Capital Suspicious and Capital Trustable Banks: Sources of Pre- and Post-Crisis Performance and Risk-taking

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Abstract

In this study, we explain why some banks with a high capital adequacy ratio (CAR) tend to be in distress and have worse performance during the crisis but not in the pre-crisis period. Using two capital ratios, the CAR and the leverage ratio (LR), we classify banks into two types: one is a capital suspicious bank that has a high CAR and a low LR, and the other is a trustable bank that has a high CAR and a high LR. We propose that capital suspicious banks, which tend to undertake more risky-projects, suffer more losses and have higher risks than capital trustable banks during a crisis. However, during the pre-crisis, capital suspicious banks outperform capital trustable banks in most profit measures, such as return on equity and non-interest income.

Keywords: risk-taking, capital adequacy ratio, leverage ratio, capital suspicious banks, capital trustable banks

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1. Introduction

The eruption of the 2008 financial crisis ignited the debate on whether capital can help a bank improve its stock returns and survive a crisis. The idea is that well-capitalized banks should be in a better position to withstand a large, unexpected negative shock to their value during a financial crisis. However, the empirical analyses of this idea do not provide clear conclusions. Using the regulatory risk-based capital adequacy ratio (CAR)[1] as the proxy for capital, one strand of the literature finds that capital cannot resist adverse shocks. Hanazaki and Horiuchi (2003) find some cases in which banks have continued to show sufficiently high CAR just prior to falling abruptly into bankruptcy. For example, at the end of 2006, Northern Rock was fully compliant with risk-weighted measures (CAR=12.3%) shortly before its failure (Mayes and Wood, 2009). For UBS, the ratio was 12.2% in 2007, and it also failed during the 2008 crisis. Dexia also had high CARs of up to 14.7% in 2010, which is almost two times as much as the regulatory requirement, but it to failed during the European debt crisis. Some of Japan's banks also exhibited high CARs but then failed during the 1998 Asian crisis.[2] Failed banks with high CARs raise doubts as to whether the CAR is an essential tool to limit risk taking, buffers against an external shock, and effectively evaluates the safety and soundness of banks.

The other strand of literature uses the leverage ratio (LR) that is commonly defined as the regulatory capital or bank equity scaled by total assets.[3] This strand has different results. These studies find that high LR can resist negative shocks and can increase a stock's performance. For example, Demirgüç-Kunt, Detragiache and Merrouche (2013) find that before the crisis, the LR had no effect on the stock returns

[1] CAR is defined as the ratio of regulatory capital over risk-weighted assets.
[2] For example, the Basel CAR of the Long-Term Credit Bank of Japan that failed in October 1998 was 10.32% in March 1998.
[3] While there are various definitions of LR before Basel III, the differences are small.

of large banks. In contrast, during the crisis, a stronger LR was associated with better performance in a stock. Berger and Bouwman (2013) find that the LR helps small banks to increase their probability of survival and market share during both a crisis and a normal time. Also, their LR enhances the performance of large banks primarily during banking crises. One exception is the study of Akhigbe, Madura and Marciniak (2012) that finds that banks with a better LR experienced more severe declines in their stock prices during the recent 2008 financial crisis. They explain that a higher LR reflects deteriorating asset quality during a crisis, and hence stock returns drop.[4]

The mixed results that CAR and LR affect bank performance motivate this study. We examine why a bank with a high CAR tends to be in distress and has worse performance during the crisis but not during the pre-crisis period. Why do some studies find that a high LR can resist negative shocks and some find that it reflects the deteriorating asset quality? Also, why do some banks with a high CAR show a strong profit performance during the crisis but some banks do not?

To answer these questions, we consider the two capital ratios, CAR and LR, simultaneously. The Basel committee argues that the risk weights in the CAR that were applied to asset categories failed to fully reflect the banks' portfolio risk. Basel III has introduced a minimum leverage ratio that is independent of risk assessment. Gambacorta and Karmakar (2016) point out that the Basel III regulation requires the two capital ratios to be in place concomitantly, since each of them addresses a particular vulnerability. To resolve each weakness, we consider both of them simultaneously. We propose that a combination of high CAR and a low LR for a bank is most likely the result of capital manipulation because they are well-capitalized in terms of the CAR but poorly capitalized in terms of the LR. These two capital ratios

[4] Recently, Barth and Miller (2017) argue that because capital requirements became more complex following the 2007–2009 crisis, it seems appropriate to compare the benefits and costs of a simpler, higher capital requirement.

should reflect the same capital status because they both measure capital adequacies. When they do not, it is probably because a bank has manipulated its risk-weighted assets in order to save capital and boost its CAR to meet the requirement. Hence, the bank's observed high CAR might be ineffective against an adverse shock. To be specific, we term this type of bank a "capital suspicious bank."

Next, we term a bank a "capital trustable bank" if it is well-capitalized in terms of both a high CAR and a high LR. The two ratios disclose consistent information on sufficient capital that makes the observed high CAR trustable. A bank with high CAR and a high LR means that it conducts little capital manipulation to boost its capital level. [5]

We examine the profit and risk performances of capital suspicious and capital trustable banks during the pre-crisis and crisis periods. We posit that capital suspicious banks have risky behavior and capital trustable banks have less risky behavior. For profit performance, we propose that during the pre-crisis period, a bank that takes more risk outperforms in profits one that takes less risk. However, during the crisis, the risk-taking bank suffers larger losses than the less risky bank. Hence, our classifications of banks based on these two ratios can successfully explain their profit performances during the two different periods.

Next, we demonstrate that a capital suspicious bank tends to have high realized risk during the crisis but not during the pre-crisis period. A capital trustable bank is prone to having low realized risk during the crisis.

In addition to listed banks, we also consider non-listed banks. Studies using US data or large banks commonly adopt listed banks. Gropp and Köhler (2010) believe

[5] We do not consider the low CAR case because it probably fails to meet the regulatory 8% capital requirement.

that considering both types of banks is important for the broader applicability of the results since non-listed banks have quite different business strategies from listed banks. For example, Demirgüç-Kunt and Huizinga (2010) and Huang and Ratnovski (2011) find that wholesale funding increases the default probability of listed banks but Gropp and Köhler (2010) find that this negative effect does not exist for non-listed banks because they get much less financing from the wholesale market. Also, unlisted banks represent the majority of banks in most countries around the world. Thus, considering both types of banks expands our applicability and sample size.

Our contribution to the literature is twofold. First, our joint consideration of the CAR and the LR clarifies why banks with more capital experience worse performance during a crisis. The simultaneous consideration more clearly identifies the risk-taking activities than the consideration of only one of them. Next, our results indicate strong policy recommendations for supervision and regulation. A bank is not safe and sound when it is well-capitalized in terms of the CAR since the bank might manipulate the ratio.

The remainder of this paper is organized as follows. Section 2 describes the capital suspicious and trustable banks. Section 3 provides our hypotheses. Section 4 presents the empirical model. Section 5 gives the basic statistics, data, and the empirical results. Section 6 presents the estimation results. Section 7 has the robustness tests. Section 8 is the conclusion.

2. Capital suspicious and capital trustable banks

2.1 Definitions of high and low CARs and LRs

While the Basel committee defines the CAR, various studies adopt slightly different LR definitions. We define the LR as the leverage equal to the amount of assets the bank's own capital finances. Based on this concept, the Federal Deposit

Insurance Cooperation (FDIC) (1981) defined LR as the equity capital over total assets. Later, Basel I (1989) proposed the tier 1 capital concept, and hence the FDIC (1989) revised its LR definition to the ratio of tier 1 capital over total assets.[6] Recently, Basel III (2014) has further revised its LR definition, where the numerator is tier 1 capital and the denominator becomes the bank's total exposure (sum of the exposures of on- and off-balance sheet items).[7] However, Basel III's LR requires detailed financial transaction data, which is not available to outsiders.

The academic studies also adopt different LR proxies. Peek and Rosengren (1997), Saunders, Strock and Travlos (1990), Galloway, Lee and Roden (1997), Pille and Paradi (2002), and Schaeck (2008) use equity capital over total assets as suggested by the FDIC (1981). Kim and Santomero (1988) and Furlong and Keeley (1989) claim that this leverage has been helpful in maintaining the stability of the banking system. However, Demirgüç-Kunt, Detragiache and Merrouche (2013) use the ratio of total regulatory capital to total assets. Our study uses the ratio of equity capital to total assets as the proxy for LR given that most studies adopt this ratio. This ratio provides a straightforward account of a bank's leverage.

2.2 Capital suspicious and trustable banks

Hildebrand (2008), the vice-chairman of the Swiss National Bank, motivates our classifications of capital suspicious and trustable banks. He made the following astonishing statement about the high CAR and low simplified LR: "Looking at risk-based capital measures, the two largest Swiss banks were among the best-capitalized international banks in the world. Looking at simple leverage, however, these institutions were among the worst-capitalized banks."[8]

[6] https://www.fdic.gov/regulations/safety/manual/section2-1.pdf
[7] http://www.bis.org/publ/bcbs270.pdf
[8] In 2006, Credit Suisse had a CAR of 16.5%, Tier 1 CAR of 11.4%, and ratio of equity to total asset of 2.123%; UBS had CAR of 14.7 %, Tier 1 CAR of 11.9%%, and ratio of equity to total asset of 2.073%.

