5. History of Credit Crisis as a Mirror: An International Perspective on the Impact of the Sub-prime Crisis on the Performance of Investment and Commercial Banks[1]

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Abstract

For analyzing the aftermath of the latest global financial crisis, five major variables are used in this study to provide separate measures of the performance of 32 representative investment and commercial banks amongst the world's 1,000 largest banks, in order to explore the changes in their overall performances. These measures are: the equity ratio (relating to capital adequacy), the operating cost ratio (management capability), the return on equity (shareholders' profitability), the return on assets (bank profitability) and Tobin's Q (business value). Our empirical results reveal that following the disclosure of the sub-prime crisis, management capability, profitability and business value, in both investment and commercial banks alike, all took a turn for the worse, with clear rises in their risks of management capability and profitability; there has also been significant deterioration in the capital adequacy of investment banks. However, the significant declines in both the management capability and profitability of investment banks and commercial banks in the developed markets differ quite markedly from the findings on similar representative banks in the emerging markets; that is, investment and commercial banks within the developed nations suffered more direct and pronounced impacts from the credit crisis than those within the emerging markets. As a direct result of the sub-prime crisis, there were

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significant declines in the capital adequacy and profitability of investment banks, as well as similar significant declines in the profitability and business value of commercial banks, regardless of the overall size of the bank. These results stand in stark contrast to the findings reported by both Li (2003) and Aysan and Ceyhan (2008), that when faced with financial crisis, the scale of a bank will be found to have a positive correlation with its financial performance.

Keywords: sub-prime crisis; financial performance; investment banks; commercial banks; capital adequacy

JEL Classification: G01, F34

1. Introduction

The US sub-prime debacle manifested itself in the form of toxic securitized instruments based upon non-performing assets; these were exported around the world, thereby leading to the ongoing global financial crisis[1.] As a result of the overall process of the sub-prime mortgage meltdown, the era of US investment banks has come to an end; faced with the alternatives of declaring bankruptcy or acquisition, the last two investment banks had elected to transform themselves into commercial banks as their only means of survival.

There are scarce studies in the previous literature exploring the effects of financial crises on the performance of banks[2.] Moreover, Kaminsky, Reinhart and Végh (2002) note that when international financial crises occur, developed countries will tend to act as a conduit, passing the effects on to the developing countries. Patel and Sarkar (1998) further indicate that banks occurring in the developed nations have become less severe over time, whereas this is not the case in the emerging stock markets. Palmer (2000) reports that claims by US banks on emerging-market counterparties declined between 1997 and 1999, as the US banks either suffered losses on claims or actively reduced their exposure in such regions. Li (2003) indicates that when banks are faced with a significant financial event, the larger the capitalization of the bank, the greater the amount of the bank's own capital; thus, such banks would have greater resources to reduce irrecoverable loans, while Aysan and Ceyhan (2008) report a positive relationship between bank capitalization and changes in efficiency.

The global financial industry now lies in tatters as a result of the sub-prime crisis. However, as the last two investment banks, Goldman Sachs and Morgan Stanley, elected to continue their operations as commercial banks, this would seem to suggest that the business model of commercial bank was more resistant to the impact of such crises than that of the erstwhile investment banks. According to Bae, Karolyi and Stulz

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[1] *On 18 September 2007, the US Federal Reserve (Fed) cut the fund rate by 0.5 per cent in the hope of reducing the negative impact of the credit crunch on the home mortgage market and the overall economy.*

[2] *Jean and Miller (2004) identified two specific factors before and immediately after the Asian financial crisis, that bank performance is positively correlated with the equity/asset ratio and negatively correlated with provisions for loan losses. Knutsen and Lie (2002) find that some banks downgraded their control systems and pursued rapid expansion in new business areas during the banking crisis, leading to huge losses.*

