Stock market listing and the persistence of bank performance across crises

This draft: December 2017

Alexandre Garel [1]

Auckland University of Technology & Labex-ReFi

Jose Martin-Flores [2]

ESCP Europe & LabEx-ReFi

Arthur Petit-Romec [3]

SKEMA Business School – Université Côte d'Azur & LabEx-ReFi

Abstract

This paper examines whether stock market listing influences the persistence of bank performance across crises. We find that for both publicly and privately held banks, bank performance during the 1998 crisis is a strong predictor of bank performance during the 2007–2008 crisis. However, while for publicly held banks the persistence is uniquely driven by bottom performers, for privately held banks the persistence is also driven by a group of top performers. Auxiliary analyses reveal that among privately held banks that were top performers in 1998, banks that transition from privately to publicly held between the two crises significantly underperform their counterparts that remained private. This effect is more pronounced when transitioning banks face greater short-term pressure from financial markets. Overall, the results are consistent with the idea that stock market listing induces short-term pressures that weigh negatively on the ability of banks to persistently perform well during crises.

JEL Classification: G21; G23

Keywords: Bank performance; Crisis; Stock market listing

We are very grateful to Rüdiger Fahlenbrach for constructive insights. We also thank Alberta Di Giuli, Pramuan Bunkanwanicha, Julien Fouquau, Bart Frijns, Christophe Moussu, Michael Troege, Alireza Tourani-Rad, Ryan Williams and seminar participants at the Auckland University of Technology and Paris 1 Sorbonne University. This work was achieved through the Laboratory of Excellence on Financial Regulation (Labex ReFi) supported by PRES heSam under the reference ANR-10-LABX-0095.

[1]Auckland University of Technology, 55 Wellesley St E, Auckland, 1010, New Zealand. +64 9-921 9999 ; alexandre.garel@aut.ac.nz

[2] ESCP Europe, 79 avenue de la République 75543 Paris Cedex 11, France. +33(0) 1 49 23 20 00; Fax: + 33 (0)1 43 55 99 63; jose_maria.martin_flores@edu.escpeurope.eu

[3] SKEMA Business School, Pôle Universitaire Leonard De Vinci, Esplanade Mona Lisa, Paris La Defense; arthur.petitromec@skema.edu

[1 2 3]Labex-ReFi, the Laboratory of Excellence on Financial Regulation, Paris, France.

1. Introduction

Better understanding the performance of financial institutions during crises is an important issue that has received increased attention in the past decade. Empirical evidence highlights several key determinants of bank performance during the 2007–2008 crisis, including bank capital and funding structures (e.g., Beltratti and Stulz, 2012; Berger and Bouwman, 2013; Demirguc-Kunt et al., 2013), corporate governance (e.g., Erkens et al., 2012; Fahlenbrach and Stulz, 2011; Minton et al., 2014), risk-management practices (e.g., Aebi et al., 2012; Ellul and Yerramilli, 2013), and ownership structure (Garel and Petit-Romec, 2017). In a related article, Fahlenbrach et al. (2012) report that one of the most important determinants of bank performance during the 2007–2008 crisis is bank performance during the 1998 crisis. Their results are consistent with the existence of a persistent business model that makes some banks particularly vulnerable to crises.

In this paper, we examine whether the persistence of bank performance across crises is a specificity of publicly held banks or whether it also applies to privately held banks. Previous literature supports the view that stock market listing influences various corporate policies in non-financial firms (e.g., Asker et al., 2014; Bernstein, 2015; Brav, 2009; Michaely and Roberts, 2012). However, empirical evidence on the effects of stock market listing in banks is relatively scarce. We attempt to fill this gap by focusing on the links between stock market listing and bank performance during crisis periods. We focus on the two worst financial crises since the Great Depression: The 1998 crisis and the 2007-08 crisis[1]. If stock market listing influences the ability of a bank to perform well during crises, it would have potentially

[1] These two crises had important effects on the real economy as bank borrowers were significantly affected by the performance of their banks during these crises (e.g., Chava and Purnanandam, 2011; Chodorow-Reich, 2014).

important implications for understanding the performance of banks during crises and how that performance can be improved through regulation.