Thus, a bank could have both the highest CAR and the lowest LR simultaneously. This type of bank might conduct risky activities and fail during a crisis. Jenkins (2009) argues that "(Basel II's) rules exacerbate the crisis because they allowed those [who] were prepared to follow the letter, but not the spirit, of the rules to increase the leverage enormously."

We use the critical values of 10% and 5% for the CAR and LR, respectively, to classify whether a bank has a high CAR and a low LR. First, the 10% critical value for the CAR is based on the FDIC Improvement Act's regulation on September 29, 1992, where they defined any institution as well-capitalized if it has a total CAR of 10% or greater.[9] Next, we use the 5% critical value for the LR because the FDIC Improvement Act of 1991 defines LR as the core capital to total assets ratio and that the LR must exceed 5% for the FDIC to consider a bank as well-capitalized.[10] Recently, Basel III has redefined the LR to be a 3% minimum. Academics cannot calculate Basel III's LR because its off-balance sheet exposure is not publicly available. However, Polk and LLP (2013) estimate that the 3% minimum leverage ratio would be roughly equivalent to a US leverage ratio of 4.3%. To examine the robustness of the results as well as the equivalent 4.3% cutoff, we also try 8% and 4% in our robust testing.

Given the two critical values, a capital suspicious bank has a high CAR that

[9] To be "well-capitalized" (defined in Section 325.103(b)(1) of the FDIC's Rules and Regulations) requires minimum ratios of 6% Tier 1 capital and 10% Tiers 1 and 2 capital to total risk-based assets and a leverage ratio of 5% Tier 1 capital to total assets. If the depository institution fails to meet this standard it would have to immediately act to restore its capital to the 10% Tier 1 common equity ratio or the "well-capitalized" standards, as applicable. If a bank fails to maintain the required capital level, it will be treated as undercapitalized. (https://www.fdic.gov/news/board/Aug26no1.pdf)

[10] The history of the minimum LR requirement in the United States is as follows: In 1981, the Federal Reserve and the Office of the Comptroller of the Currency (OCC) developed guidelines and revisions for the bank capital ratio. The guidelines indicated that the minimum primary-capital-total-asset ratio for regional banking organizations was 5%, and the minimum for community banks was 6%. In June 1983, regulators revised the guidelines for multinational organizations, which were also required to meet the 5% minimum primary-capital-to-total-asset ratio. In 1985, The FDIC and OCC announced a uniform 5.5% for the primary-capital-to-total asset ratio of capital (essentially equity and loan-loss reserves) to total assets for all banking organizations, regardless of their size.

exceeds 10% and a low LR that is below 5%. The two capital ratios in a capital suspicious bank demonstrate the conflicting information about capital adequacy. In contrast, a capital trustable bank has a CAR that exceeds 10% and a LR that exceeds 5%, and both ratios signal the same information about the capital adequacies.

After classifying the two types of banks, the banks that failed or performed worse during the crisis commonly show the capital suspicious pattern. For example, Northern Rock and UBS are classified as capital suspicious banks since their CAR and LR are (12.3%, 1.905%) and (14.7%, 2.073%), respectively. Thus, these banks have a greater tendency to take risks. Furthermore, Japan's Long-term Credit Bank, which failed in October 1998, had a high CAR and a low LR of 10.34% and 3.59%, respectively in 1997. The Hokkaido Takushoku Bank, which failed in November 1997, had a CAR of 9.34% and a LR of only 1.56%. Thus, a crude examination indicates that capital suspicious banks might suffer more than capital trustable banks during a crisis period.

3. Hypotheses

In this section, we build the four hypotheses based on the argument of capital suspicious and trustable banks.

3.1 Performance of capital suspicious and trustable banks in the pre- and crisis periods

Our proposition is that a riskier bank tended to generate higher profits during the pre-2008 crisis period, but once the crisis erupted, the cash flows from these projects ended. Thus, this type of bank lost considerable profits. In contrast, a less risky bank had mediocre performance during the pre-crisis period but only suffered mildly during the crisis. Hence, a risky project brings profits during boom periods but jeopardizes the bank during crises.

Our capital suspicious bank tends to engage in riskier projects for two reasons: First, as discussed in the introduction, a capital suspicious bank is likely to manipulate capital. This manipulation can include capital arbitrage through securitizing loans (Jones, 2000; Jablecki, 2009), adopting an internal rating approach to purposely downgrade risk-weighted assets (Andersen, 2011; Friedman, 2011),[11] moving risky loans off the balance sheet to disguise the true financial ratios (Lee, 2014), and more. [12] The motivation of this manipulation might be that the bank undertakes risky projects to exhaust capital quickly (Demirgüç-Kunt, Detragiache and Merrouche, 2013).

Next, Calm and Rob (1999) provide a theoretical argument that there is a U-shaped curve between capital and risk taking. After the turning point of the U curve, the well-capitalized bank believes that insolvency is remote and therefore takes more risk to benefit from the upside. Besides, while the LR is not the right regulatory criterion to judge banks' insolvency before Basel III, a low LR induces the agency problem, which means that the bank takes more risks since the low LR incurs less losses for shareholders when projects fail. Thus, a low LR bank also tends to take more risks. Thus, a bank with a high CAR and a low LR tends to undertake risky projects.

In contrast, a capital trustable bank has a high CAR and a high LR, and the two capital ratios are of opposite strengths in relation to risk taking based on our arguments. Its high CAR might encourage risk taking and its high LR might not, it is

[11]Friedman (2011) shows that banks were able to circumvent the Fed's risk-based capital regulations by acquiring certain types of assets such as mortgage backed securities that were rated as safe in the risk-based capital risk-weighting system but were actually very risky.

[12] Early studies also mention capital management through loan loss provision, see Ahmed, Takeda, and Thomas (1999) and Kanagaretnam, Lobo and Yang (2004). However, capital management focuses on how banks manage capital without discussing the LR.

uncertain what the final dominating power is. Nevertheless, the degree of risk-taking behavior is much reduced.

We thus propose our first and second hypotheses by comparing the two types of banks. We start with the performance comparison during the crisis period.

H1 (profit performance during the crisis): Under the risk-taking argument, a capital suspicious bank has larger losses than a capital trustable bank during a crisis period.

H2 (profit performance during the pre-crisis): Under the risk-taking argument, a capital suspicious bank has larger positive profits than a capital trustable bank during a pre-crisis period.

3.2 Risk of capital suspicious and trustable banks in the pre- and crisis periods

We also examine the risk performance of two types of banks before and after the crisis. We propose that our capital suspicious banks would have higher realized risk during the crisis. In contrast, our capital trustable banks would be cautious of taking risks, thus they would have lower realized risk than capital suspicious banks during the crisis.

H3 (risk performance during the crisis): Under the risk-taking argument, a capital suspicious bank has higher realized risk than a capital trustable bank during a crisis.

However, during the pre-crisis, capital suspicious banks might not necessarily have higher realized risk than capital trustable banks because few loans default or few investments lose in the boom period. Thus, whether capital suspicious banks have higher realized risk than capital trustable banks is uncertain during the pre-crisis.

H4 (risk performance during the pre-crisis): Under the risk-taking argument,

the performance of ex post risk between the two types of banks is uncertain during the pre-crisis.

4. Empirical model

4.1 Profit performance

Following Beltratti and Stulz (2012) and Laeven and Levine (2009), we compare the profit and risk performances of the capital suspicious and trustable banks using a cross-sectional model during the two sample periods.

The profit model during the crisis period is:

$$\text{Profit\_Perform}_{ik,2007-2009} = \alpha_{0ik,2006} + \alpha_1 D_{\text{CS}_{ik,2006}} + \alpha_2 D_{\text{CT}_{ik,2006}} + \alpha_3 \mathbf{Bank}_{ik,2006} + \alpha_4 \mathbf{Country}_{ik,2006} + \alpha_5 \mathbf{Region}_{ik,2006} + \varepsilon_{ik,2006} \quad (1)$$

The profit model during the pre-crisis model is:

$$\text{Profit\_Perform}_{ik\,2005-2006} = \beta_{0ik,2004} + \beta_1 D_{\text{CS}_{ik,2004}} + \beta_2 D_{\text{CT}_{ik,2004}} + \beta_3 \mathbf{Bank}_{ik,2004} + \beta_4 \mathbf{Country}_{ik,2004} + \beta_5 \mathbf{Region}_{ik,2004} + \varepsilon_{ik,2004} \quad (2)$$

where subscripts i and k denote the i^{th} bank in the k^{th} country. The crisis period subscript 2007-2009 denotes the crisis period and the subscript 2005-2006 denotes the pre-crisis period. Profit_Perform represents the performances of three accounting and one market measure. Following Wu and Shen (2013), Shen, Hasan and Lin (2014), the three accounting measures are return on assets (*ROA*), return on equity (*ROE*), and non-interest income ratio (*NonII*). The market measure is the stock return (*SR*). For the dummy variables, D_{CS} is equal to one for capital suspicious banks with CAR higher than 10% and LR lower than 5% and zero otherwise, and D_{CT} is equal to one for capital trustable banks with CAR higher than 10% and LR higher than 5% and zero otherwise. We also use 8% and 4% as criteria to distinguish capital suspicious banks and capital trustable banks in our robust testing.