(2003), the emerging markets are more vulnerable than the developed markets to the impacts of international financial crises; indeed, Kim and Ying (2007) argue that the market opening in an emerging financial market serves only to accelerate the impact of a financial crisis. Nevertheless, the asset impairment associated with sub-prime and the related credit losses suffered by the financial sectors of the developed nations in the US and Europe accounted for approximately 96% of all global losses from the sub-prime debacle; it is therefore questionable as to whether the aforementioned empirical studies would have successfully identified which would be more seriously affected by the sub-prime crisis, the financial sector of the developed economies or the emerging economies. Furthermore, it is argued in both Li (2003) and Aysan and Ceyhan (2008) that when a financial crisis occurs, the scale of a bank will be positively related to its performance; nevertheless, following the disclosure of the sub-prime crisis, all the biggest commercial banks in the US reported unprecedented huge quarterly losses. This would again seem to suggest that large capitalization and total asset levels were not necessarily of any help to the banks in weathering the storm of the sub-prime crisis. This study therefore sets out to examine whether there are significant differences between the negative effects of the sub-prime crisis on the financial performance of investment and commercial banks, and whether bank size and market maturity are significant factors in the battle against the negative impacts on the financial performance of investment and commercial banks arising from the sub-prime crisis.

We provide a detailed examination of whether the negative impacts on the financial performance of banks arising from the sub-prime crisis were greater for investment banks than for commercial banks. Our main focus is on determining the reasons why the investment banks failed, while the commercial banks survived. Moreover, we explore whether the negative impacts on financial performance attributable to the sub-prime crisis were significantly greater for the banks located in the more mature markets. Furthermore, we attempt to determine whether the negative impacts on financial performance attributable to the sub-prime crisis were significantly smaller for larger-size banks.

The remainder of this paper is organized as follows. A description of the study sample, variable measurements and research design is provided in Section 2, followed in Section 3 by discussion of the empirical results. Finally, the conclusions and implications in this study are presented.

2. Methodology

2.1 Sample Profile

This study takes September 2007 as the starting point of the sub-prime crisis[3]. We select as our study period the five consecutive quarterly financial statement periods prior to the crisis (the second quarter of 2006 to the second quarter of 2007) and the

[3] *The cycle of continuing rate cuts began with the Fed lowering the fund rate by 0.5 % on 18 September 2007, which thereby indicated that the US government was taking the sub-prime crisis seriously.*

three consecutive quarterly financial statement periods after the crisis (the fourth quarter of 2007 to the second quarter of 2008). The sampling criteria adopted for this study involves data covering the eight quarters on a total of 32 banks, comprising of 9 investment banks and 23 commercial banks. Since the ranking of banks by the Banker magazine is convincing, the selected banks in this study must exist among the world's 1,000 largest banks as ranked by the Banker magazine in our all sample periods[4].

2.2 Variable Measurement

2.2.1 Measures of Financial Performance Indicators

The CAMEL rating method is adopted in this study as the means of measuring the financial performance variables[5]. Given that investment banks do not engage in any loan or deposit business, no measures of asset quality or liquidity are provided in the study.

(1) Capital adequacy

Since many investment banks did not release their capital adequacy ratios after the sub-prime crisis, this study uses only the equity ratio variable as the measure of a bank's capital adequacy.

(2) Managerial capability

Given that investment banks do not engage in any loan or deposit business, this study uses only expense ratio (the weighting of operating costs to operating income) to measure the management capability of the banks.

(3) Earnings

A bank's earnings are measured by its return on equity (ROE) and return on assets (ROA). The larger the indicators, the better the profitability of the bank.

(4) Business value

In addition to the CAMEL rating system, this study includes the Tobin's Q indicator to measure the business value of the two types of banks. Tobin's Q, as defined by Silva *et al*. (2006), is used to compare the market and book values of a firm[6].

2.2.2 The sub-prime crisis

Within the test and estimates of the panel data model, whether the sub-prime crisis occurred is set as a dummy variable D_S ; if the sample period was later than September 2007, then $D_S = 1$; otherwise $D_S = 0$.

2.2.3 Moderating variables

(1) Market maturity (Dma):

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[4] *Meanwhile, the ranking of both investment and commercial banks in our bank samples must be more preceding and larger in bank capitalization than other banks among the world's 1,000 largest banks.*

[5] *The CAMEL rating system assesses the performance of financial institutions under five operational dimensions: capital adequacy, asset quality, management performance, earnings and liquidity.*

[6] *The definition by Silva* et al. *(2006) is as follows:*

$$Tobin's\ Q = \frac{Market\ Value\ of\ Equity + Book\ Value\ of\ Liabilities}{Book\ Value\ of\ the\ Company}$$

In the panel data model, the maturity level of a market is set as a dummy variable Dma; if the sample bank is located in a developed market, then Dma = 1; otherwise Dma = 0.