Because privately held banks do not have any stock price data, we rely on accounting measures of bank performance throughout the analysis. We begin our empirical analysis by examining whether the results of Fahlenbrach et al. (2012) hold when we use accounting-based measures of bank performance instead of stock performance during the crisis. Using a sample of 387 publicly held U.S. banks,[2] we show that the return on assets (ROA) of public banks in the 2007–2008 crisis is positively related to that of the 1998 crisis. The result is highly statistically significant and robust to the introduction of various pre-crisis characteristics of banks.[3]

Next, we examine the persistence of bank performance across crises for privately held banks. We reproduce the same regressions as for publicly held banks. One issue is that privately held firms are generally smaller than publicly held firms. To alleviate the concern that any observed differences between publicly and privately held banks may be driven by size differences rather than stock market listing, we follow Asker et al. (2014) and Gao et al. (2013) and use a matching procedure based on size.[4] This matching procedure leads to a sample of 387 privately held banks.[5] Using this sample, we show that the ROA of privately held banks in the 1998 crisis is strongly associated to their ROA in the 2007–2008 crisis. As for publicly held banks, the result is highly statistically significant and robust to the introduction of various pre-crisis characteristics. These findings indicate that the persistence of bank performance across crises is not a specificity of publicly held banks but also exists for

[2] As discussed in Section 2, we consider a bank publicly held if it either is listed on a U.S. stock market or is part of a publicly traded bank holding company (BHC).
[3] We obtain similar results if we use return on equity (ROE) instead of ROA.
[4] The matching procedure in the two aforementioned articles is based on size and industry. However, as our paper focuses on a single industry, we use only a matching based on size.
[5] As we match with replacement, the number of matched private banks is inferior to the number of matched public banks.

private banks. We then look at which banks drive this persistence. For publicly held banks, in line with Fahlenbrach et al. (2012), we find that the correlation between crisis ROAs is driven by the quintile of bottom performers. However, in the case of privately held banks, we find that the correlation between crisis ROAs is driven by both best and worst performers. This finding indicates that, in the case of private banks, there is a persistence of good performance (i.e., banks that did well during the 1998 crisis again do well during the 2007–2008 crisis).

So far, our results suggest that stock market listing is detrimental to the persistence of good bank performance across crises. To shed further light on this issue, we exploit the fact that some banks that were private in 1998 made a private-to-public transition between the two crises. We match these banks with banks that were private in 1998 and remained private during the whole sample period. If stock market listing is detrimental to the persistence of good performance across crises, becoming publicly held should have a negative impact on bank performance during the recent financial crisis mainly for banks that were good performers in 1998. This is exactly what we find. We show that among banks that made the private-to-public transition, only those that were top performers during the 1998 crisis significantly underperformed their privately held counterparts during the 2007–2008 financial crisis. This finding provides further supporting evidence that stock market listing is detrimental to the persistence of good performance across crises.

Existing evidence for non-financial firms suggests that stock market listing may induce short-term pressure (e.g., Asker et al. 2014). In additional tests, we seek to examine the relevance of the short-term pressure hypothesis to explain our results. If this is the case, the detrimental effect of becoming publicly listed on bank performance during the crisis should be more pronounced for the group of transitioning banks experiencing a higher short-term pressure. When a bank becomes publicly listed, it undergoes important changes in its ownership structure. Previous research suggests that short-term investors impose pressure to

meet short-term earnings targets while long-term investors induce managers to invest for the long run (e.g., Bushee, 1998; Chen et al., 2007; Derrien et al., 2013; Gaspar et al., 2005; Stein, 1996). Thus, transitioning banks with a high proportion of short-term investors after the transition should be subject to a greater short-term pressure than transitioning banks with a lower proportion of short-term investors. Consistent with the short-term pressure hypothesis, our results indicate that among privately held banks that were top performers during the 1998 crisis, banks that made the private-to-public transition perform worse than their peers during the 2007–2008 crisis only when they have a larger fraction of short-term investors. In contrast, transitioning banks that have a higher fraction of long-term investors do not underperform compared with banks that remained privately held. Overall, our findings provide supporting evidence that stock market listing, through the short-term pressure it induces, weighs negatively on the ability of a bank to perform well across crises.