Bank is the vector of variables for bank characteristics: the lagged performance (*lagPerform*), natural logarithmic transformation of total assets (*logTA*), loan to deposit ratio (*LoanDep*), cost to income ratio (*CostInc*), and the ratio of total security trading to total assets (*Security*). Following Beltratti and Slutz (2012), we add a measure for 2006 as one of the independent variables because past performance might jointly affect the determinants of the capital ratios and current performance.

Macro is a vector of macroeconomic, governance and bank restriction variables: real GDP growth (*GDPg*); rule of law effectiveness (*RuleEff*); and the restrictions on the banks' engagement in security, insurance, and real estate activities (*Restrict*). The *RuleEff* is equal to the rule of law times government effectiveness, where the rule of law captures the perceptions of how much confidence agents have in the rules of society. Government effectiveness captures perceptions of the quality of public services. Rule of law and government effectiveness are collected from Kaufmann, Kraay and Mastruzzi (2010, 2012). We define the *Restrict* as the sum of the three restrictions on banking activities in securities, insurance, and real estate. Each type of restriction ranges from 1 to 4, with a higher number denoting a stricter restriction. The degree of this overall restriction ranges from 3 (less restriction) to 12 (higher restriction). The data is provided by Barth, Caprio and Levine (2006, 2008).[13]

Region is the vector of three regional dummies: D_{Euro}, D_{America}, and D_{Asia}.

Hypothesis 1 argues that capital suspicious banks have larger losses than capital trustable banks during the crisis. Thus, in Equation (1), we expect $\alpha_1 < \alpha_2 < 0$.

Hypothesis 2 argues that capital suspicious banks have larger profit gains than capital trustable banks during the pre-crisis period. Thus, in Equation (2), we expect

[13] See also Shen and Chang (2006) who examine how a country's governance affects a bank's performance when there are various restrictions on its activities.

$\beta_1 > \beta_2 > 0$.

4.2 Risk performance

The specifications of our risk models are similar to the profit performance models during the two periods. The models are specified in Equations (3) and (4), and are estimated by OLS.

The risk model during the crisis period is:

$$\begin{aligned}\text{Risk\_Perform}_{ik,2007-2009} = {} & \gamma_{0_{ik,2006}} + \gamma_1 D_{CS_{ik,2006}} + \gamma_2 D_{CT_{ik,2006}} + \gamma_3 \mathbf{Bank}_{ik,2006} + \\ & \gamma_4 \mathbf{Country}_{ik,2006} + \gamma_5 \mathbf{Region}_{ik,2006} + \varepsilon_{ik,2006}\end{aligned} \tag{3}$$

The risk model during the pre-crisis model is:

$$\begin{aligned}\text{Risk\_Perform}_{ik,2005-2006} = {} & \lambda_{0_{ik,2004}} + \lambda_1 D_{CS_{ik,2004}} + \lambda_2 D_{CT_{ik,2004}} + \lambda_3 \mathbf{Bank}_{ik,2004} + \\ & \lambda_4 \mathbf{Country}_{ik,2004} + \lambda_5 \mathbf{Region}_{ik,2004} + \varepsilon_{ik,2004}\end{aligned} \tag{4}$$

where Risk_Perform denotes the banks' realized risks. We use three risk measures: the logarithmic transformation of the Z-score (*lnZscore*), the volatility in stock returns (σ_{SR}), and the volatility in the return on assets (σ_{ROA}). The first risk measure, *lnZscore*, is equal to ln(-1×(*ROA*+*Equity/TA*)/ σ_{ROA}), where σ_{ROA} denotes the standard deviation in the *ROA*, *Equity* is the total equity, and *TA* is the total assets.[14] The Z score is a widely used concept to examine default risk (Camara, Lepetit, and Tarazi, 2013), and we add a negative sign to *lnZscore* to it consistent with the risk measures, thus a higher value means a higher probability of default. Following Laeven and Levine (2009), Foos, Norden and Weber (2010), and Beltratti and Stulz (2012), we use the natural logarithm of the Z-score for 2007-2009. The second risk measure is the volatility in the return on assets (σ_{ROA}) that is the standard deviation in

[14] There is no consensus in calculating the Z-score. Beltratti and Stulz (2012) calculate the ratio of total equity over total asset and ROA for 1996-2006. However, they do not specify which period is used to calculate. We use 2002-2006 to calculate Z-score.

the yearly *ROA* for three years. The third risk measure is the volatility of stock returns (σ_{SR}), which is the three-year average value of the annual standard deviation in the stock return that is computed using monthly data for a year.

According to H3, capital suspicious banks might experience more risk than capital trustable banks during the crisis period. Thus, we expect $\gamma_1 > \gamma_2 > 0$ in Equation (3).

Hypothesis 4 argues that riskier banks might not have higher realized risk during the pre-crisis period. According to H4, we do not have an expectation on the signs and sizes of λ_1 and λ_2 in Equation (4).

5. Source of data and basic statistics

5.1 Data selection, construction, and sources

We collect 220 listed and non-listed banks with 3,072 bank-year observations from 34 OECD countries.[15] Our data comes from three databases. The balance sheet and income statement data come from Bankscope, which is published by Bureau van Dijk and has delivered unrivaled business intelligence and company information over the past 25 years. The stock prices come from the Datastream (now renamed Eikon) database, which is published by Thomson Reuters and covers all of the major financial markets–equity, fixed income, commodities, and foreign exchange. Macro variables come from the International Financial Statistics published by the International Monetary Fund, World Governance Indicators database (Kaufmann, Kraay and Mastruzzi, 2010, 2012) and Bank Regulation data (Barth et al., 2006, 2008). Table 1 contains the definitions and sources of the variables.

[15] The 34 countries are Australia, Austria, Belgium, Canada, Chile, Czech, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Israel, Italy, Japan, South Korea, Luxembourg, Mexico, Netherlands, New Zealand, Norway, Poland, Portugal, Slovak, Slovenia, Spain, Sweden, Switzerland, Turkey, the United Kingdom, and the United States.

Our bank sample is selected based on the following three rules. First, we choose banks that are active from 2004 to 2009 and were not insolvent or not received by the government or acquired by other banks during the crisis period.[16] Thus, the banks' capital structures and other characteristics are not distorted. For example, Washington Mutual Bank in United States was excluded from our sample because it was placed into receivership with the Federal Deposit Insurance Corporation on September 25, 2008.

Second, we consider depository banks only, including commercial banks, saving banks, and cooperative banks. Hence, we do not consider investment banks. However, Bankscope occasionally has errors in their classifications on depository and investment banks probably because they are based on the banks' names. For example, Associated Trust Company focuses on investment banking but it is classified as a commercial bank in Bankscope.

Third, given that it is difficult to identify or whether a bank is commercial bank or investment bank by using the information provided by Bankscope, we also follow Beltratti and Stulz's (2012) concept to exclude banks with an abnormally high CAR, ROA or other financial ratios. In our case, we exclude those banks with a ratio of CAR and LR over 40%, and a ratio of ROA greater than 10%. For example, the CARs of the above Washington Mutual Bank and Associated Trust Company are 147.24% and 113.21%, respectively in 2007. Thus, we do not even know that it is taken over by government and cannot identify whether it is an investment bank. We follow the third rule and exclude these banks to minimize this bias.

5.2 Basic statistics

Table 2 presents the number and percentage of capital suspicious and trustable

[16] The inactive status includes three statuses: bankruptcy, dissolved (including split and merger), liquidation.

banks across 34 countries in 2004-2006. The a priori knowledge is that capital suspicious banks should be rare since capital manipulation is an exception. However, we find that 20% or more of the total local banks in many countries are capital suspicious banks. These include Austria (25.13%), Australia (21.43%), Belgium (39.29%), Canada (31.58%), Finland (20%), France (29.17%), Germany (40.82%), Ireland (50%), Luxembourg (65.38%), Netherlands (22.22%), South Korea (30.77%), Switzerland (31.58%), and the United Kingdom (30.23%). The results show that most capital suspicious banks are from Western European countries. Thus, banks in all of the above countries should have big losses during the crisis. Next, the percentages of capital trustable banks are even higher in most countries. The capital trustable banks exceed more than 40% in all countries except for Luxembourg (26.92%) and Ireland (25%). There are other banks that are neither capital trustable nor suspicious banks, such as banks with CARs below 10%.[17]

Table 3 compares the performance and bank characteristics between capital suspicious and trustable banks during the crisis and pre-crisis periods. For profit performance, during the crisis period (the left part of Table 3), capital suspicious banks have much smaller *ROE*s and *ROA*s than capital trustable banks. For example, the average *ROE*s are –1.60 and 4.22 for capital suspicious and trustable banks, respectively, and are –0.05 and 0.38 for their *ROA*s, respectively. Also, the difference in each pair is significant. However, the differences between *NonII* and *SR* for two types of banks are insignificant. Hence, using the basic statistics, the accounting profits of capital suspicious banks are inferior to capital trustable banks during the crisis, which supports H1.