(2) Capitalization (q1):

Bank capitalization is designated to explore whether greater capitalization had a smaller negative impact on the financial performance variables during the sub-prime crisis[7].

(3) Total assets (q2):

Banks' total assets are also designated to explore whether greater total assets resulted in smaller negative impacts of the sub-prime crisis on financial performance variables[8].

2.3 Research Design

A descriptive statistical test is first employed to determine whether the sub-prime crisis caused any significant deterioration in the average financial performance levels of investment and commercial banks, or any significant rise in their level of financial risk. Since the sample includes 32 global representative banks covering a period of eight quarters, we use the panel data model to analyze the different effects of the sub-prime crisis on financial performance of both investment and commercial banks[9].

2.3.1 Panel Data Model-Fixed Effects

The fixed effects focus on the allowance between the differences in financial performance, with a fixed intercept for each of the different cross-sectional structures. If we assume that the dummy variable for a bank i, Dj , should be:

$Dj_i = \begin{cases} 1, i=j \\ 0, otherwise \end{cases}$ The regression can be expressed as[10]:

$$Y_{it} = \sum_{j=1}^{N} \beta_{0j} Dj_i + \beta_1 Ds_t + \beta_2 Dma_i + \beta_3 q1_{it} + \beta_4 q2_{it} + \varepsilon_{it} , \quad (3)$$

2.3.2 Panel Data Model-Random Effects

The random effects focus on the relationship with the study sample as a whole. The regression of random effect can be expressed as[11]:

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[7] *In the statistical analysis, this study also divides all of the bank samples into top-half and bottom-half groups, by capitalization, to explore whether greater capitalization were successful in reducing the impact of the sub-prime credit crisis.*

[8] *In the statistical analysis, all of the bank samples are again divided into top-half and bottom-half groups, by total assets, to determine whether greater total assets were successful in reducing the impact of the sub-prime credit crisis.*

[9] *The advantage of this model is that it can simultaneously deal with the co-existence of cross-sectional and time series data and generate efficient estimates.*

[10] *Where: i = bank 1,2,…,N ; t = quarter 1,2,…,T ;* Y_{it} *= [*$y1_{it}$ *,* $y2_{it}$ *,…*$y5_{it}$ *] refers to the values of the various financial performance variables for a bank i in quarter t; and* Dj_i *is the fixed intercept, which indicates that the cross-sectional data each have a different structure.*

$$\begin{aligned} Y_{it} &= \beta_{0i} + \beta_1 Ds_t + \beta_2 Dma_i + \beta_3 q1_{it} + \beta_4 q2_{it} + \varepsilon_{it} \\ &= \overline{\beta}_0 + \beta_1 Ds_t + \beta_2 Dma_i + \beta_3 q1_{it} + \beta_4 q2_{it} + \mu_i + \varepsilon_{it} \end{aligned}, \quad (4)$$

If this is represented with random variables, then $\beta_{0i} = \overline{\beta}_0 + \mu_i$, which indicates that the difference occurs randomly, and that the expectation value of β_{0i} is $\overline{\beta}_0$. We therefore use the Hausman Test to examine whether the fixed effect model or the random effect model is used[12.]

3. Empirical Results

3.1 Descriptive Statistical Test

3.1.1 Whole Sample

The results shown in Table 1 and Table 2 (Annexes) clearly indicate that preceding the sub-prime crisis the investment banks demonstrated superior management performance, equity returns and business value; however, they had significantly higher business risks than the commercial banks. Following the disclosure of the sub-prime crisis, the capital adequacy of investment banks was still significantly worse than that of commercial banks, and their risks of management performance, profitability and business value were significantly higher than those of commercial banks.

