio of NPLs to gross loans was 10.56% for Itau Unibanco Holdings and 7.54% for Banco Bradesco in 2010, or well above that of the Banco do Brasil. On July 11, 2011, Itau Unibanco Holdings raised its default-rate forecast for 2011 to between 4.5% and 4.6% from its previous

Put together, the three systematically important Brazilian banks showed enhanced financial stability from 2006 to 2010

FIGURE 1. Stability (natural log value of Z-score) of the Top Brazilian Lenders

Banco do Brasil ---- 　Itau Unibanco Holdings ──── 　Banco Bradesco ────
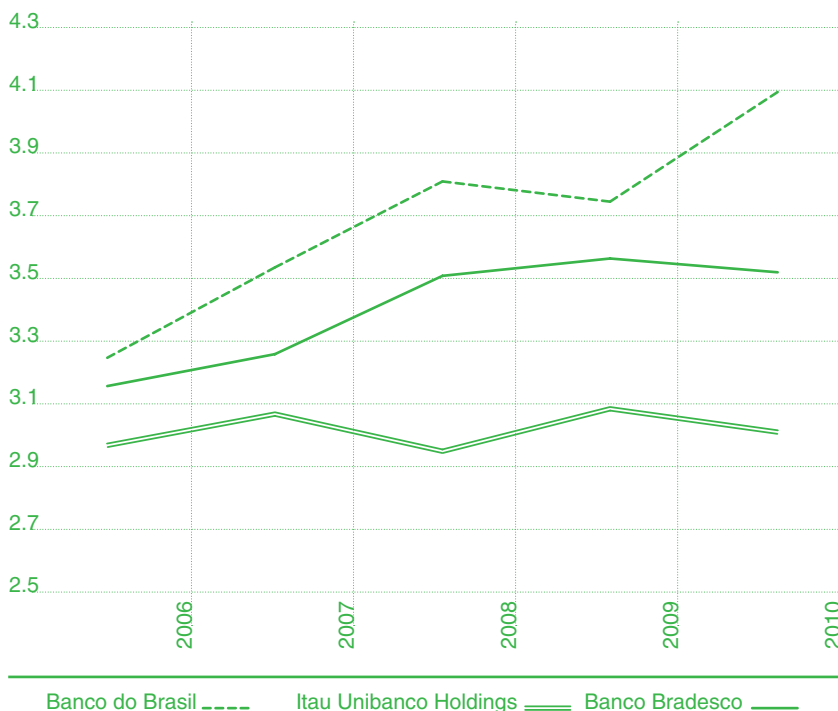
Source: Bankscope and author's calculations.

forecast of 4.2% to 4.5%. The worry for the future performance of this bank is well reflected in its share price, which tumbled 25.49% in 2011, helping to drag down the MSCI Brazil Financials Index by 19% in local currency terms (Bloomberg, 2011).

Put together, the three systematically important Brazilian banks showed enhanced financial stability from 2006 to 2010 (Figure 1), helped by the strong economy of Brazil and a booming commodity market during the same time period. How do these banks compare to other banks in the region (South and Central America)? We identified a group of 10 commercial banks with comparable sizes by matching their total assets. Since the top Brazilian lenders are also the largest commercial banks in the region, the peer group of banks actually includes the 10 largest banks in South and Central America with eight of them being Brazilian banks. The comparison shows that the three top Brazilian lenders are much bigger than an average bank in the peer group and thus have a significantly greater impact on the regional banking market (Appendix, Table 1). In other words, the systemic importance of the top Brazilian lenders may go well beyond the borders of Brazil and expand at least into the banking markets of South and Central America, although their global impact may still be limited. Another interesting finding from the comparison is that the capital adequacy of the top Brazilian lenders, as measured by the equity to total assets ratio, is significantly lower than that of the peer group. This may indicate that the top Brazilian lenders have been more aggressive in making loans and taking more risks compared to their smaller peers in the same region.

TOP LENDERS IN RUSSIA

The two systemically important lenders in Russia are the Sberbank of Russia and VTB Bank, accounting for 23.54% and 11.71%, respectively, of the overall banking assets of the country in 2010. Both are state-owned banks with respective direct government ownership of 57.58% (via the Central Bank of the Russian Federation) and 85.5% (via the Federal Property Agency). Being the major government-sponsored banks in Russia, they have enjoyed certain advantages compared to other non-state-owned Russian banks. For instance, Sberbank is the only bank in Russia that benefits from a government guarantee on deposits. Compared to other banks, both the Sberbank and the VTB bank have relatively cheap and stable household deposits and can quickly access government funds for financing, which allows them to hold less excess liquidity (Table 2). On one hand, this strong affiliation with the state could enhance the profitability and stability for these two banks. On the other hand, they must serve some government agendas, including bailing out other smaller banks that are in financial trouble at the government's request. Consequently, the riskiness of these banks

reflects not only their own strategic choices regarding risk-taking but also the soundness of the whole banking sector in Russia.

Table 2 shows some basic risk indicators of these two banks in 2010. As the largest and most prestigious lender in Russia and Eastern Europe, the Sberbank of Russia shows better loan quality, more prudent loan loss provisioning behavior, and higher stability (or lower insolvency risk) than the VTB bank. In the past eight years, the average annual growth rate of Sberbank's loan portfolio reached 36.2%, despite a moderate setback in its expansion during the 2007–2008 global financial crisis. In 2010, it posted a healthy ROAE of 19.2%, which allowed the bank to make an early repayment of Rub200 billion (out of Rub500 billion) in subordinated credits that it had received from the government during the crisis. The bank's predominant position in the Russian banking system was strengthened by its takeover of the country's leading investment bank, Troika Dialog, in February 2011. Although rapid expansion usually puts pressure on a bank's capital adequacy, the average tier one capital ratio of Sberbank is 11.9% in the past eight years, or well above the minimum requirement by the Basel I and II accords.