Also, the results are mixed regarding the three risk measures during the crisis

[17] For example, the percentage of banks with CAR below 10% in Japan is 45.47%. The reason might be that banks in Japan have to follow a special capital regulation.

period. First, capital suspicious banks have significantly higher market risk (i.e., high σ_{SR}) than capital trustable banks, which is consistent with our expectation. Next, the difference in default risk (i.e., *lnZscore*) is insignificant. However, capital suspicious banks have significantly lower volatility in the three-year *ROA* (i.e., σ_{ROA}) than capital trustable banks, which is inconsistent with our expectation. Thus, the basic statistics only partially support H3.

Next, during the pre-crisis period (the right part of Table 3), the performance changes dramatically from those during the crisis. Using *ROE* as an example, a capital suspicious bank's profit outperforms a capital trustable bank during this period. Taking the results obtained from the two periods, a capital suspicious bank has lower *ROE* during the crisis and higher *ROE* during the pre-crisis periods, which supports the argument on risk-taking behavior. In addition, capital suspicious banks have higher *NonII* than capital trustable banks, which is consistent with Lepetit, Nys, Rous and Tarazi (2008) who show that banks that expand their non-interest income activities are riskier than banks that mainly supply loans. Köhler (2015) also finds that risky banks tend to conduct more nontraditional activities. However, the results for *ROA* contradict our risk-taking argument to some extent since a capital suspicious bank has lower *ROA* than a capital trustable bank before the crisis. This is probably because the capital suspicious banks are highly leveraged by our definition (i.e., low LR), which indicates that capital suspicious banks have more assets relative to equities, whereas capital trustable banks are just opposite and have less assets relative to equities.[18] Hence, given the same incomes, a capital suspicious bank has a smaller *ROA* than a capital trustable bank because the former has larger assets than the latter. Furthermore, capital suspicious banks also have a lower *SR* than capital trustable banks before the crisis. Thus, capital suspicious banks outperform capital trustable

[18] For example, the *logTA* is 15.25 and 13.85 for capital suspicious and trustable banks, respectively.

banks in *ROE* and *NonII* but not in *ROA* and *SR* before the crisis, which partially supports H2.

Regarding risk performance in the pre-crisis period, capital suspicious banks have significantly higher default risk (i.e., *lnZscore*) and market risk (i.e., σ_{SR}) than capital trustable banks. However, the capital suspicious banks have lower earnings risk in *ROA* (i.e., σ_{ROA}) than capital trustable bank. Thus, the results are mixed for the two types of banks during the pre-crisis period. This is consistent with H4's prediction.

The results of bank characteristics are roughly the same regardless of the period. The capital suspicious banks have significantly larger asset sizes (*logTA*) and security investments (*Security*) but significantly lower loan to deposit ratios than capital trustable banks during the crisis and pre-crisis periods. The cost to income ratio (*CostInc*) shows a reversal. The capital suspicious banks have lower and higher cost to income ratios than capital trustable banks before and during the crisis. We conjecture that this is because capital suspicious banks provide larger loan loss provisions during the crisis, which increases the cost.

6. Estimation results

6.1 Profit performance

In Table 4, we present the estimation results for profit performance during the crisis and pre-crisis periods on the left- and right-hand sides, respectively. First, during the crisis period, when performance is the *ROE*, the coefficients for D_{CS} and D_{CT} are –5.036 and –0.258 respectively and the former is significant. These coefficients indicate that both types of banks had declining profits during the crisis; however, capital suspicious banks apparently performed worse than capital trustable banks during the crisis. The results are robust to different performance measures, such as *ROA* (two coefficients are –0.187 and –0.138, and both are significant), *NonII* (two

coefficients are -12.597 and 2.241 and the first is significant) and *SR* (two coefficients are –4.605 and 0.969 and the former is significant).[19] Accordingly, capital suspicious banks have larger losses than capital trustable banks regardless of the profit measures during the crisis, which fully supports H1.

Next, we discuss the estimation results for the profit performance during the pre-crisis period. In Table 4, when the *ROE* is used as a profit measure, the coefficients for D_{CS} and D_{CT} are 2.059 and 1.504 and both are significant. Hence, capital suspicious banks have larger positive profits than capital trustable banks during the pre-crisis period. The results are statistically the same when the dependent variable is *NonII*. In contrast, when *ROA* is used, the coefficients for D_{CS} and D_{CT} are 0.036 and 0.254, respectively, with the former being smaller than the latter, which indicates that capital suspicious banks have lower profits than capital trustable banks. Recall that capital suspicious banks are highly leveraged and have larger assets than capital trustable banks, as we discussed in Table 3. In the last columns, for the stock return equation, both of the coefficients for D_{CS} and D_{CT} are significantly positive and the former is significantly smaller. Hence, both capital suspicious and trustable banks earn positive profits during the pre-crisis period and capital suspicious banks outperform capital trustable banks in terms of *ROE* and *NonII* but not in *ROA* and *SR*, which partially supports H2.

In terms of *ROE* and *NonII*, the results lend support to our risk-taking explanation that capital suspicious banks undertake riskier projects during the pre-crisis and suffer bigger losses during the crisis. In contrast, capital trustable banks undertake less risky projects and suffer smaller losses. In terms of *ROA*, capital suspicious banks do not outperform capital trustable banks during the pre-crisis,

[19] The bank-year observations are considerably reduced from 10,531 in the *ROE* estimation to 561 when using the *SR*.

although both of them have a positive *ROA* and a positive *SR*. One of the reasons to account for lower *SR* for capital suspicious banks is probably that investors use *ROA* to decide whether to purchase shares.

6.2 **Risk performance**

Table 5 presents the estimation results considering risk performance for the two types of banks. During the crisis period, capital suspicious banks have higher risk than capital trustable banks regardless of the risk measures. When *lnZscore* is used, the coefficients for D_{CS} and D_{CT} are 0.967 and 0.080, and hence capital suspicious banks, which have a higher *lnZscore*, have higher default risk than capital trustable banks. For σ_{ROA}, the coefficients for D_{CS} and D_{CT} are 0.076 and -0.029; and for σ_{SR}, the coefficients for the two dummy variables are 1.483 and –0.599. Accordingly, during the crisis, capital suspicious banks demonstrate larger realized risks than capital trustable banks. The results fully support H3.

During the pre-crisis period, when *lnZscore* is the risk measure, the coefficients for D_{CS} and D_{CT} are 0.567 and 0.268 and both are significant, respectively. Hence, capital suspicious banks have higher default risk than capital trustable banks.[20] However, the results change for the other two ex post risks (i.e., σ_{ROA} and σ_{SR}) since capital suspicious banks have the same risk in their earnings and in stock returns as capital trustable banks. Thus, performance in terms of realized risk is uncertain during the pre-crisis period, which fully supports H4.

7. Robustness tests

7.1 Endogeneity: 2-stage least squares

[20] The net effects of capital suspicious and trustable banks need to consider the coefficient for the constant term, which is 3.706. When D_{CS}=1, the net effect for capital suspicious banks is 3.044 (=3.706 –0.662) and is 3.351(=3.706 –0.355) for capital trustable banks. Hence, capital suspicious banks have a lower *lnZscore* than capital trustable banks during the pre-crisis, which indicates higher default risk.

We also consider the endogeneity problem. Our two types of banks are dummy variables and are lagged one period to the dependent variable. Hence, the endogeneity problem is greatly reduced. Beltratti and Stulz's (2012) model is similar to ours. They argue that the endogeneity problem is minimized in this kind of specification. This is because the possibility that a high CAR and low LR is caused by expectations about future outcomes is low.

Nevertheless, we use the 2-stage least square to check the endogeneity. See Greene (2013) for a detailed explanation of how this method can reduce the endogeneity problem. Also, this method is adopted by previous studies. For example, Berger and Bouwman (2013) investigate how capital affects banks' performance during financial crises. In Table 6, the results from using this method are similar to those in Tables 4 and 5, except that the coefficient for D_{CS} becomes insignificant when the dependent variable is the profit performance during the crisis. That is, capital suspicious banks have worse profits and higher risks than capital trustable banks during the crisis, which fully supports H1 and H3. During the pre-crisis period, capital suspicious banks have better profits, such as higher ROE and NonII, but are in a tie with capital trustable banks in ROA, which partially H2. Also, the results fully support H4 in terms of risk performance.

7.2 Endogeneity: Heckman 2-stage regression

A bank's choice to be either capital suspicious or capital trustable might not be random, but rather a deliberate decision by managers to self-select their preferred options, thereby creating a selection bias. Thus, we use Heckman's (1978) 2-stage method to minimize the endogeneity problem. The first stage estimates the determinant equations for capital suspicion and capital trustable banks by using the probit model. We obtain the two inverse mills ratios (IMR) for each probit regression.