In complementary tests, we further explore whether banks that made the private-to-public transition with more short-term investors and those that remained privately held have different pre-crisis characteristics. While we do not observe any significant differences between the two groups in 1997 (i.e., before the 1998 crisis), we find that banks with more short-term investors have lower bank capital, more asset growth, and more short-term funding in 2006. Previous research shows that asset growth, leverage, and short-term funding have a negative impact on bank performance during crisis periods (e.g., Fahlenbrach et al. 2012). Overall, our results provide evidence supporting the idea that short-term pressure from financial markets induces banks to change some important aspects of their business model that are detrimental to their ability to perform well during crisis periods.

Our paper is related to several streams of research in banking and corporate finance. First, it contributes to the literature investigating the determinants of bank performance during crises. A large part of what is known about the determinants of bank performance during the

2007–2008 crisis is based on evidence from publicly held banks (e.g., Beltratti and Stulz, 2012; Ellul and Yerramilli, 2013; Erkens et al., 2012; Fahlenbrach and Stulz, 2011; Minton et al., 2014). Further research is necessary to assess whether the determinants of bank performance during crises highlighted for public banks also apply to private banks. Our results show that as for public banks, there is persistence in bank performance across crises for private banks. However, the results also highlight a specificity of private banks: banks that did well in the 1998 crisis do well again in the 2007–2008 crisis. Our findings suggest that publicly held banks may be subject to more short-term pressure that, in turn, affects their ability to maintain sound business models and persistently perform better in crises.

Our paper is also related to the corporate finance literature investigating the impact of stock market listing on various corporate policies. Asker et al. (2014) show that compared with private firms, public firms invest substantially less and are less responsive to changes in investment opportunities. Bernstein (2015) reveals that going public changes firms' strategies in pursuing innovation. Michaely and Roberts (2012) show that private firms smooth dividends less than public firms, and Brav (2009) shows that private firms rely more on debt financing. Our paper complements this literature by focusing on banks and showing that stock market listing may induce a shift towards a more risky business model that in turn affects the ability of a bank to perform well across crises.

The rest of the paper proceeds as follows. Section 2 presents our sample of public and private banks and the empirical methodology. Section 3 presents the results. Section 4 concludes.

2. Data and methodology

2.1 Data sources and sample construction

Our data come from three main sources. Balance sheet and income statement data come from Call Reports. Data on whether or not a bank is publicly listed comes from CRSP, and data on investor horizons is based on Thomson Reuters Institutional (13F) Holdings database.[6] The starting point for the formation of our sample comprises all U.S. banking entities that are present in the Reports of Condition and Income (Call Reports) at the end of the second quarter of 1998. In line with Berger and Bouwman (2009, 2013), Kashyap et al. (2002), and Kashyap and Stein (2000), we work with data at the individual bank level.[7] We exclude banks that are not located in the United States and banks that are fully held by foreign owners, to keep our focus on U.S. banks. We also exclude banks that are not categorized as commercial banks[8] and banks that are out of the traditional banking business.[9] To ensure that our sample only includes "true" commercial banks, we further remove all entities for which loans or deposits are equal to zero. Bank organizations with total assets less than $150 million are excluded. Finally, we restrict the sample to those banking entities that have the same identifier (RSSD9001) in 1998 Q2 and 2007 Q3. Following Fahlenbrach et al. (2012), we allow banks to merge and change names between 1998 Q2 and 2007 Q3. As long as the RSSD9001 is the same in 1998 Q2 and 2007 Q3, we include the merger in our sample.