An examination of Sberbank's insolvency risk shows that it was generally stable in the past six years (Figure 2). Nonetheless, there have been worrisome signs of the fast building-up of NPLs on its balance sheet, which increased its insolvency risk in the past two years. For instance, the NPL ratio averaged 7.9% for the bank in 2009 and 2010, or four times the mean of the previous seven years (1.71%). The true magnitude of its non-performing loans is probably even higher than reported, according to a recent assessment of the Russian banking system carried out by the IMF. This

| TABLE 2. RISK INDICATORS OF THE TOP RUSSIAN LENDERS (2010)			
		Sberbank of Russia	VTB Bank
Credit quality	NPL ratio	0.073	0.106
	Loan loss reserves/NPLs	1.5533	0.8471
	Growth rate of total loans (average 2008-10)	0.1271	0.1985
Liquidity	Deposits & short term funding / total asset	0.8065	0.6083
	Loans/deposits & short term funding	0.7888	1.0671
Bank solvency	Tier one capital ratio	0.119	0.124
	Z-score (natural log)	2.8296	2.291
Whether systemically important bank as identified by the Basel Committee (consultative document in 2011)		No	No

NOTE: NPL (Non-performing loan); Tier one capital ratio is the ratio of a bank's core equity capital to its total risk-weighted assets (RWA); Z-score is a measure of a bank's insolvency risk and is calculated as: Z-score = (ROA+CAR)/σ(ROA), where ROA is the mean rate of return on assets and CAR is the mean equity-to-assets ratio. σ(ROA) is the standard deviation of ROA. SOURCE: Bankscope and author's calculations.

concern about its credit quality has been reflected by the -22.93% fall of the bank's shares in the financial market in 2011 (Bloomberg, by Dec. 14, 2011).

As another leading universal bank in Russia, VTB Bank, similar to Sberbank, has achieved rapid expansion since 2003, and the average annual growth rate of its total assets was 48.9% for the period. Its role as the second-largest bank in Russia was strengthened by its takeover of the Bank of Moscow, the country's fifth-largest commercial bank, in June 2011. However, in terms of financial performance, VTB Bank suffered greatly from the 2007–2008 global financial crisis, and it had to be rescued by the Russian state for US$6.4bn. Compared to Sberbank, VTB Bank reported much lower returns (average annual ROAE at 8.59% during the past eight years) and much higher NPL ratio (average 11.5% from 2009 to 2010). The $14 billion bailing-out of the Bank of Moscow also caused concerns about the VTB Bank's loan quality since the takeover is likely to be politically motivated and the size of bad loans of the Bank of Moscow can be much bigger than expected (at least US$9bn according to BBC News). Consistent with this

The insolvency risk of the two systemically important banks in Russia has increased since 2007. But they are resilient to a variety of shocks

FIGURE 2. Z-score (natural log) of the Top Russian Lenders

Sberbank of Russia ----   VTB Bank ——
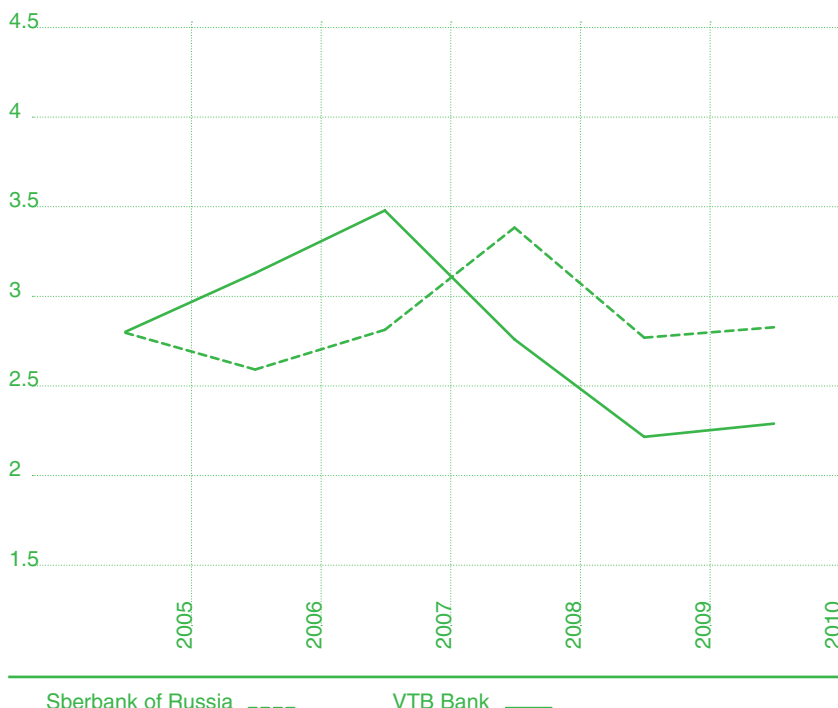
Source: Bankscope and author's calculations.

anecdotal evidence, the insolvency risk for VTB Bank has increased significantly and has been about 20% higher than that of Sberbank since 2007 (Figure 2).