The second stage uses the IMRs as an additional explanatory variable in the profit and risk performance equation (see Wu and Shen, 2013; Li and Prabhala, 2007; Hamilton and Nickerson, 2003).[21] If the coefficient for the IMR is significant, there is then a significant correlation between the error terms obtained in the two stages of the Heckman model (Magableh et al., 2011). An insignificant effect for the IMR on the dependent variables indicates that no sample selection bias exists. The results using Heckman's 2-stage regression are similar to those of using the least squares estimation. Hence, our results are robust to this different estimation method.

7.3 Using different critical values of CAR and LR to define capital suspicious and capital trustable banks

We also consider different critical values, such as 8% and 4% for the CAR and LR, respectively. In Table 7, the results are similar to those in both sample periods except that *NonII* is lower and *SR* is higher for capital suspicious banks during the pre-crisis period. These results also totally support H1, H3, and H4 and partially support H2.

7.4 Results of using only LR as the threshold variable

We also investigate whether the LR itself might be sufficient to distinguish between capital suspicious and trustable banks. We do so because the LR is referred to as a high-quality capital ratio in some studies (Demirgüç-Kunt, Detragiache and Merrouche, 2013). If the results are the same, our purpose of distinguishing between

[21] Wu and Shen (2013) suggest that the IMR does not have a significant ''economic'' interpretation but an ''econometric'' interpretation. The IMR is added because it is the correct term for a self-selection bias and is produced by the first-stage regression of the Heckman 2-stage model. Accordingly, the significance of the IMR coefficient justifies that the bias is removed. This econometric background was developed by the Nobel Prize winner, Heckman (1978), and is well documented in many econometric books, such as that by Greene (2003). Application studies typically cite Heckman's work to justify the validity of empirical models. A number of applied studies add simple and mixed economic and econometric reasoning. For example, Clatworthy et al. (2009) argue that the IMR is a proxy for unobservable characteristics that affect both the decision and performance equations. We provide a similar interpretation.

capital suspicious and capital trustable is weakened. We classify banks into low and high LR banks using the same 5% cutoff. The low LR banks include capital suspicious banks and banks with a low LR and a low CAR, whereas the high LR banks include capital trustable banks and banks with a high LR and a low CAR. The two dummy variables, $D_{\text{Low LR}}$ and $D_{\text{High LR}}$ are created to denote low and high LR banks, respectively. In Table 8, during the crisis, the coefficients for $D_{\text{Low LR}}$ and $D_{\text{High LR}}$ are similar to those in Tables 4 and 5 when the two profit measures (i.e., *ROE* and *ROA*) and the two risk measures (i.e., *lnZscore*, and σ_{ROA}) are used as the dependent variables. The results are different when the other two profit measures (i.e., *NonII* and *SR*) and one risk measure (i.e., σ_{SR}) are the dependent variables (the coefficients are insignificant). Thus, during the crisis, the use of high and low LRs to classify banks is sensitive to the performance variables. However, the results change substantially when using the pre-crisis sample. The high LR banks significantly outperform low LR banks regardless of the performance variables, which indicates that low LR banks had poor business strategies during the pre-crisis period. The results are in sharp contrast to those for the capital suspicious banks, which are prone to taking more risk that result in better *ROE* and *NonII*.

In sum, using only LR to classify banks yields results that are not the same as when using the CAR and LR jointly. The capital suspicious and trustable banks capture a more pronounced pattern of risk-taking behavior than that of low and high LR banks. Further, high LR banks almost outperform low LR banks during both periods.

7.5 Using European countries sample

We then focus on European countries because most capital suspicious banks are from European countries. In Table 9, most of the results are similar to those in both

sample periods. That is, during the crisis period, capital suspicious banks have worse profit performance and higher risks than capital trustable banks, whereas capital suspicious banks have better profits than capital trustable banks during the pre-crisis period. These results totally support H1, H3, and H4 and partially support H2. Hence, the results are robust when using European countries only.

8. Conclusion

Our study explains why some well-capitalized banks, which should be in a better position to withstand a large, unexpected negative shock, failed during the financial crisis. We propose two types of banks, one is a capital suspicious bank that has a high CAR and a low LR, and the other is the trustable bank that has a high CAR and a high LR. The existence of capital trustable banks should be common since both CAR and LR are used to measure the capital level, and these measures should move in the same direction. In contrast, the existence of capital suspicious banks should not be common because the CAR and LR deviate from each other. Our results show that 20% of our banks are capital suspicious in 13 out of 34 OECD countries. Policy makers and investors should be cautious in understanding why they have high CARs with low LRs.

One explanation for the existence of capital suspicious banks could be that these banks undertake risky projects and manipulate their regulatory capital ratios. Based on this risk-taking argument, we find that capital suspicious banks suffer more losses and show higher risks than capital trustable banks during a crisis period. However, during a pre-crisis period, the results are mixed. Capital suspicious banks outperform capital trustable banks in *ROE* and *NonII* but not necessarily in *ROA* and *SR*. However, the performance of the realized risk is unclear for the two types of banks during the pre-crisis period. These results confirm most of our risk-taking hypotheses.

Our study has strong policy suggestions. Academics argue that high capital could curb the excessive risk taking created by limited liability and amplified by deposit insurance and bailout expectations. However, simply using the CAR can yield misleading results. A bank with a high CAR might be safe and sound on the surface, but might be fragile if their LR is low because this unique combination in reality indicates that their high CAR is transitory and subject to adverse shocks. Hence, our study justifies the requirement in Basel III that a leverage ratio is a useful tool to complement the risk-weighted measure and to mitigate pro-cyclical increases in leverage. The risk-adjusted capital requirements are not sufficient to prevent a significant cyclical buildup of leverage.

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Table 1. Definition of variables

Variable	Definition	Source
Profit performances		
ROE	Three-year average of the return on equities. The three years are 2007-2009 during the crisis and 2005-2006 during the pre-crisis period.	Bankscope
ROA	Three-year average of the return on assets. The three years are 2007-2009 during the crisis and 2005-2006 during the pre-crisis period.	Bankscope
NonII	Three-year average of the non-interest income ratios. The three years are 2007-2009 during the crisis and 2005-2006 during the pre-crisis period.	Bankscope
SR	Three-year average of the stock returns. The three years are 2007-2009 during the crisis and 2005-2006 during the pre-crisis period.	Datastream
Risk performances		
lnZscore	Average of the natural logarithmic transformation of the Z-score that is $\ln\{(\text{ROA}+\text{Equity/TA})/\sigma_{ROA}\}$, where σ_{ROA} denotes the standard deviation of ROA, Equity is the total equity, and TA is the total assets. We add a negative sign to *lnZscore* to it consistent with the risk measures.	Bankscope
σ_{ROA}	Average of the standard deviation in the ROA that is calculated as the average of 2007, 2008, and 2009 during the crisis and the average of 2005 and 2006 during the pre-crisis.	Bankscope
σ_{SR}	Average of the standard deviation in the stock return that is calculated as the average of 2007, 2008, and 2009 during the crisis and the average of 2005 and 2006 during the pre-crisis.	Datastream
Independent variables		
D_{CS}	A dummy variable for a capital suspicious bank whose CAR exceeds 10% and whose LR is less than 5%.	Authors
D_{CT}	A dummy variable for a capital trustable bank whose CAR exceeds 10% and whose LR exceeds 5%.	Authors
lagPerform	The profit performance in lagged one period.	Bankscope
lnTA	Natural logarithmic transformation of the total assets.	Bankscope
LoanDep	(Loan/deposit ratio) ×100%	Bankscope
CostInc	(Overhead cost/total income)×100%.	Bankscope
Security	(Total securities trading/Total asset)×100%	Bankscope
GDPgrow	Real GDP growth rate.	IFS
RuleEff	The Rule of Law Effectiveness that is equal to the Rule of Law×Government Effectiveness. The Rule of Law captures the perceptions of the extent to which agents have confidence in and abide by the rules of society. Government Effectiveness captures the perceptions of the quality of the policy.	KKM (2010, 2012)
Restrict	Equals the sum of the restrictions on banking activities in security + restrictions on banking activities in insurance + restrictions on banking activities in real estate. The degree of this overall restriction ranges from 3 (less restriction) to 12 (higher restriction)	Barth et al., (2006, 2008)
D_{Euro}	Dummy variable for banks in European countries.	World Bank
D_{America}	Dummy variable for banks in America countries.	World Bank
D_{Asia}	Dummy variable for banks in Asia countries.	World Bank

Note:

1. IFS is International Financial Statistics published by the International Monetary Fund.
2. KKM (2010, 2012) is Kaufmann, Kraay and Mastruzzi's (2010, 2012) investigation.