The results in Tables 1 and 2 (Annexes) demonstrate not only that the sub-prime crisis had significant negative impacts on the capital adequacy of investment banks, but also that it also had severe impacts on the management performance, profitability and business value of investment banks and commercial banks, and simultaneously raising the risks on their management performance and profitability.

3.1.2 Classification by Market Maturity

(1) Developed Markets

The results in Appendices 1 and 2[5] reveal that, following the sub-prime crisis, investment banks in the developed markets had significantly worse capital adequacy, management performance and profitability than commercial banks, and their risks on business value, management performance and profitability were all significantly higher than those of commercial banks. Our results on the investment banks in the developed markets show that the sub-prime crisis had significant negative impacts on

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[11] *The intercept, β_{0i}, represents the different structure of each of the cross-sections.*

[12] *Under the null hypotheses, H0: $\mu_i, Ds_t, Dma_i, q1_{it}$ and $q2_{it}$ are statistically uncorrelated, the fixed effect model is used. Under H1, the random effect model is used. If* H $\leq \chi_k^2$*, then the null hypothesis will be accepted and the random effects model should yield a better result. If* H $> \chi_k^2$*, the fixed effects model should yield a better result.*

[5] *Appendices are available on http://rjef.ipe.ro*

capital adequacy, management performance and profitability, and also pushed up the risks on their management performance and profitability.

(2) Emerging markets

As shown in Appendices 3 and 4, following the sub-prime crisis, it was only the capital adequacy of investment banks that remained significantly worse than that of commercial banks, whilst they had no significantly higher risks than commercial banks in all dimensions. The results on the investment banks in the emerging markets show that the sub-prime crisis had significant negative impacts on their capital adequacy, profitability and business value, although it did not significantly increase their risks. The sub-prime crisis brought about significant declines in the management capability and profitability of both investment and commercial banks in the developed markets, all of which was accompanied by increased risk. As a result of the crisis, the capital adequacy, management capability and profitability of investment banks were all significantly worse than those of commercial banks. In contrast, the effects of the sub-prime crisis in the emerging markets were a significant worsening of the capital adequacy, profitability and business value of investment banks, with no apparent increase in risk. Furthermore, there was neither significant worsening in the financial performance of commercial banks from the crisis. Our results reveal that in the developed markets, both investment and commercial banks suffered significantly larger negative impacts from the crisis than their counterparts in the emerging markets.

3.1.3 Classification by Firm Size

Regardless of the classification used by capitalization or total assets, firm size does not make any significant difference to the findings on the financial performance of both investment and commercial banks following the sub-prime crisis. Regardless of the classification by capitalization or total assets and regardless of the size of firm size, the sub-prime crisis had significantly negative impacts on the capital adequacy and overall profitability of investment banks, and commercial banks experienced significantly negative impacts on their overall profitability and business value.

3.2 Empirical Results of the Panel Data Model

3.2.1 Financial Ratios for the Whole Sample

The Hausman test results are shown in Appendix 5. The estimating results for the whole sample are presented in Table 3. The sub-prime crisis led to deterioration in almost all aspects of financial performance, including management performance, profitability and business value for all banks, with the only exception being capital adequacy. Worsening management performance indicates that the high global credit risk led to a rise in financing costs, and lower interest rates led to a narrowing of spreads and a substantial reduction in bank business as they struggled to restructure their balance sheets, which ultimate resulted in higher operating costs and declining revenues. Lower profitability and business value indicate that the income and profit sources of the banks have been squeezed, with the recessionary impact leading to a decline in business value. Amongst the moderating variables, we can find that banks in the developed markets of Europe and the US were most seriously affected, resulting in significant declines in overall profitability. Greater capitalization levels were

clearly of no help in avoiding the impact of the crisis on overall profitability and business value. (See table 3 from Annexes)