In general, the two state-owned top lenders of Russia have benefited from the emergency measures by the government to maintain systemic stability, given that such measures mainly helped the large banking institutions. Recent stress tests conducted by the IMF in 2011 showed that the major Russian banks are resilient to a variety of shocks. Their status of being the systemically important banks in Russia has been strengthened by the post-crisis consolidation of Russian banking sector. Although still not counted as one of the "globally systemically important banks" by the Basel Committee, they have grown to become the largest (and thus the most influential) banks in Eastern Europe, as illustrated by the comparison of these two banks with a group of the closest 10 international commercial banks according to the total assets in the region (Appendix, Table 2). With Russia's entry into WTO in 2012, the country's banking market and its major banks are likely to become more international and integrated with the world banking market in the future. As a result, the influence of the two top Russian lenders in the regional banking market will grow. The same comparison (Appendix, Table 2) also reveals that the two top Russian lenders had better financial performance (e.g., profitability) and stronger capital position than their peers in Eastern Europe in 2010, which underlines their competitive advantage in the regional banking market.

TOP LENDERS IN INDIA

Compared to the other BRICs, the banking sector of India is relatively fragmented. The three largest commercial banks in India—the State Bank of India, ICICI Bank, and Punjab National Bank—jointly accounted for 26.67% of the total banking assets of the country (17.12%, 5.54% and 4.01%, respectively) in 2010. Among the three, the State Bank of India is the leading commercial bank and has the highest level of systemic importance in India. This state-owned bank (59.41% direct ownership by the Government of India) played an important role in the much needed consolidation of the domestic banking sector. It took over the State Bank of Saurashtra in August 2008 and the State Bank of Indore on August 26, 2010. These transactions, among other M&A deals, helped the bank achieve stable growth (average annual growth rate of its total assets at 16.3%) for the past seven years, even during the 2007–2008 global financial crisis. A closer examination of the bank's risk factors in Table 3 reveals that the bank has been more aggressive in making loans relative to its deposit base than the other major lenders in India. This is probably because it has the advantage of being the largest state-owned bank in India and thus could rely on government funding in case of a liquidity problem.

TABLE 3. RISK INDICATORS OF THE TOP INDIAN LENDERS (2010)				
		State Bank of India	ICICI Bank	Punjab National Bank
Credit quality	NPL ratio	0.0311	0.0406	0.0175
	Loan loss reserves/NPLs	0.5045	0.731	0.5249
	Growth rate of total loans (average 2008–2010)	0.1867	0.0136	0.2686
Liquidity	Deposits & short term funding / total asset	0.7619	0.6482	0.8787
	Loans/deposits & short term funding	0.8016	0.74	0.7299
Bank solvency	Tier one capital ratio	0.0802	0.1272	0.0882
	Z-score (natural log)	5	4.36	4.002
Whether systemically important bank as identified by the Basel Committee (consultative document in 2011)		Yes	Yes	Yes

NOTE: NPL (Non-performing loan); Tier one capital ratio is the ratio of a bank's core equity capital to its total risk-weighted assets (RWA); Z-score is a measure of a bank's insolvency risk and is calculated as: Z-score = (ROA+CAR)/σ(ROA), where ROA is the mean rate of return on assets and CAR is the mean equity-to-assets ratio. σ(ROA) is the standard deviation of ROA. SOURCE: Bankscope and author's calculations.

Helped by a strong Indian economy and a stable domestic environment, the insolvency risk of the State Bank of India is the lowest among the major lenders of the country and its stability improved continuously from 2006 to 2010 (Figure 3). To maintain this trend, the bank needs to strengthen its capital base. In 2010, its tier one capital ratio was 8.02%, the lowest among the three largest banks in India (Table 3). In addition, the bank's income growth (13.7% annual growth on average) lagged that of its asset growth (16.3%), which may harm the bank's financial performance in the future. Furthermore, the bank needs to pay attention to its low level of loan loss reserves relative to its NPLs. According to Bloomberg, the share price of the State Bank of India dropped 49.3% in 2011 (by Dec. 14, 2011). This may reflect investors' concerns about the potential deterioration of its loan quality and the need for more loan loss provisions in the future.

As the largest privately owned bank in India, ICICI Bank is relatively small in terms of total assets (one-third of those of the State Bank of India), but its profitability, measured by ROAE, has been noticeably higher with an average annual rate of 24.3% during the past seven years. Although the majority of Indian banks have only a limited presence in foreign countries, the ICICI Bank is fairly internationalized and had expanded its operations into more than 19 countries by 2011. This helps the bank to lower its credit risk by effective diversification in the various international banking markets. During the past eight years, the ICICI Bank has achieved rapid expansion with the annual growth rate of the total asset at 23.3% on average, or much higher than that of the State Bank of India. This rapid expansion, however, did not seem to put much pressure on the bank's capital adequacy. Its tier one capital ratio was 12.72% in 2010, or well above that of the other two

systemically important banks in India (Table 3). In addition, the ICICI Bank shows relatively prudent loan loss provisioning behavior among the group and it has been more cautious about extending new loans than the other two Indian banks in the recent years. These factors have led to increased stability for the bank during 2006–2010 (Figure 3). Nonetheless, its insolvency risk is higher than that of the state-owned State Bank of India in general, probably due to its relatively higher level of NPLs and funding disadvantage as a smaller and non-state-owned bank.