Table 2. The numbers and percentages of capital suspicious, capital trustable and other banks: 2004-2006

	Capital trustable banks		Capital suspicious banks		Other banks		All
	Num	Percent	Num	Percent	Num	Percent	Num
West European	**174**	**55.41%**	**107**	**34.08%**	**33**	**10.51%**	**314**
Austria	19	59.38%	9	25.13%	4	12.50%	32
Belgium	17	60.71%	11	39.29%	0	0.00%	28
France	35	48.61%	21	29.17%	16	22.21%	72
Germany	22	44.90%	20	40.82%	7	14.28%	49
Luxembourg	7	26.92%	17	65.38%	2	7.69%	26
Netherlands	34	75.56%	10	22.22%	1	2.22%	45
Switzerland	11	57.89%	6	31.58%	2	10.53%	19
UK	29	67.44%	13	30.23%	1	2.33%	43
East European	**101**	**78.29%**	**11**	**8.53%**	**17**	**13.18%**	**129**
Czech	23	79.31%	2	6.89%	4	13.79%	29
Hungary	17	65.38%	3	11.54%	6	23.08%	26
Poland	50	86.21%	5	8.62%	3	5.17%	58
Slovak	11	68.75%	1	6.25%	4	25.00%	16
North European	**523**	**93.06%**	**25**	**4.44%**	**14**	**2.49%**	**562**
Denmark	125	93.28%	6	4.48%	3	2.24%	134
Estonia	9	100.00%	0	0.00%	0	0.00%	9
Finland	12	80.00%	3	20.00%	0	0.00%	15
Iceland	3	100.00%	0	0.00%	0	0.00%	3
Ireland	3	25.00%	6	50.00%	3	25.00%	12
Norway	212	96.80%	4	1.83%	3	1.37%	219
Sweden	159	93.53%	6	3.53%	5	2.94%	170
South European	**1147**	**86.11%**	**17**	**1.28%**	**168**	**12.61%**	**1332**
Greece	15	78.95%	0	0.00%	4	21.05%	19
Italy	1060	87.24%	8	0.66%	147	12.09%	1215
Portugal	12	60.00%	2	10.00%	6	30.00%	20
Slovenia	25	71.43%	2	5.71%	8	22.86%	35
Spain	35	81.40%	5	11.63%	3	6.98%	43
North America	**965**	**97.18%**	**22**	**2.22%**	**6**	**0.60%**	**993**
Canada	39	68.42%	18	31.58%	0	0.00%	57
USA	926	98.93%	4	0.43%	6	0.64%	936
South America	**51**	**96.23%**	**2**	**3.77%**	**0**	**0.00%**	**53**
Chile	18	90.00%	2	10.00%	0	0.00%	20
Mexico	33	100.00%	0	0.00%	0	0.00%	33
Asia region	**222**	**49.78%**	**52**	**11.66%**	**172**	**38.57%**	**446**
Japan	161	42.82%	44	11.70%	171	45.47%	376
Korea Rep	17	65.38%	8	30.77%	1	3.85%	26
Turkey	44	100.00%	0	0.00%	0	0.00%	44
Australia region	**21**	**67.74%**	**5**	**16.13%**	**5**	**16.13%**	**31**
Australia	9	64.29%	3	21.43%	2	14.29%	14
New Zealand	12	70.59%	2	11.76%	3	17.64%	17
Other region	**18**	**75.00%**	**2**	**8.33%**	**4**	**16.67%**	**24**
Israel	18	75.00%	2	8.33%	4	16.67%	24
All	3222	82.96%	243	6.26%	419	10.79%	3884

Note:
1. Capital suspicious bank: capital suspicious banks whose CAR exceeds 10% and whose LR is less than 5%.
2. Capital trustable bank: capital trustable banks whose CAR exceeds 10% and whose LR exceeds 5%.
3. Other banks: banks whose CAR less than 10%.
4. Number: number of banks; Percentage is the ratio of the number of observations for capital suspicious banks or capita trustable banks to the total number in the country.

Table 3. Basic statistics: performance and bank characteristics of capital suspicious and capital trustable banks

	During Crisis period			During pre-crisis period		
	capital suspicious banks mean (std. dev.)	capital trustable banks mean (std. dev.)	*t*-value of difference	capital suspicious banks mean (std. dev.)	capital trustable banks mean (std. dev.)	*t*-value of difference
Profit Performances						
ROE	-1.60	4.22	-5.90***	13.15	10.25	1.66*
	(19.20)	(7.13)		(26.06)	(7.12)	
ROA	-0.05	0.38	-12.35***	0.40	1.03	-22.50***
	(0.61)	(0.71)		(0.36)	(0.76)	
NonII	10.50	9.15	1.06	19.02	12.77	3.31***
	(17.21)	(11.55)		(22.26)	(15.40)	
SR	-24.97	-20.64	-1.27	16.61	28.29	-2.78***
	(18.22)	(17.32)		(25.32)	(49.86)	
Risk Performances						
ln*Zscore*	-4.21	-4.30	0.38	-4.00	-4.18	2.24***
	(4.48)	(2.49)		(1.10)	(1.00)	
σ_{ROA}	0.23	0.27	-1.99***	0.14	0.29	-9.60***
	(0.34)	(0.42)		(0.18)	(0.46)	
σ_{SR}	15.25	13.85	11.67***	17.67	14.12	24.87***
	(2.21)	(1.83)		(2.10)	(2.08)	
Bank Characteristics						
logTA	15.25	13.85	11.67***	17.67	14.12	24.87***
	(2.21)	(1.83)		(2.10)	(2.08)	
LoanDep	60.39	88.62	-15.52***	66.27	139.89	-2.55***
	(30.72)	(41.84)		(40.20)	(1609.40)	
CostInc	84.28	71.12	4.88***	63.41	65.50	-1.97***
	(50.42)	(33.35)		(14.35)	(23.75)	
Security	28.10	20.05	10.19***	30.00	20.19	7.71***
	(14.69)	(11.66)		(17.90)	(13.23)	

Note:

1. Capital suspicious banks: capital suspicious banks whose CAR exceeds 10% and whose LR is less than 5%.
2. Capital trustable banks: capital trustable banks whose CAR exceeds 10% and whose LR exceeds 5%.
3. Four performance variables: *ROE*, *ROA*, *NonII*, and *SR*.
4. Three risk performance variables: ln*Zscore*, σ_{ROA} and σ_{SR} .
5. Four bank characteristics: log*TA*, *LoanDep*, *CostInc*, and *Security*.
6. The standard deviations in the variables is in parentheses.
7. Crisis period (2007~2009) and pre-crisis period (2005~2006).

Table 4. Effects of capital suspicious and trustable banks on profit performance

	ROE		*ROA*		*NonII*		*SR*	
	Crisis	**Pre-crisis**	**Crisis**	**Pre-crisis**	**Crisis**	**Pre-crisis**	**Crisis**	**Pre-crisis**
Constant	15.863***	15.772***	0.775***	0.633***	43.000***	39.947***	17.981***	8.011***
	(40.904)	(44.952)	(42.461)	(22.735)	(39.437)	(38.793)	(10.059)	(6.375)
D_{CS}	-5.036***	2.059***	-0.187***	0.036	-12.597***	6.915***	-4.605*	2.010*
	(4.060)	(4.447)	(6.011)	(0.972)	(2.926)	(6.178)	(1.677)	(1.654)
D_{CT}	-0.258	1.504***	-0.138***	0.254***	2.241	4.131***	0.969	10.035***
	(0.868)	(6.570)	(8.317)	(5.137)	(1.611)	(9.823)	(0.784)	(11.802)
logTA	0.180***	0.528***	0.017***	-0.006	3.108***	-0.392***	0.576*	1.946***
	(7.313)	(12.388)	(6.586)	(1.046)	(3.395)	(5.829)	(1.905)	(5.577)
lagReturn	0.461***	0.419***	0.468***	0.481***	0.232***	0.861***	0.001***	-0.006***
	(21.447)	(20.261)	(25.068)	(6.232)	(2.144)	(82.685)	(4.611)	(21.077)
LoanDep	-0.017***	-0.044***	-0.001***	-0.002***	-0.712***	-0.113***	0.215***	-0.109
	(4.725)	(7.848)	(4.571)	(3.012)	(6.663)	(11.070)	(3.629)	(1.245)
CostInc	0.020***	-0.029***	-0.002***	0.001	0.617***	-0.044***	0.021	0.015
	(4.352)	(5.395)	(5.105)	(1.223)	(3.852)	(4.168)	(0.629)	(0.283)
Security	-0.039***	-0.068***	-0.002***	-0.0004	-0.701***	-0.072***	0.097	-0.164*
	(7.552)	(5.749)	(6.571)	(0.369)	(5.936)	(5.739)	(1.211)	(1.704)
GDPg	-0.090***	-0.325***	-0.011***	0.004	-3.113***	1.196***	1.815***	-4.361***
	(2.861)	(4.394)	(4.162)	(0.261)	(5.582)	(8.113)	(6.169)	(6.193)
RuleEff	-0.830***	-0.081	-0.126***	-0.019	-0.128	-3.133***	-2.695***	3.238***
	(12.982)	(1.102)	(22.915)	(1.131)	(0.261)	(14.710)	(5.270)	(3.413)
Restrict	-0.465***	-0.058	0.0004	0.004	-3.456***	0.203	-4.990***	-0.148
	(6.783)	(0.654)	(0.096)	(0.267)	(2.753)	(1.403)	(7.755)	(0.137)
D_{Euro}	-10.686***	-10.709***	-0.208***	-0.285***	-8.698***	-5.681***	-20.311***	-15.379***
	(26.753)	(30.358)	(11.227)	(10.038)	(7.939)	(5.464)	(10.210)	(11.649)
$D_{American}$	-7.928***	-8.397***	0.157***	-0.073**	-19.284***	-17.369***	-14.095***	-9.972***
	(19.270)	(22.635)	(7.433)	(2.061)	(15.634)	(16.138)	(7.589)	(6.811)
D_{Asia}	-13.526***	-13.402***	-0.572***	-0.578***	-27.624***	-23.246***	-18.181***	-14.130***
	(32.914)	(36.800)	(30.870)	(15.039)	(23.170)	(19.811)	(9.804)	(10.669)
Nobs	10531	13499	11157	27112	9821	9725	561	727
R^2	0.225	0.581	0.315	0.053	0.011	0.016	0.164	0.838