We then determine whether a bank is publicly held. More precisely, we consider a bank publicly held if the bank itself is listed on a stock market or if it is under the umbrella of a

[6] Since 1978, the SEC requires all institutions with more than $100 million of securities under discretionary management to report their holdings. All common-stock positions greater than 10,000 shares or $200,000 must be disclosed.

[7] As Kashyap and Stein (2000) discuss, an alternative approach is to work with aggregated data at the level of the top holder entity. However, it is not obvious whether this approach is more appropriate. Given that the focus of the regulator tends to be on individual banks, we decide to study the performance across crises at this level. Nonetheless, in robustness tests, we reproduce our baseline analysis using data at an aggregated level (RSSD9348) and find that our findings are unchanged.

[8] We exclude those banks for which the variable RSSD9331 is different from 1 and those for which IDs correspond to branches (RSSD9346 having the indicator DBR).

[9] We remove all entities that are not considered banks according to the variable RSSD9044.

publicly listed BHC in 2006.[10] To determine whether an entity is public or belongs to a BHC that is public, we link Call Reports and CRSP data using the PERMCO-RSSD correspondence file available at the New York Fed website.[11] If the bank (or its BHC) has a stock price on CRSP in 2006, we classify it as publicly held. This classification leads to a sample of 2,459 banks, 512 of which are publicly held and 1,947 privately held.

2.2 Main dependent and independent variables

Our main dependent variable is the accounting performance of banks during the 2007–2008 crisis. While several studies on the determinants of bank performance during crises focus on stock performance (e.g., Aebi et al., 2012; Beltratti and Stulz, 2012; Fahlenbrach et al., 2012), we rely on accounting measures of bank performance throughout the analysis because our focus is on both publicly and privately held banks. Following Fahlenbrach and Stulz (2011), we use the crisis ROA and the crisis ROE as measures of accounting performance. The former is computed as the cumulative quarterly net income from 2007 Q3 to 2008 Q3 divided by total assets at the end of 2007 Q2. For ROE, we divide the cumulative quarterly net income by the book value of equity at the end of 2007 Q2. The 2007–2008 crisis obviously did not end in 2008 Q3. However, in line with previous studies (e.g., Fahlenbrach and Stulz, 2011), we stop the calculation of our measures of accounting performance at that point in time to avoid biases in the computation of our dependent variables due to the initiation of the Troubled Assets Relief Program (TARP) at the beginning of the fourth quarter of 2008.[12]

[10] To identify whether a bank is held by a BHC, we link subsidiaries to their top holder entity (RSSD9348) in Call Reports.

[11] See https://www.newyorkfed.org/research/banking_research/datasets.html.

[12] Research on this topic shows that the behavior of banks was influenced by this program (Berger and Roman, 2015; Fahlenbrach and Stulz, 2011). Therefore, we find it appropriate to stop our measure of performance before the initiation of the TARP to avoid biases in the computation of our dependent variables. For the banks that

Our main independent variable is the accounting performance of banks during the 1998 crisis. In line with Berger and Bouwman (2013) and Fahlenbrach et al. (2012), we consider that the 1998 crisis period corresponds to the last two quarters of 1998. We thus compute the ROA for the 1998 crisis as the cumulative net income over 1998 Q3 and 1998 Q4 divided by the total assets of each bank at the end of 1998 Q2. Alternatively, for the ROE we divide the cumulative net income over the crisis period by the book value of equity at the end of 1998 Q2.