The third-largest lender in India, the Punjab National Bank, is one of the oldest banks in India (established in 1895). Similar to the State Bank of India, it is state-owned with the Government of India holding 57.8% of its shares directly. Being about one-fourth that the size of the State Bank of India, the Punjab National Bank's loan growth rate was noticeably higher (20.4% annually on average during 2004–2010), which helped it to achieve relatively high profitability. However, this rapid expansion put some pressure on its capital adequacy. In 2010, it reported a tier one capital ratio of 8.82%, the lowest level since 2008. In the same year, it also reported the highest level of NPL ratio and the lowest level of the loan loss reserves in the past three years, causing concerns for increased credit risk of the bank's asset portfo-

FIGURE 3. Z-score (natural log) of the Top Indian lenders

State Bank of India ——— ICICI ——— Punjab National Bank ----

Source: Bankscope and author's calculations.

lio. Figure 3 shows the stability level of the top three Indian lenders for the past five years. Consistent with the above discussion, Punjab National Bank was found to have the highest level of insolvency risk among the group since 2008, and its stability declined since 2007 with only a mild recovery in 2010.

In general, the three top lenders in India have benefited greatly from the rapid growth of the country's economy in recent years and their insolvency risk is relatively low. However, their influence in the global banking market is still limited. Although India has become the second-largest EM economy in the world, no Indian banks have made it into the list of top 10 banks in the world and none of the major lenders from India have been categorized as the "globally systemically important banks" by the Basel Committee. Compared to the peer group of commercial banks in the region of the Far East (Appendix, Table 3), the size of the major Indian lenders is relatively small. For instance, the largest bank in India (the State Bank of India) has an asset holding that is about one-sixth of that of the largest bank in China (the Industrial and Commercial Bank of China). Another interesting finding from the comparison (Appendix, Table 3) is that the non-state-owned ICICI Bank stands out as the most competitive bank from India in the regional banking market. Its profitability and capital adequacy are well above the averages of its peers. Currently, the Indian government still controls a significant portion of the country's banking assets. While the state ownership helped to stabilize the banking sector during the global financial crisis, the non-state-owned banks should play a more important role in the development of an internationally competitive and financially sound banking sector under regular conditions.

TOP LENDERS IN CHINA

The four largest and systemically important banks in China (the "Big Four") are the Industrial & Commercial Bank of China (ICBC), China Construction Bank (CCB), Bank of China (BOC) and Agricultural Bank of China (ABC). They accounted for 15.39%, 12.36%, 11.97%, and 11.82% of the country's banking assets, respectively, in 2010. All of them are state-owned commercial banks with an average direct state ownership of 70% and are thus heavily influenced by the Chinese government. The Big Four also share a number of other similarities (e.g., their governance structure, risk management system, etc.).

Compared to the top lenders in the other BRICs, the Big Four have probably experienced the greatest "reverse of fortune" in terms of their financial performance and insolvency risk during the past decade. The Big Four were initially specialized banks, but they were transformed into commercial

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banks in 1990s. Although they were the dominant powers and accounted for the majority of lending in the banking market of China, their financial performance was quite poor in the 1990s. These banks were heavily burdened by a large number of NPLs as a result of policy loans made to loss-making state owned enterprises (SOEs) in previous years. Their overall bank capital was much less than the capital adequacy requirement of 8% specified by the Basel Agreement at the time. With the aim of cleaning up the balance sheets of the Big Four, most of the NPLs were transferred into state-owned Asset Management Companies (AMCs). By 2004, the AMCs had absorbed about RMB 2000 billion (or US$242 billion) worth of NPLs from the Big Four. In addition, starting from 1998, the Chinese government implemented a special scheme to inject capital into the Big Four. The total injection amounted to RMB785 billion (or US$95 billion) from 1998 to 2005, which is equivalent to 10% of the central government's revenue. After the removal of the NPLs from and massive capital injection into the Big Four, these banks were transformed into public companies that are listed on the domestic stock exchanges or the Hong Kong Stock Exchange (HKSE) starting from 2005 onward.

The reform of China's Big Four has proven to be a great success. These banks have been significantly strengthened and have experienced rapid expansion over the past several years, even in the midst of the global financial crisis. Their operations have grown steadily since 2003, in terms of both assets and deposits. In addition, the capital position of the Big Four has grown stronger since 2003. China employs the common capital adequacy ratio (CAR), a measure of a bank's capital expressed as a percentage of its risk-weighted credit exposure, as its major risk-management tool for banks. The CARs of the Big Four exceeded the safety line recommended by the Basel Committee (Table 4) in 2010. Because of the restrictions imposed by the country's banking regulations, the Big Four engage in substantially

TABLE 4. RISK INDICATORS OF THE TOP CHINESE LENDERS (2010)					
		ICBC	CCB	BOC	ABC
Credit quality	NPL ratio	0.0108	0.0114	0.0113	0.0203
	Loan loss reserves/NPLs	2.282	2.2114	1.9234	1.6805
	Growth rate of total loans (average 2008–2010)	0.1886	0.274	0.2721	0.2123
Liquidity	Deposits & short term funding /total asset	0.9131	0.9107	0.8666	0.9198
	Loans/deposits & short term funding	0.5389	0.5613	0.611	0.5036
Bank solvency	Tier one capital ratio	0.0997	0.104	0.1009	0.0975
	Z-score (natural log)	4.537	4.958	5.392	4.033
Whether systemically important bank as identified by the Basel Committee (consultative document in 2011)		Yes	Yes	Yes	Yes

NOTE: NPL (Non-performing loan); Tier one capital ratio is the ratio of a bank's core equity capital to its total risk-weighted assets (RWA); Z-score is a measure of a bank's insolvency risk and is calculated as: Z-score = (ROA+CAR)/σ(ROA), where ROA is the mean rate of return on assets and CAR is the mean equity-to-assets ratio. σ(ROA) is the standard deviation of ROA. SOURCE: Bankscope and author's calculations.

fewer high-risk activities relative to their counterparts in the other BRICs. Their performance has also improved remarkably since 2003. For instance, the NPLs appearing on the banks' balance sheets have been significantly reduced over time, with their average share as a percentage of total loans decreasing from 17.9% in 2003 to 1.35% in 2010.