Note

1. In the crisis equations, the dependent variable is calculated based on years 2007-2009, and the capital suspicious/capital trustable banks are determined for 2006.
2. In the pre-crisis equations, the dependent variable is calculated based on the years 2005-2006, and the capital suspicious/capital trustable banks are determined for 2004.
3. D_{CS} is a dummy variable for capital suspicious banks (CAR>10% and LR <5%); D_{CT} is a dummy variable for capital trustable banks (CAR>10% and LR >5%).
4. The four profit performance variables are *ROE*, return on equity; *ROA*, return on assets; *NonII*, non-interest income divided by total equities; *SR*, stock returns, which are defined in Table 1. The other variable definitions are as in Table 1.
5. The Nobs are the number of observations; R^2 are the coefficients for determinants; *, **, and, *** denote significance levels of 10%, 5%, and 1%, respectively.
6. The table uses White heteroscedasticity consistent estimates and weighted least squares regressions where weights are the square roots of the residuals.

Table 5. Effects of capital suspicious and trustable banks on risk performance

	lnZscore		σ_{ROA}		σ_{SR}	
	Crisis	**Pre-crisis**	**Crisis**	**Pre-crisis**	**Crisis**	**Pre-crisis**
Constant	-3.820***	-3.706***	0.296***	0.311***	3.732***	1.662***
	(50.527)	(52.028)	(8.880)	(9.344)	(9.265)	(6.403)
D_{CS}	0.967***	0.567***	0.076*	-0.061	1.483***	-3.044
	(5.988)	(2.804)	(1.735)	(1.593)	(2.524)	(0.822)
D_{CT}	0.080	0.268***	-0.029	-0.046	-0.599	-2.883
	(1.251)	(2.595)	(1.137)	(1.114)	(1.166)	(0.852)
logTA	0.042***	0.033***	-0.002	0.005	-0.359***	-0.639
	(3.739)	(2.332)	(0.735)	(0.923)	(4.399)	(1.640)
lagReturn	0.007***	0.005	0.203***	0.066	0.132***	0.033***
	(2.484)	(0.119)	(7.224)	(0.993)	(900.106)	(16.154)
LoanDep	0.022	-0.006***	-0.002***	-0.002***	-0.051***	-0.052
	(0.972)	(4.945)	(4.647)	(2.905)	(3.621)	(1.410)
CostInc	-0.007***	0.007***	0.002***	0.005***	0.009	-0.093
	(2.740)	(4.412)	(2.488)	(4.543)	(0.394)	(1.264)
Secuity	-0.003	-0.012***	-0.002***	-0.005***	-0.080***	0.109
	(0.786)	(3.000)	(2.242)	(4.641)	(2.945)	(0.733)
GDPg	-0.115***	0.014	-0.014***	-0.016	-0.263***	0.746
	(8.475)	(0.459)	(3.107)	(1.070)	(3.094)	(0.960)
RuleEff	-0.100***	-0.099***	-0.004	-0.037***	-2.247***	0.300
	(4.387)	(2.347)	(0.477)	(2.443)	(8.967)	(0.351)
Restrict	0.081***	-0.107***	0.005	-0.026***	1.335***	1.898***
	(3.309)	(3.638)	(0.633)	(2.122)	(8.109)	(2.185)
D_{Euro}	-0.919***	-1.000***	-0.073***	-0.085***	10.948***	15.076***
	(11.729)	(13.397)	(2.187)	(2.532)	(14.320)	(2.826)
$D_{American}$	-0.034	-0.038	0.193***	0.209***	5.449***	6.777***
	(0.432)	(0.508)	(5.424)	(5.849)	(7.520)	(2.760)
D_{Asia}	-0.020	-0.051	0.036	0.035	0.292	0.775
	(0.253)	(0.683)	(0.740)	(0.709)	(0.600)	(0.962)
Nobs	11036	26608	26471	26471	581	1519
R^2	0.082	0.024	0.014	0.013	0.769	0.017

Note

1. In the crisis equations, the dependent variable is calculated based on years 2007-2009, and the capital suspicious/capital trustable banks are determined for 2006.
2. In the pre-crisis equations, the dependent variable is calculated based on the years 2005-2006, and the capital suspicious/capital trustable banks are determined for 2004.
3. D_{CS} is a dummy variable for capital suspicious banks (CAR>10% and LR <5%); D_{CT} is a dummy variable for capital trustable banks (CAR>10% and LR >5%).
4. The three risk performance variables are *lnZscore*, σ_{ROA} , and σ_{SR} , which are defined in Table 1. The other variable definitions are as in Table 1.
5. The Nobs are the number of observations; R^2 are the coefficients for determinants; *, **, and *** denote significance levels of 10%, 5%, and 1%, respectively.
6. The table uses White heteroscedasticity consistent estimates and weighted least squares regressions where the weights are the square root of residuals.

Table 6. Considering endogeneity by using 2SLS

A. Profit performance

	ROE		*ROA*		*NonII*		*SR*	
	Crisis	**Pre-crisis**	**Crisis**	**Pre-crisis**	**Crisis**	**Pre-crisis**	**Crisis**	**Pre-crisis**
Constant	13.230***	18.198***	0.770***	0.630***	36.765***	40.045***	16.625***	4.989***
	(42.366)	(17.257)	(40.526)	(22.364)	(56.520)	(39.013)	(8.361)	(24.070)
D_{CS}	-6.851***	18.814*	-0.286***	0.170	-7.279*	33.919**	-1.023	19.109*
	(4.568)	(1.833)	(5.829)	(0.599)	(1.770)	(2.061)	(0.368)	(1.808)
D_{CT}	-1.506***	2.979***	-0.154***	0.415***	1.205	7.792***	4.000*	25.765***
	(2.288)	(5.277)	(5.663)	(5.257)	(0.647)	(9.053)	(1.768)	(9.454)
Control variables	yes	yes	yes	yes	yes	yes	yes	yes
Nobs	873	13507	12875	27112	9815	9747	667	729
R^2	-0.173	-0.022	-0.086	0.052	0.880	0.024	0.284	0.973

B. Risk Performance

	ln*Zscore*		σ_{ROA}		σ_{SR}	
	Crisis	**Pre-crisis**	**Crisis**	**Pre-crisis**	**Crisis**	**Pre-crisis**
Constant	-3.818***	-3.713***	0.296***	0.310***	2.653	1.552***
	(50.312)	(52.035)	(8.867)	(9.306)	(0.352)	(5.323)
D_{CS}	1.500***	2.362***	0.156***	-0.058	-10.583	17.834
	(5.867)	(2.924)	(2.435)	(0.350)	(0.420)	(1.354)
D_{CT}	0.093	0.676***	-0.060*	0.003	-2.115	8.509
	(1.077)	(4.097)	(1.684)	(0.032)	(0.125)	(1.445)
Control variables	yes	yes	yes	yes	yes	yes
Nobs	26608	26608	26471	26471	1519	1519
R^2	0.028	0.023	0.014	0.013	0.541	0.016

Note

1. In the crisis equations, the dependent variable is calculated based on years 2007-2009, and the capital suspicious/capital trustable banks are determined for 2006.
2. In the pre-crisis equations, the dependent variable is calculated based on the years 2005-2006, and the capital suspicious/capital trustable banks are determined for 2004.
3. D_{CS} is a dummy variable for capital suspicious banks (CAR>10% and LR <5%); D_{CT} is a dummy variable for capital trustable banks (CAR>10% and LR >5%).
4. The four profit performance variables are *ROE*, return on equity; *ROA*, return on assets; *NonII*, non-interest income divided by total equities; *SR*, stock returns, and the three risk performance variables are *lnZscore*, σ_{ROA} , and σ_{SR} , which are defined in Table 1. The other variable definitions are as in Table 1.
5. The Nobs are the number of observations; R^2 are the coefficients for determinants; *, **, and *** denote significance levels of 10%, 5%, and 1%, respectively.