3.2.2 Financial Ratios for Investment and Commercial Banks

The results of the Hausman test for the investment and commercial banks are shown in Appendices 6 and 7. The estimating results of investment banks and commercial banks shown in Tables 4 and 5 reveal that, in addition to the significantly negative impacts on management capability, profitability and business value of both investment and commercial banks, the sub-prime crisis has had significantly negative impacts on the capital adequacy of investment banks. The underlying reason may be the continuing issuance by these banks of structured securitized instruments, following the emergence of the sub-prime crisis; investment banks frequently use such instruments to reduce their losses, and this would have had serious negative impacts on their capital adequacy levels. The negative impacts on capital adequacy and shareholder profitability in the developed markets were far more significant on investment banks than on commercial banks, which may be attributable to the more relaxed supervisory regulations on investment banks than those governing commercial banks, causing investment banks to invest heavily in high-risk, sub-prime loan-related instruments. Finally, the greater capitalization levels of investment banks ultimately proved to be of no help whatsoever in terms of avoiding the negative impacts of the sub-prime crisis on their capital adequacy, management capability and profitability, nor were they of any help to the business value of commercial banks. Greater total assets are, however, found to have been of some help in enhancing the business value of investment banks, but not that of commercial banks. See Tables 4 and 5 from Annexes

4. Conclusions and Implications

4.1 Impact of the Sub-prime crisis on Financial Performance

In the aftermath of the sub-prime crisis, a sharp drop in profits coupled with the high amortization rates of the sub-prime loans and subsequent high-risk investment losses caused the financial performance of both investment and commercial banks to deteriorate still further. Clearly, the deterioration in capital adequacy in investment banks may be attributable to the fact that after the crisis, they continued to issue sub-prime loan-related instruments to reduce their losses.

4.2 Potential Moderating Effects of Market Maturity and Firm Size

The epicenter of the sub-prime crisis was in the developed markets of Europe and the US; thus, the investment and commercial banks of the developed countries would have suffered more direct and pronounced impacts from the crisis. The impacts of the sub-prime crisis have clearly been less significant and direct on the emerging markets, presumably as a result of the capital restrictions and the lower degree of financial maturity within these emerging markets, as compared to those of the developed markets of Europe and the US. Commercial banks within the emerging markets have been far less aggressive than investment banks with regard to the range and style of

investment instruments used; thus, there was no significant worsening in any of the of financial performance variables. Moreover, the negative impacts of the current financial crisis were felt on all classes of assets, ranging from high-risk derivatives, stocks and corporate bonds to low-risk money market instruments, which led to declines in both risk diversification and profitability. Therefore, greater capitalization and total asset levels were of no help to financial institutions in avoiding the impact of the financial crisis, particularly with regard to their overall profitability.

4.3 Implications of the Sub-prime Crisis

Investment and commercial banks were similarly affected by the sub-prime crisis, suffering huge asset write-offs and investment losses, which ultimately translated to reduced profits. More importantly, there was significant worsening of the capital adequacy and profitability levels of investment banks, as compared to those of commercial banks, which was accompanied by significantly higher operating costs. The significantly lower capital adequacy levels, higher operating costs and decline in profits would seem to suggest that investment banks have tended in the past to adopt higher levels of financial leverage, non-transparent pay structures, high profit-sharing bonuses and more relaxed investment restrictions; thus, they suffered far greater impacts than commercial banks from the sub-prime crisis. This also explains why the era of investment banks in the US has ended so depressingly in the wake of the sub-prime crisis.

References

Altunbas, Y. Fazylov, O. and P. Molyneux, 2002. Evidence on the Bank Lending Channel in Europe. *Journal of Banking and Finance,* 11, pp.2093-2110.

Aysan, A.F. and S.P. Ceyhan, 2008. What determines the banking sector performance in globalized financial markets? The case of Turkey. *Physica A,* 387, pp.1593-1602.

Bae, K.H. Karolyi, G.A. and R.M. Stulz, 2003. A New Approach to Measuring Financial Contagion. *Review of Financial Studies,* 16, pp.717-63.

Cavallo, L. and S.P.S. Rossi, 2001. Scale and Scope Economics in the European Banking System. *Journal of Multinational Financial Management,* 11, pp.515-31.

Clarke, G.R.G. Cull, R. and M.S.M. Peria, 2001. Does Foreign Bank Penetration Reduce Access to Credit in Developing Countries? Evidence from Asking Borrowers. *The World Bank: Development Research Group*.

Hameeteman, D. and B. Scholtens (2000), 'Size, Growth and Variance Among the World's Largest Non-merged Banks', *International Journal of the Economics of Business,* 7(3), pp.313-23.