Table 4 presents the basic risk indicators of the Big Four. Compared to the top lenders in the other BRICs, the Chinese banks show higher stability with a lower NPL ratio and more prudent loan loss provisioning behavior. Figure 4 plots the natural log value of the Z-score for ICBC, CCB, and BOC during 2006–2010.[3] It is clear that their insolvency risk has generally declined over time. The Z-score value increased significantly in 2010, mainly helped by the record profits posted by these banks in that year. Among the group, ICBC has shown the highest level of risk tolerance, while BOC has been the most conservative one since 2008. Although not plotted in Figure 4 due to a lack of data, ABC has a log Z-score value of 4.03 in 2010, which was the lowest among the Big Four, indicating its relatively high level of insolvency risk. This is probably due to the dramatic turbulence in its profitability around the bank's IPO process in 2010[4].

The most important risk factors that the Big Four need to be concerned about are probably the heavy policy burdens and the massive government interventions. They were the key reasons why the NPLs piled up on the Big Four's balance sheets and these banks were near collapse in the 1990s. An important goal of China's banking reform since 2000s has been to force the commercial banks to operate on business principles. However, this goal has not been achieved, despite the greater market-orientation of the Chinese banks. The Big Four still carry a heavy policy burden, and their lending decisions are often significantly influenced and directly manipulated by the government. Since the eruption of the global financial crisis in 2008, the Chinese government has taken aggressive measures to stimulate the economy. To help the government achieve its policy goals, the Big Four have implemented a very loose credit policy and flooded the credit market with more than RMB10 trillion in new loans. Many of these new loans went into the real estate sector. For instance, the mortgage loans of the ICBC expanded 34.7% annually during 2008–2010. To date, no formal reports on the credit risk associated with these loans have been released. However, it is widely believed that a real estate bubble has been building up in China

Compared to the top lenders in the other BRICs, the major Chinese banks show higher stability with a lower NPL ratio and more prudent loan loss provisioning behavior

[3]   ABC is excluded due to insufficient data.
[4]   The ICBC, CCB, and BOC had all completed their IPOs by 2006.

since 2006 and the bursting of this bubble may lead to large number of bad loans for the Big Four. Consequently, the NPL ratio of the major banks may rise again in the next several years. A recent assessment report by the IMF confirms the possible worsening loan quality for the major Chinese banks.

The Chinese Big Four are among the largest banks not only in China but in the Far East (and the rest of the world, too), as illustrated by the comparison between the Big Four and a group of 10 closest international commercial banks in the region (Appendix, Table 4). The Chinese Big Four reported better financial performances in terms of profitability and stronger capital positions than their peers in 2010. At present, the Big Four still mainly focus on the domestic banking market, as shown by their heavy reliance on domestic deposits as their major funding source. Nonetheless, as the Chinese economy and its banking sector continue to grow and become more open, the global influence of the top Chinese banks is likely to grow. In a recent consultative document by the Basel Committee, the BOC has already been categorized as one of the "globally systemically important banks"—the only EM bank in the list. Consequently, whether the Chinese Big Four can maintain their stability and soundness in the post-crisis era will have a great impact on the overall stability of the world banking market.

FIGURE 4. Z-score (natural log) of the Top Chinese lenders

ICBC ____   CCB _ _ _ _   BOC ____

Source: Bankscope and author's calculations.

III.
WHAT EXPLAINS THE RISKINESS OF THE MAJOR BRIC BANKS?

The examination of the 12 systemically important BRIC banks in the previous section reveals an interesting time trend of their riskiness in recent years. Generally speaking, the top lenders in China and Brazil have become more stable (lower insolvency risk), while the stability of the top Russian banks has declined. The riskiness of the top Indian lenders does not have a monotonic trend during the same period. Do these patterns represent the overall banking sector of the country and are they consistent with the economic fundamentals of BRICs?

To have a thorough understanding of the factors underlying the risk-taking of the BRIC banks, in this section, we expand our sample beyond the systemically important banks and study the risk-taking (and its determinants) of a larger number of major banks in BRICs. A BRIC bank is included in our sample if it satisfies the following conditions: 1) being in the *Bankscope* database during 2002–2010 and 2) being in the list of the 1000 biggest banks by *The Banker* during the same period. Our study covers 142 BRIC banks with a time range of 2003–-2010, which includes a period of rapid global economic expansion and a very deep world financial crisis. The bank-level data is from *Bankscope* and information about the macroeconomic indicators at the country-level is from the World Bank and the IMF.

As a measure of a bank's insolvency risk, the natural logarithm of the Z-score is used in our regression analysis. A higher Z-score implies more stability (or less insolvency risk). We calculated a Z-score for each BRIC bank every four years and the results of the average Z-score (natural log value) for each country's banking sector are plotted in Figure 5.