Our control variables include various potential determinants of bank performance during the 2007–2008 crisis. We measure all the variables as of the end of fiscal year 2006. Specifically, we control for Tier 1 ratio, defined as Tier 1 capital to risk-weighted assets; size, defined as the natural logarithm of total assets; pre-crisis ROA (ROE), defined as the cumulative net income over the five quarters before 2006 Q4[13] divided by total assets (total equity) in 2005 Q3; the ratio of non-performing loans to total loans[14]; the ratio of deposits to total assets; the ratio of liquid assets to total assets; and the loan ratio. Finally, we also control for a dummy variable that captures whether or not a bank is held by a BHC. A detailed definition of all our control variables is available in the Appendix. We winsorize all continuous variables at the 1% and 99% levels.

2.3 Empirical methodology

We investigate the persistence of accounting performance of individual banks across crises using cross-sectional regressions of the ROA (or ROE) of a bank in the 2007–2008 crisis on its ROA in the 1998 crisis. Formally, our baseline results come from running the following OLS regression for publicly held banks and privately held banks separately:

---

disappear from the sample before 2008 Q3, we compute the cumulative net income until the last quarter they are in the sample.

[13] We compute ROA in this way to be consistent with the measurement of our dependent variables.

[14] The ratio of non-performing loans is often used as a measure of asset risk.

$$Crisis\ RoA\ 07/08_i\ or\ Crisis\ RoE\ 07/08_i = \beta_0 + \beta_1 Crisis\ RoA98_i\ or\ Crisis\ RoE98_i + \beta_i X_i + u_i \quad (1)$$

We also use the following regression to test whether the persistence of bank performance in crises is statistically different for privately and publicly held banks. The variable *publicly held* is a dummy variable that equals 1 if the bank is classified as publicly held and 0 otherwise:

$$Crisis\ RoA\ 07/08_i\ or\ Crisis\ RoE\ 07/08_i = \beta_0 + \beta_1 Crisis\ RoA98_i\ or\ Crisis\ RoE98_i + \beta_2 Publicly\ held + \beta_3 Crisis\ RoA98_i\ or\ Crisis\ RoE98_i * Publicly\ held + \beta_i X_i + u_i \quad (2)$$

The main dependent variable is bank accounting performance in the 2007–2008 crisis, and the main independent variable is bank accounting performance in the 1998 crisis. X_i is a set of control variables, including several determinants of bank performance during the crisis. In addition to testing the persistence of bank performance across crises for public and private banks, we are interested in analyzing whether there are asymmetries in the relation between accounting performance during the 1998 crisis and during the 2007-2008 crisis. That is, we examine whether the persistence of bank performance across the two crises is driven by good performers (i.e., banks that did well in 1998 again doing well in the recent crisis) or bad performers (i.e., banks that did poorly in 1998 again doing poorly). To do so, we split banks into quintiles based on their performance in the 1998 crisis and create indicator variables for each of the five groups. In some specifications, we therefore replace accounting performance during the 1998 crisis with these indicator variables.

2.4 Matching

As discussed in Section 2.1, our initial sample comprises 2,459 banks, 512 of which are publicly listed and 1,947 privately held. Private firms are generally smaller than public firms (e.g., Asker et al., 2014). This raises the concern that any observed differences between public

and private banks may be driven by size differences rather than stock market listing. For example, previous research documents differences across banks of different size in terms of portfolio composition (Kashyap et al., 2002), performance during crises (Berger and Bouwman, 2013), and business models (Köhler, 2015). To address this concern and control for observable differences between public and private banks, we follow Asker et al. (2014) and Gao et al. (2013) and use a matching procedure. The aim of this procedure is to have a group of private banks and a group of public banks that are comparable. Figure 1 a) shows a kernel density graph of the size distribution for both groups measured by the natural logarithm of total assets at the end of 2006. We observe a large difference in size between publicly and privately held banks.