Table 7. Effects of capital suspicious and capital trustable banks on risk performance using cutoffs of 8% & 4%

	ROE		*ROA*		*NonII*		*SR*	
	Crisis	**Pre-crisis**	**Crisis**	**Pre-crisis**	**Crisis**	**Pre-crisis**	**Crisis**	**Pre-crisis**
Constant	14.118***	14.385***	0.645***	0.634***	15.522***	12.772***	22.997***	10.333***
	(7.1192)	(6.955)	(23.488)	(22.858)	(25.752)	(88.050)	(11.617)	(5.572)
D_{CS}	-5.926***	3.366***	-0.231***	0.111	-15.455***	0.7045*	-8.932***	17.382***
	(2.527)	(2.536)	(3.988)	(2.305)	(2.586)	(1.887)	(2.489)	(3.854)
D_{CT}	-0.442	2.025***	-0.143***	0.249***	-8.907***	3.305***	3.832**	5.280
	(0.401)	(4.583)	(4.083)	(5.980)	(2.389)	(15.167)	(1.977)	(1.451)
Control variables	yes	yes	yes	yes	yes	yes	yes	yes
Nobs	10531	2689	11157	2860	5998	689	561	153
R^2	0.224	0.375	0.314	0.507	0.003	0.164	0.193	0.300

	ln*Zscore*		σ_{ROA}		σ_{SR}	
	Crisis	**Pre-crisis**	**Crisis**	**Pre-crisis**	**Crisis**	**Pre-crisis**
Constant	-3.815***	-3.706***	0.297***	0.304***	9.041 ***	2.646***
	(50.913)	(52.037)	(9.012)	(9.277)	(4.228)	(11.198)
D_{CS}	1.075***	0.693***	0.126***	0.058	7.767***	10.385
	(7.961)	(3.567)	(2.923)	(0.760)	(2.325)	(0.712)
D_{CT}	0.200***	0.343***	0.012	0.082**	6.584*	7.932
	(2.923)	(3.680)	(0.483)	(1.963)	(1.841)	(0.892)
Control variables	yes	yes	yes	yes	yes	yes
Nobs	11036	2815	10516	2698	581	162
R^2	0.084	0.020	0.166	0.082	0.758	0.909

Note

1. In the crisis equations, the dependent variable is calculated based on years 2007-2009, and the capital suspicious/capital trustable banks are determined for 2006.
2. In the pre-crisis equations, the dependent variable is calculated based on the years 2005-2006, and the capital suspicious/capital trustable banks are determined for 2004.
3. D_{CS} is a dummy variable for capital suspicious banks (CAR>10% and LR <5%); D_{CT} is a dummy variable for capital trustable banks (CAR>10% and LR >5%).
4. The four profit performance variables are *ROE*, return on equity; *ROA*, return on assets; *NonII*, non-interest income divided by total equities; *SR*, stock returns, and the three risk performance variables are *lnZscore*, σ_{ROA} , and σ_{SR} , which are defined in Table 1. The other variable definitions are as in Table 1.
5. The Nobs are the number of observations; R^2 are the coefficients for determinants; *, **, and, *** denote significance levels of 10%, 5%, and 1%, respectively.
6. The table uses White heteroscedasticity consistent estimates and weighted least squares regressions where weights are the square roots of the residuals.

Table 8. Effects of high and low LR banks on profit and risk performances

A. Profit performance

	ROE		***ROA***		***NonII***		***SR***	
	Crisis	**Pre-crisis**	**Crisis**	**Pre-crisis**	**Crisis**	**Pre-crisis**	**Crisis**	**Pre-crisis**
$D_{\text{Low LR}}$	-5.932***	0.619	-0.167***	0.089*	-24.670	-1.483	-5.520	-7.778
	(2.919)	(0.466)	(3.089)	(1.775)	(0.982)	(0.507)	(1.215)	(1.338)
$D_{\text{High LR}}$	-0.212	1.876***	-0.130***	0.263***	-16.212	-0.143	-0.526	-1.537
	(0.183)	(3.944)	(3.530)	(5.863)	(0.903)	(0.060)	(0.127)	(0.259)
Control variables	yes	yes	yes	yes	yes	yes	yes	yes
Nobs	11157	2860	11157	2860	5998	689	598	167
R^2	0.138	0.314	0.314	0.507	0.004	0.164	0.173	0210

Risk Performance

	ln*Zscore*		σ_{ROA}		σ_{SR}	
	Crisis	**Pre-crisis**	**Crisis**	**Pre-crisis**	**Crisis**	**Pre-crisis**
$D_{\text{Low LR}}$	1.091***	0.607***	0.248***	0.164***	-0.645	2.801
	(9.150)	(4.353)	(5.182)	(2.122)	(0.259)	(0.730)
$D_{\text{High LR}}$	0.189***	0.352***	0.013	0.089**	2.196	0.824
	(2.688)	(3.590)	(0.502)	(2.007)	(0.587)	(0.204)
Control variables	yes	yes	yes	yes	yes	yes
Nobs	11036	2815	10516	2698	579	166
R^2	0.084	0.021	0.169	0.089	0.035	0.032

Note

1. In the crisis equations, the dependent variable is calculated based on years 2007-2009, and the high/low LR banks are determined for 2006.
2. In the pre-crisis equations, the dependent variable is calculated based on the years 2005-2006, and the high/low LR banks are determined for 2004.
3. $D_{\text{Low LR}}$ is a dummy variable for banks with LR <5%; $D_{\text{High LR}}$ is a dummy variable for banks with LR >5%.
4. The four profit performance variables are *ROE*, return on equity; *ROA*, return on assets; *NonII*, non-interest income divided by total equities; *SR*, stock returns, and the three risk performance variables are *lnZscore*, σ_{ROA} , and σ_{SR} , which are defined in Table 1. The other variable definitions are as in Table 1.
5. The Nobs are the number of observations; R^2 are the coefficients for determinants; *, **, and, *** denote significance levels of 10%, 5%, and 1%, respectively.
6. The table uses White heteroscedasticity consistent estimates and weighted least squares regressions where weights are the square roots of the residuals.

Table 9. Effects of capital suspicious and trustable banks on risk performance using the European countries sample

	ROE		***ROA***		***NonII***		***SR***	
	Crisis	**Pre-crisis**	**Crisis**	**Pre-crisis**	**Crisis**	**Pre-crisis**	**Crisis**	**Pre-crisis**
Constant	5.364***	5.092***	0.579***	0.543***	14.841***	16.072***	1.773	-6.417***
	(155.853)	(160.053)	(165.354)	(166.285)	(100.731)	(81.029)	(1.252)	(14.362)
D_{CS}	-4.541***	4.574***	-0.143***	0.129***	-8.064*	2.863*	-5.471**	9.837**
	(4.027)	(5.503)	(3.029)	(2.251)	(1.880)	(1.885)	(1.989)	(1.984)
D_{CT}	0.406**	4.004***	-0.009	0.472***	-0.575	1.360*	-3.688***	13.649***
	(2.071)	(12.453)	(0.413)	(7.423)	(0.504)	(1.822)	(2.363)	(3.300)
Control variables	yes	yes	yes	yes	yes	yes	yes	yes
Nobs	7854	1806	8435	1948	4579	222	236	52
R^2	0.146	0.364	0.320	0.447	0.003	0.275	0.167	0.254

	ln*Zscore*		σ_{ROA}		σ_{SR}	
	Crisis	**Pre-crisis**	**Crisis**	**Pre-crisis**	**Crisis**	**Pre-crisis**
Constant	-4.745***	-4.714***	0.241***	0.242***	13.253***	32.104***
	(200.417)	(212.528)	(59.190)	(62.949)	(166.814)	(6.972)
D_{CS}	1.079***	1.076***	0.189***	0.069	1.495***	10.115***
	(6.389)	(5.306)	(3.901)	(1.456)	(4.227)	(5.904)
D_{CT}	0.469***	1.053***	0.056**	0.279***	1.384***	-3.177***
	(6.190)	(8.161)	(1.989)	(4.213)	(3.978)	(2.131)
Control variables	yes	yes	yes	yes	yes	yes
Nobs	8326	1910	7844	1812	255	60
R^2	0.048	0.010	0.188	0.090	0.751	0.913

Note

1. In the crisis equations, the dependent variable is calculated based on years 2007-2009, and the capital suspicious/capital trustable banks are determined for 2006.
2. In the pre-crisis equations, the dependent variable is calculated based on the years 2005-2006, and the capital suspicious/capital trustable banks are determined for 2004.
3. D_{CS} is a dummy variable for capital suspicious banks (CAR>10% and LR <5%); D_{CT} is a dummy variable for capital trustable banks (CAR>10% and LR >5%).
4. The four profit performance variables are *ROE*, return on equity; *ROA*, return on assets; *NonII*, non-interest income divided by total equities; *SR*, stock returns, and the three risk performance variables are *lnZscore*, σ_{ROA} , and σ_{SR} , which are defined in Table 1. The other variable definitions are as in Table 1.
5. The Nobs are the number of observations; R^2 are the coefficients for determinants; *, **, and, *** denote significance levels of 10%, 5%, and 1%, respectively.
6. The table uses White heteroscedasticity consistent estimates and weighted least squares regressions where weights are the square roots of the residuals.