It is clear from Figure 5 that the riskiness of a typical commercial bank in Russia increased during 2006–2010, while the Chinese banks became more stable on average during the same period. These patterns resemble those of the two systemically important banks in Russia (Figure 2) and the Chinese Big Four (Figure 4). This is probably because all the top Russian and Chinese lenders investigated in the previous section are large state-owned banks and they play a dominant role in their domestic banking market. Consequently, their riskiness is representative of the country's banking sector. On the contrary, India and Brazil have market-based economies and their banking concentrations are low. As a result, the riskiness of their top lenders may deviate from the country average. Figure 5 shows that the stability of the Indian banking sector increased significantly during 2006–2010, although the riskiness of its three top lenders did not have a clear downward trend (Figure 3) during the same period. Similarly, the insolvency risk of an average commercial bank in Brazil increased during 2006–2010 (Figure 5), which is in sharp contrast to the downward trend of the riskiness of the top Brazilian lenders (Figure 1).
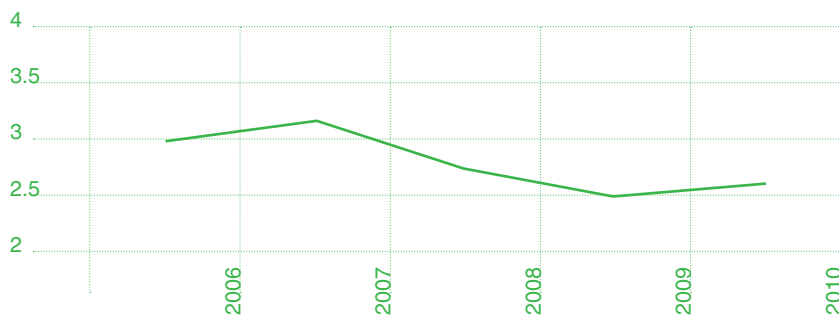
Generally speaking, a bank's risk-taking is likely the outcome of its

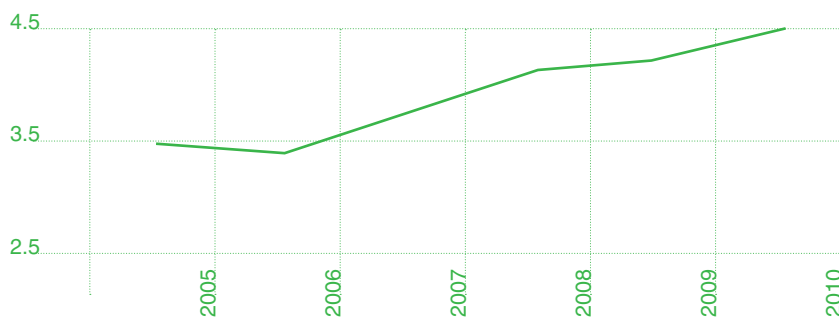# FIGURE 5. Average Z-score (natural log) of BRIC Banks

STABILITY (AVERAGE) OF BRAZILIAN BANKS
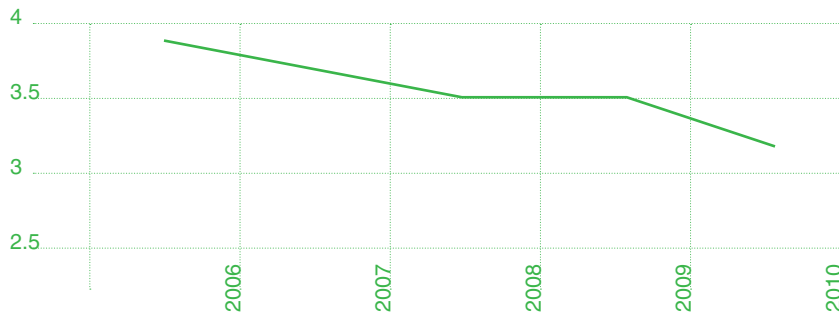
STABILITY (AVERAGE) OF RUSSIAN BANKS

STABILITY (AVERAGE) OF INDIAN BANKS

STABILITY (AVERAGE) OF CHINESE BANKS

Source: Bankscope and author's calculations.

own strategic choice in reaction to the changing external macroeconomic environment and its internal characteristics. To pinpoint the specific country factors that affect the riskiness of the BRIC banks, we consider six major indicators of the economic and financial development of a country in our regression analysis, which is explained in the attached text box. We find that the riskiness of individual BRIC banks is generally consistent with the country's economic fundamentals. A high economic growth rate helps to reduce a bank's insolvency risk and the quantitative effect is significant (Appendix, Table 5). Among the BRICs, China and India achieved a much higher real GDP growth rate annually (11.22% and 8.54% on average, respectively) during 2005–2010 than did Russia and Brazil (4.09% and 4.2%, respectively). This is likely to be the key reason why we observe an uphill trend of stability for the banking sector of India and China, while the trends for Russia and Brazil are different (Figure 5).

The riskiness of a typical commercial bank in Russia and Brazil increased during 2006–2010, while the Chinese and Indian banks became more stable on average during the same period

We also find that the net interest spread of a country is negatively associated with a bank's insolvency risk, which is not surprising as higher net interest spread means more net interest income for a bank. For instance, interest rates in China are still largely determined under the guidance of the central bank and the net interest spread has been quite stable over time. This results in a stable interest income margin for the Chinese banks and, in turn, lowers their insolvency risk.

A third macroeconomic factor that has a significant influence on the riskiness of a BRIC bank is the size of the economy. Our results show that banks are more willing to make aggressive expansions and take risks when they operate in a bigger banking market, *ceteris paribus*. Other macroeconomic indicators under consideration, i.e., loans/GDP ratio, concentration ratio of the banking market, and the share of state-owned banks in the country's banking sector, do not seem to have a quantitatively significant impact on the riskiness of the BRIC banks (Appendix, Table 5).