Henderson, B.C. and S.E. Kaplan, 2000. An Examination of Audit Report Lag for Banks: A Panel Data Approach', *Journal of Practice and Theory,* 19, pp.159-74.

Hester, D.D., 1992. Financial Institutions and the Collapse of Real Estate Markets. *Federal Reserve Bank of Boston*, (September), pp.114-35.

Jean, Y. and S. M. Miller (2004), 'The effect of the Asian financial crisis on the performance of Korean nationwide banks', *Applied Financial Economics,* 14, pp.351-360.

Jeong, W. Kymn, K.O. and C.J. Kymn, 2003. The Long-run Interdependence of Bank Health, Investment-oriented Bank Loans and Economic Performance: A Time-series Analysis', *Quarterly Review of Economics and Finance*, 43, pp.11-30.

Kaminsky, G.L. Reinhart, C.M. and C.A. Végh, 2002. The Unholy Trinity of Financial Contagion. *Journal of Economic Perspectives*, 17(4), pp.51-74.

Kim, Y. and Y.H. Ying, 2007. An empirical assessment of currency devaluation in East Asian countries. *Journal of Internal Money and Finance*, 26, pp.265-283.

Konishi, M. and Y. Yasuda 2004. Factors Affecting Bank Risk Taking: Evidence from Japan. *Journal of Banking and Finance,* 28, pp.215-32.

Knutsen, S. and E. Lie, 2002. Financial Fragility, Growth Strategies and Banking Failures: The Major Norwegian Banks and the Banking Crisis, 1987-92. *Business History,* 44 (2), pp.88-111.

Li, Y. 2003. The Asian Financial Crisis and Non-performing Loans: Evidence from Commercial Banks in Taiwan. *International Journal of Management,* 20 (1), pp.69-74.

Palmer,D.E., 2000. U.S.Bank Exposure to Emerging Market Countries during Recent Financial Crises' *Federal Reserve Bulletin February, pp.*81-96.

Patel, S.A. and A. Sarkar 1998. Crises in Developed and Emerging Stock Markets', *Association for Investment and Research*, November/December, pp.50-58.

Annexes

Table 1

Average Investment and Commercial Bank Variables for the Whole Sample and the Pre- and Post-Sub-Prime Crisis Z Test Results

	Equity Ratio		Operating Cost Ratio		Return on Equity		Return on Assets		Tobin's Q	
Panel A: Pre-crisis Period										
H1:	u1<u2		u1<u2		u1>u2		u1>u2		u1>u2	
Investment (u1) (Average)	3.3598		27.8010		25.6193		1.0461		1.0681	
Commercial (u2) (Average)	5.6137		31.0610		18.7329		0.9932		1.0472	
H1 Test (Z-statistic)	3.4668	***	2.6428	***	5.5475	***	0.5288		1.7318	*
Panel B: Post-crisis Period										
H1:	u1<u2		u1>u2		u1<u2		u1<u2		u1<u2	
Investment (u1) (Average)	2.6927		42.0430		0.8245		0.2276		1.0330	
Commercial (u2) (Average)	6.1058		34.5558		8.3789		0.5234		1.0183	
H1 Test (Z-statistic)	2.8625	***	1.0737		1.1288		1.3379		–1.0737	
Panel C: Investment										
H1:	u1>u2		u1<u2		u1>u2		u1>u2		u1>u2	
Pre-crisis (u1) (Average)	3.3598		27.8010		25.6193		1.0461		1.0681	
Post-crisis (u2) (Average)	2.6927		42.0430		0.8245		0.2276		1.0330	
H1 Test (Z-statistic)	2.3362	***	2.5324	***	4.6118	***	4.3950	***	2.26579	***
Panel D: Commercial										
H1:	u1>u2		u1<u2		u1>u2		u1>u2		u1>u2	
Pre-crisis (u1) (Average)	5.6137		31.0610		18.7329		0.9932		1.0472	
Post-crisis (u2) (Average)	6.1058		34.5558		8.3789		0.5234		1.0183	
H1 Test (Z-statistic)	-0.3727		2.0011	**	5.5494	***	4.6349	***	4.6142	***