We use a propensity score matching based on size to minimize the difference in terms of size between the groups of public and private banks (Rosenbaum and Rubin, 1985). We run a probit regression of the natural logarithm of total assets on a dummy equal to one if the bank is publicly held and zero otherwise. For each public bank in 2006, we find the private bank with the closest propensity score. We do the matching without replacement so we finish with the same number of publicly and privately held banks. The matched observations remain in the sample, while we remove the observations that are not matched. The matched sample has 387 banks for each group. Figure 1 b) shows a kernel density graph on the natural logarithm of total assets for both samples after matching. The differences observed in Figure 1 a) are widely reduced after matching. Table 1 compares the characteristics of public banks and private banks. It shows that when we test whether the means of the two samples are different using a t-test, the null hypothesis that the means of the natural logarithm of total assets are equal between the groups of publicly and privately held banks cannot be rejected (p-value=0.61).

[*Insert Figure 1 about here*]

2.5 Summary statistics

Table 1 presents descriptive statistics for our main dependent and independent variables. The mean and median ROAs during the 2007–2008 crisis were 0.91% and 1.19%, respectively. The mean and median ROAs during the 1998 crisis were 0.63% and 0.64%, respectively. In contrast, pre-crisis ROAs were much higher, with a mean value of 1.75%. The statistics are similar for the ROE. The average bank has a ROE of 10.17% in the 2007–2008 crisis and 7.03% in the 1998 crisis, which is substantially lower than that in the pre-crisis period (19.66% in average).

The mean and median Tier 1 ratios are 11.71 and 10.64, respectively, well above the minimum regulatory requirements. The difference between publicly and privately held banks is statistically significant. The average bank in our sample has a deposit ratio of 80.15% and a loan ratio of 70.63%. The minimums for these two variables are 54.73% and 35.97%, respectively, confirming that our sample focuses on commercial banks. Finally, some variables present statistically significant differences between publicly and privately held banks. On average, privately held banks have higher deposit ratios, lower asset growth, higher real estate loans ratios and higher non-performing loans ratios. However, after matching, we find no statistical differences between the two groups in terms of the proportion of liquid assets, short-term funding and the ratio of loans to total assets.

[*Insert Table 1 about here*]

3. Results

3.1 Persistence of accounting performance across crises for public and private banks

We begin by examining the persistence of performance across the 1998 and 2007–2008 crises for the group of publicly held banks. Using a sample of public banks and focusing on stock performance, Fahlenbrach et al. (2012) document a strong persistence of bank

performance across crises. We are therefore interested in whether the results of Fahlenbrach et al. (2012) hold when using accounting-based measures of bank performance instead of stock performance.

Table 2, Panel A, presents regressions, where the dependent variable is accounting performance in the 2007–2008 crisis and the main independent variable is accounting performance in the 1998 crisis. Columns 1 and 4 present results for public banks, Columns 2 and 5 for private banks, and Columns 3 and 6 for public and private banks together. For public banks, the results indicate that the crisis ROA of 1998 has strong predictive power for the ROA in the 2007–2008 crisis. The effect appears statistically and economically significant. According to Column 1, in the cross-section of public banks, a one standard deviation increase in ROA in the 1998 crisis is associated with a 0.25% (0.732*0.34) increase in the ROA in the 2007–2008 crisis. Relative to a sample mean of 0.74, this corresponds to a 34% increase. Column 4 shows that the results are similar if we use ROE instead of ROA as a measure of accounting performance. Indeed, crisis ROE in 1998 has a strong and positive impact on ROE in the 2007–2008 crisis. This confirms that the persistence of bank performance across crises also holds when using accounting-based measures of bank performance instead of stock performance.

[*Insert Table 2 about here*]

The results from Columns 2 and 5 show that there is also a strong persistence of bank performance across crises for privately held banks. As in the case of publicly held banks, the ROA in the 1998 crisis of a privately held bank has strong predictive power for its ROA in the 2007–2008 crisis. The effect is also statistically and economically significant. In the cross-section of private banks, a one standard deviation increase in ROA in the 1998 crisis is associated with a 0.47% (1.434*0.33) increase in the ROA in the 2007–2008 crisis. Relative

to a sample mean of 1.07, this corresponds to a 44% increase. Column 5 shows that the results are similar if we use ROE instead of ROA as a measure of accounting performance. Thus, the persistence of bank performance across crises is not a specificity of public banks, as it also exists for private banks.