In addition to macroeconomic factors, a bank's own characteristics can obviously affect its risk-taking decisions. We include a large set of bank-level variables in the regression analysis and the results are reported in the Appendix in Table 5. We find that a public listing makes a bank more stable, probably as a result of the increased pressure from the public shareholders, as compared to non-listed banks. A number of EM banks have undergone IPOs in the recent years, which helped to lower these banks' insolvency risk. One good example is the public listing of the major Chinese banks on domestic and international stock exchanges (e.g., HKSE) since

DESCRIPTION OF THE ESTIMATION MODEL AND THE VARIABLES

We implement the following fixed-effects estimation model:

$$Z_{ijt} = \alpha + \beta_1 \text{Macro Variables}_{jt} + \beta_2 \text{Bank Variables}_{it} + \beta_3 \text{Bank Fixed Effect}_i + \beta_4 \text{Time Variable}_t + \varepsilon$$

The dependent variable in the regressions is the natural logarithm of the Z-score, and the explanatory variables are divided into macro variables and bank characteristics. The macro variables at the country level include the degree of financial deepening, measured by the ratio of total loans of all banks in the province to GDP of the province; size of the economy, measured by the natural logarithm of gross domestic product (GDP) at the beginning of the year (the GDP value is adjusted to the 2000 price level using the GDP deflator); economic growth, measured by the annual GDP growth rate; net interest spread; market concentration as measured by the top five banks' market share; and share of state-owned banks in the country's banking market. We include a large set of bank level variables in the regressions: bank size, the quadratic form of bank size, growth rate of the operating income, non-interest income to operating income ratio, equity to assets ratio, reliance on interbank borrowing, non-performing loans (NPLs) ratio, ratio of securities to total earnings assets, public listing status and a dummy variable for systemically important banks. We also control for firm fixed-effects and time effect in the regressions. The macro variables are both time (t) and region (j) variables, while the bank-level control variables are bank specific variables (i) that vary over time.

2003. Not only have the public listings strengthened the capital base for the Chinese banks, they have also significantly changed the management system of these banks. Compared to the conditions in 1990s, the Chinese banks have greatly transformed their internal governance system and their risk management system has been significantly enhanced with the help of the strategic investors, which are usually the large international banks from the developed countries with a minority ownership stake in the Chinese banks. All these factors help to reduce the insolvency risk for the listed Chinese banks.

Interestingly, our study shows that being a systematically important bank actually makes a bank more willing to take risks (Appendix, Table 5). In the current regulatory system for most of the EMs, banks with systemic importance receive an implicit guarantee of their solvency from the government (the so-called "too important to fail" doctrine), which encourages these banks to be more aggressive in terms of risk-taking. Another bank

characteristic that is found to have a significant impact on the riskiness of BRIC banks is the bank's reliance on non-interest income. Compared to the savings banks that focus more on the interest income, investment banks rely more on fee income banking businesses and they tend to be more risky.

Being a systematically important bank actually makes a bank more willing to take risks

IV.
CONCLUSIONS

This report focuses on assessing the riskiness of individual banks in BRICs. Our study covers both the systemically important banks and a larger sample of 142 major commercial banks in the four countries from 2003 to 2010. We conclude with the following statements regarding the riskiness of the BRIC banks:

• Helped by rapid economic growth, BRICs have a stable short-to-medium outlook in terms of the solvency of their major banks and the overall banking sector. However, an economic slowdown may lead to considerably higher insolvency risk for the BRIC banks. Policymakers should pay close attention to any early warning signs of an economic slowdown and adjust their banking regulations accordingly.

• A close examination of the risk profiles of the 12 systemically important BRIC banks shows that the immediate risk of a major bank failure is low. Among the group, Banco do Brasil, Sberbank of Russia, the State Bank of India, and the Bank of China have the lowest levels of insolvency risk in each country respectively.

• Generally speaking, the top lenders in China and Brazil have become more stable (lower insolvency risk) over time, while the stability of the top Russian banks has declined. The riskiness of the top Indian lenders does not have a monotonic trend during the same period.

• A significant portion (75%) of the systemically important banks in BRICs is state-owned. While the state ownership helped to stabilize the banking sector during the global financial crisis, it is important for policymakers to realize that the non-state-owned banks should play a bigger role in the development of an internationally competitive and financially sound banking sector under regular conditions.

• One common feature of the top BRIC lenders is their rapid loan growth, especially to the real estate sector, in recent years. This may become the main driver for increased NPLs and the overall riskiness of the BRIC banks in the next two to three years. The concern is especially serious for the Chinese banks and regulators in China should pay close attention to the possible worsening loan quality for the major Chinese banks in the near future.

• Publicly listed and savings banks showed higher stability in the BRICs. On the other hand, being a systemically important bank and relying more on non-interest income are associated with higher insolvency risk for a BRIC bank. To reduce the moral hazard problem in the systemically important banks and thus increase their solvency, the "too important to fail" doctrine in the current regulatory system may need to change.