*Note: *** indicates significance at the 1 per cent level; ** indicates significance at the 5 per cent level; and * indicates significance at the 10 per cent level.*

Table 2

Variance in Investment and Commercial Bank Variables for the Whole Sample and the Pre- and Post-Sub-Prime Crisis F Test Results

	Equity Ratio		Operating Cost Ratio		Return on Equity		Return on Assets		Tobin's Q	
Panel A: Pre-crisis Period										
H1:	S^21>S^22		S^21>S^22		S^21>S^22		S^21>S^22		S^21>S^22	
Investment (S^21) (Variance)	1.9322		31.0414		45.7382		0.3060		0.0059	
Commercial (S^22) (Variance)	43.6683		95.6483		60.3280		0.3709		0.0016	
H1 Test (F-value)	0.0443		0.3245		0.7582		0.8250		3.7608	***
Panel B: Post-crisis Period										
H1:	S^21>S^22		S^21>S^22		S^21>S^22		S^21>S^22		S^21>S^22	
Investment (S^21) (Variance)	1.0424		835.3223		752.9890		0.7530		0.0029	
Commercial (S^22) (Variance)	50.1016		153.0507		203.9960		0.4865		0.0018	
H1 Test (F-value)	0.0208		5.4578	***	3.6912	***	1.5479	*	1.6510	*
Panel C: Investment										
H1:	S^21<S^22		S^21<S^22		S^21<S^22		S^21<S^22		S^21<S^22	
Pre-crisis (S^21) (Variance)	1.9322		31.0414		45.7382		0.3060		0.0059	
Post-crisis (S^22) (Variance)	1.0424		835.3223		752.9890		0.7530		0.0029	
H1 Test (F-value)	1.8535		0.0372	***	0.0607	***	0.4063	***	2.0245	
Panel D: Commercial										
H1:	S^21<S^22		S^21<S^22		S^21<S^22		S^21<S^22		S^21<S^22	
Pre-crisis (S^21) (Variance)	43.6683		95.6483		60.3280		0.3709		0.0016	
Post-crisis (S^22) (Variance)	50.1016		153.0507		203.9960		0.4865		0.0018	
H1 Test (F-value)	0.8716		0.6249	**	0.2957	***	0.7620	*	0.8888	

Note: *** indicates significance at the 1 per cent level; ** indicates significance at the 5 per cent level; and * indicates significance at the 10 per cent level.

Table 3

Panel Data Model for the Whole Sample

Independent Variables	Dependent Variables														
	Equity Ratio			Operating Cost Ratio			Return on Equity			Return on Assets			Tobin's Q		
	Coeff.	t-statistic		Coeff.	t-statistic		Coeff.	t-statistic		Coeff.	t-statistic		Coeff.	t-statistic	
Constant	0.0000	0.0000		28.1572	6.9534		0.0000	0.0000		1.5407	6.6977		1.0581	66.8490	
Ds	0.5048	1.2549		6.3261	4.7172	***	–14.5494	–1.6408	***	–0.5212	–0.0542	***	–0.0275	–6.1395	***
Dma	–2.2984	–0.8044		3.1213	0.6212		–3.9066	–0.8117		–0.6447	–2.3325	**	0.0035	0.1792	
q1	–5.9260e-05	–0.8129		0.0004	1.6424		0.0008	0.0003		–0.0000	–4.5534	***	0.0000	–1.6651	*
q2	–1.0132e-06	–1.3897		0.0000	–0.9111		0.0000	1.9525		0.0000	1.1537		0.0000	–0.7377	
RSS	1612.059			20207.1902			26821.8573			31.6316			0.2212		
Log Likelihood	–598.7798			–973.2352			–958.6780			–155.5892			482.0862		
Total Sample No.	256			256			256			256			256		

Notes:

a Ds is a dummy variable for the sub-prime crisis which is equal to 1 for the post-crisis period, and 0 for the pre-crisis period; Db is a dummy bank variable which is equal to 1 for investment banks, and 0 for commercial banks; Dma is a dummy variable for market status which is equal to 1 for the developed markets, and 0 for the emerging markets; q1 is a dummy variable for total capitalization amount which is equal to 1 if the total capitalization is amongst the top half of the sample, and 0 if the total capitalization is amongst the bottom half of the sample; q2 is a dummy variable for total assets which is equal to 1 if the total assets are amongst the top half of the sample, and 0 if the total assets are in the bottom half of the sample. RSS refers to the residual sum of squares.

b *** indicates significance at the 1 per cent level; ** indicates significance at the 5 per cent level; and * indicates significance at the 10 per cent level.