In Columns 3 and 6, we examine whether the predictive power of the 1998 crisis ROA (ROE) is of similar magnitude for public and private banks. To do so, we pool public and private banks together and interact the 1998 crisis ROA with a publicly held indicator variable. According to these specifications, the interaction between 1998 crisis ROA and the publicly listed dummy has a negative significant effect and the 1998 crisis ROA remains positive and highly significant. This suggests that the persistence of bank performance across crises is of greater magnitude for privately than for publicly held banks. We further explore this difference. While we find strong persistence of bank performance across crises for both public and private banks, it is not necessarily driven by the same banks in the two cases. We thus examine whether the persistence is driven by banks that did well in 1998 doing well again in 2007–2008 or by banks that did poorly in 1998 doing poorly again. Following Fahlenbrach et al. (2012), we split banks into quintiles based on their crisis ROA (ROE) in 1998 and create indicator variables for each quintile. Crisis ROA 98-q1 contains all banks whose crisis ROA in 1998 is in the lowest quintile, while Crisis ROA 98-q5 contains all banks whose crisis ROA in 1998 is in the highest quintile. We replace the crisis ROA in 1998 by the quintile indicator variables and rerun our main regressions from Panel A of Table 2. The omitted quintile is Crisis ROA 98-q3. Panels B and C report the results for public and private banks, respectively.

In the case of public banks, the results from Panel B indicate that banks that performed poorly in 1998 (i.e., banks in the bottom quartile in 1998) did so again in the 2007–2008 crisis. Crisis ROA 98-q2 and even more Crisis ROA 98-q1 have a strong and negative impact

on ROA in the 2007–2008 crisis. By contrast, the top quintile indicator variables are not statistically significant. We find similar results if we use ROE instead of ROA as a measure of accounting performance. In both cases, we observe that the persistence of bank accounting performance in the 1998 crisis and the 2007-08 crisis is driven by the group of worst performers.

In the case of private banks, the results from Panel C indicate that private banks that performed poorly in 1998 (i.e., banks in the bottom quartile in 1998) did so again in the 2007–2008 crisis. Crisis ROA 98-q1 has a strong and negative impact on ROA in the 2007–2008 crisis. However, in sharp contrast with public banks, we also find that private banks that performed well in the 1998 crisis continued to do so in the 2007–2008 crisis. In the case of private banks, the persistence of bank performance across crises is thus at least partially driven by best performers and not only by worst performers, as is the case for the group of public banks. This difference explains a persistence of a higher magnitude for privately held banks in Panel A. The results from Columns 3 and 4, in which we use ROE instead of ROA, confirm that in the case of private banks, the persistence is not only driven by worst performers but also by a group of best performers that did well in both crises.

So far, our empirical analysis of the persistence of bank performance in crises highlights two main findings. First, the persistence of bank performance across crises, previously documented by Fahlenbrach et al. (2012) for publicly held banks, also exists and if anything is even stronger for privately held banks. Second, while in the case of publicly held banks, the persistence is uniquely driven by worst performers, in the case of privately held banks, we find a persistence of good performance in crises (i.e., private banks that did well in 1998 again do well in the 2007–2008 crisis). These findings suggest that stock market listing can be detrimental to the persistence of good bank performance across crises. In the next sub-section,

we provide auxiliary analyses to further examine whether and how stock market listing weighs on the ability of a bank to persistently perform well during crises.

3.2 Stock market listing, short-term pressure, and the persistence of good performance across crises

In this sub-section, we aim to shed further light on the detrimental effect of stock market listing on the ability of some banks to persistently perform well in crises. To address this issue, we exploit the fact that some banks that were privately held in 1998 made a private-to-public transition between the two crises. Specifically, we examine whether and for which banks transitioning to publicly held status between the two crises influences bank performance during the 2007–2008 crisis. If stock market listing is detrimental to the persistence of good performance across crises, this would predict that becoming publicly held has a negative impact on bank performance during the 2007–2008 crisis mainly for banks that were good performers in 1998.