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APPENDIX

TABLE 1. TOP BRAZILIAN LENDERS AND THEIR PEER GROUP

	Total asset (000 USD)	Net income/total asset	Operating income/ total asset	Equity/total asset	Deposits & short term funding /total asset
Banco do Brasil	481,179,275	0.0144	0.0681	0.0643	0.6786
Itau Unibanco Hold-ings	447,925,211	0.0189	0.0814	0.0856	0.5817
Banco Bradesco	378,149,672	0.0159	0.0705	0.0761	0.6059
Peer Group: Closest 10 international banks according to the total assets amongst the standard peer group (Commercial Banks South and Central America)					
Median	114,718,475	0.0159	0.0698	0.0936	0.6744
Average	213,124,280	0.0157	0.0653	0.0914	0.6149
Source: Bankscope and author's calculations.					

TABLE 2. TOP RUSSIAN LENDERS AND THEIR PEER GROUP

	Total asset (000 USD)	Net income/total asset	Operating income/ total asset	Equity/total asset	Deposits & short term funding /total asset
Sberbank of Russia	283,116,940	0.0211	0.0781	0.1144	0.8065
VTB Bank	140,791,873	0.0128	0.0517	0.1348	0.6083
Peer Group: Closest 10 international banks according to the Total Assets amongst the standard peer group (Commercial Banks Eastern Europe)					
Median	45,237,983	0.0142	0.0470	0.0853	0.7670
Average	49,727,035	0.0110	0.0528	0.1121	0.7273
Source: Bankscope and author's calculations.					

TABLE 3. TOP INDIAN LENDERS AND THEIR PEER GROUP

	Total asset (000 USD)	Net income/total asset	Operating income/ total asset	Equity/total asset	Deposits & short term funding /total asset
State Bank of India	369,070,181	0.0068	0.0483	0.0525	0.7619
ICICI Bank	119,544,880	0.0118	0.0791	0.1062	0.6482
Punjab National Bank	86,513,734	0.0117	0.0406	0.0593	0.8787
Peer Group: Closest 10 international banks according to the Total Assets for the last available year amongst the standard peer group (Commercial Banks Far East)					
Median	302,026,947	0.0083	0.0216	0.0563	0.8495
Average	301,015,216	0.0065	0.0243	0.0528	0.8647
Source: Bankscope and author's' calculations.					

TABLE 4. TOP CHINESE LENDERS AND THEIR PEER GROUP

	Total asset (000 USD)	Net income/total asset	Operating income/ total asset	Equity/total asset	Deposits & short term funding /total asset
ICBC	2,032,134,307	0.0123	0.0280	0.0611	0.9131
China Construction Bank	1,632,263,396	0.0125	0.0301	0.0648	0.9107
Bank of China	1,579,348,206	0.0105	0.0255	0.0646	0.8666
Agricultural Bank of China	1,560,857,967	0.0092	0.0283	0.0525	0.9198
Peer Group: Closest 10 international banks according to the Total Assets for the last available year amongst the standard peer group (Commercial Banks Far East)					
Median	1,560,857,967	0.0052	0.0178	0.0538	0.8768
Average	1,438,921,949	0.0072	0.0203	0.0575	0.8503
Source: Bankscope and author's calculations.					

TABLE 5. Z-SCORE REGRESSIONS: BANK LEVEL FIXED-EFFECTS REGRESSIONS

	(1)	(2)	(3)
Ln(GDP)	-1.384***	-1.441**	--
	[-5.71]	[-2.36]	
GDP growth rate	27.856***	27.482***	--
	[5.3]	[4.13]	
Net interest spread	6.690**	8.481**	--
	[2.35]	[2.59]	
Loans/GDP	--	0.063	--
		[0.42]	
Market concentration	--	-0.288	--
		[-0.21]	
Share of state-owned banks	--	0.971	--
		[1.03]	
Country dummy: Brazil	--	--	0.478
			[1.22]
Country dummy: Russia	--	--	-0.028
			[-0.1]
Country dummy: India	--	--	0.804***
			[3.57]
Whether systemically important	-20.378**	-18.831**	-19.47*
	[-2.05]	[-1.91]	[-1.95]
Public listing	0.317**	0.297**	0.282*
	[2.17]	[2.02]	[1.92]
Log(size)	-0.61	-0.534	-0.603
	[1.33]	[-1.18]	[-1.31]
Log(size) square	0.073	0.065	0.071
	[1.48]	[1.34]	[1.44]

Non-interest income ratio	-1.503***	-1.399***	-1.272**
	[-3.11]	[-3.11]	[2.52]
Operating income growth rate	-0.001	-0.019	-0.108
	[-0.01]	[-0.14]	[-0.82]
Equity/asset	-0.694	-0.321	0.228
	[-0.79]	[-0.34]	[0.19]
NPL ratio	-2.023	-2.293	-4.482***
	[-1.12]	[-1.26]	[-2.83]
Securities/earning assets	0.964	0.517	0.327
	[1.54]	[0.62]	[0.39]
Reliance on interbank borrowing	-0.382	-0.194	-0.518
	[-0.86]	[-0.4]	[-1.01]
Constant	22.48***	22.354***	6.018***
	[5.6]	[2.9]	[2.79]
Year	yes	yes	yes
Observations	349	349	349
Cluster	133	133	133
R-square (within group)	0.34	0.352	0.332

Note: The dependent variable is the natural logarithm of the Z-score. Z-score = (ROA+CAR)/σ(ROA), where ROA is the return on assets and CAR is the capital-asset ratio, both averaged over the past five years. σ(ROA) is the standard deviation of ROA over the past five years. Higher Z-score implies more stability. Operating income = interest income + non-interest income. Values of macro variables are from the previous year. t-values are computed by the robust standard errors clustered for individual banks and are presented in brackets. ***, ** and * indicate significance at the 1%, 5% and 10% levels, respectively.

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