Table 4

Panel Data Model for Investment Banks

Independent Variables	Dependent Variables														
	Equity Ratio			Operating Cost Ratio			Return on Equity			Return on Assets			Tobin's Q		
	Coeff.	t-statistic		Coeff.	t-statistic		Coeff.	t-statistic		Coeff.	t-statistic		Coeff.	t-statistic	
Constant	5.2941	5.0029		16.5238	4.1602		34.5428	9.026		1.9185	3.4252		1.0778	17.0304	
Ds	–0.5972	–4.4461	***	9.8765	2.5961	**	–18.9726	–5.1759	***	–0.6504	–7.3488	***	–0.0487	–3.5386	***
Dma	–2.4576	–1.8739	*	3.9702	0.5954		–11.6488	–1.8129	*	–0.8599	–1.9870	**	–0.1221	–1.4236	
q1	0.0000	–1.9712	**	0.0038	4.6710	***	–0.0038	–4.7938	***	–0.0002	–6.0464	***	0.0000	0.0420	
q2	0.0000	0.2625		0.0000	0.7032		0.0000	–3.9334	***	0.0000	0.2161		0.0000	2.4372	**
RSS	13.0695			13873.0294			10818.3707			5.8308			0.1457		
Log Likelihood	–62.0122			–298.9690			–291.9456			–31.3173			104.8914		
Total Sample No.	72			72			72			72			72		

Notes:

a Ds is a dummy variable for the sub-prime crisis which is equal to 1 for the post-crisis period, and 0 for the pre-crisis period; Db is a dummy bank variable which is equal to 1 for investment banks, and 0 for commercial banks; Dma is a dummy variable for market status which is equal to 1 for the developed markets, and 0 for the emerging markets; q1 is a dummy variable for total capitalization amount which is equal to 1 if the total capitalization is amongst the top half of the sample, and 0 if the total capitalization is amongst the bottom half of the sample; q2 is a dummy variable for total assets which is equal to 1 if the total assets are amongst the top half of the sample, and 0 if the total assets are in the bottom half of the sample. RSS refers to the residual sum of squares

b *** indicates significance at the 1 per cent level; ** indicates significance at the 5 per cent level; and * indicates significance at the 10 per cent level.

Table 5

Panel Data Model for Commercial Banks

Independent Variables	Dependent Variables														
	Equity Ratio			Operating Cost Ratio			Return on Equity			Return on Assets			Tobin's Q		
	Coeff.	t-statistic		Coeff.	t-statistic		Coeff.	t-statistic		Coeff.	t-statistic		Coeff.	t-statistic	
Constant	0.0000	0.0000		33.1575	7.3182		17.6781	9.8866		1.3800	13.3184		0.0000	0.0000	
Ds	0.9823	1.7534	*	3.3687	3.9317	***	–11.1772	–6.6905	***	–0.4241	–4.4189	***	–0.0235	–6.8290	***
Dma	–2.3314	–0.5975		–2.5469	–0.4800		–1.0009	–0.4416		–0.3545	–2.7225	***	0.0145	0.7743	
q1	–0.000063	–0.7091		0.0002	1.5091		0.0002	1.1556		–0.0000	–1.3030		–1.6269e-05	–2.9703	***
q2	–0.000001	–1.4727		0.0000	–0.6677		0.0000	1.4576		0.0000	–1.1915		–9.1320e-06	–1.6858	*
RSS	1573.5667			3922.3881			11406.6163			66.7463			0.0592		
Log Likelihood	–458.5318			–594.1723			–672.4138			–167.7932			478.6957		
Total Sample No.	184			184			184			184			184		

Notes in Table 20 are the same with those in Table 19.