To examine this issue, we begin by identifying banks that transitioned from private to public status after the 1998 crisis. In line with our identification of publicly held banks in Section 2, we consider that a bank became publicly held if it was private in 1998 and then either went public (or its BHC went public) or became part of a BHC that was publicly listed between 1999 Q1 and 2006 Q4. We further require that the stock market listing status remains the same until 2006 Q4. We find that 253 banks in our sample transitioned from being privately held to publicly held between the two crises. We then match the sample of transitioning banks with banks that were private in 1998 and remained private over the whole sample period using a nearest-neighbor matching based on a propensity score as described in Section 2.4.[15] The matched sample has 252 banks that made the private-to-public transition

[15] We use size as the sole criterion for matching. We do the matching without replacement.

and 252 banks that remained private. As Table 3, Panel A, shows, the t-test gives a *p*-value of 0.886 when we test whether the mean difference of the variable *Ln(assets)* is significant between the two groups.

We then use this matched sample to assess the impact of the interaction between the 1998 crisis ROA and a dummy *Transition*[16] on bank performance during the 2007–2008 crisis. Table 3, Panel A, reports the summary statistics of this sample and Panel B the regression results. To examine whether transitioning to publicly held status between the two crises mainly have an effect for banks that were good performers in 1998, we split this matched sample into three groups based on their performance in the 1998 crisis. We then run regressions of bank performance in the 2007–2008 crisis on a dummy equaling 1 if a bank transitioned from private to public status and 0 otherwise for the bottom (Column 1), medium (Column 2) and top (Column 3) tercile of performance. Control variables are the same as in the previous regressions. The results indicate that the *transition* dummy does not have a significant impact on bank performance for banks that were bottom or medium performers in the 1998 crisis. By contrast, the results in Column 3 show that the transition dummy has a strong and negative impact on bank performance in the 2007–2008 crisis. This indicates that among banks that were top performers in 1998, those becoming publicly held between the two crises did significantly worse during the 2007–2008 crisis than their top- performing counterparts that remained private. Overall, the results from Table 3 offer further supporting evidence that stock market listing is detrimental to the persistence of good performance in crises.

[*Insert Table 3 about here*]

[16] This variable takes the value of 1 if the bank transitioned from privately to publicly held and 0 otherwise.

A possible explanation is that stock market listing induces short-term pressure that is detrimental to the persistence of good performance across crises. In particular, transitioning from private to public status may impose short-term pressure that impedes private banks that were good performers in 1998 from maintaining a sound business strategy and continuing to perform well in the next crisis. In the rest of this sub-section, we examine the relevance of this short-term pressure explanation.

To do so, we begin by differentiating banks that become publicly held according to the pressure they face from financial markets to focus on short-term performance. If short-termism explains the detrimental effect of stock market listing on the persistence of good performance across crises, this effect should be more pronounced for banks facing greater short-term pressure. As a proxy for the pressure to focus on short-term performance, we use investor horizons and, in particular, short-term investor ownership. This proxy is motivated by previous research on investor horizons showing that short-term investors impose pressure on managers to meet short-term earnings targets while long-term investors induce managers to invest for the long run (e.g., Bushee, 1998; Chen et al., 2007; Derrien et al., 2013; Gaspar et al., 2005; Stein, 1996). In addition to investor horizons, we focus on the presence of blockholders. Prior research shows that blockholders play a critical role in monitoring managers, deterring managerial myopia, and pushing managers to invest for the long run (e.g. Edmans, 2009; Edmans and Holderness, 2016).

To measure investor horizons, we follow recent literature in corporate finance and banking and compute several measures of investor horizons at the bank level (e.g., Derrien et al., 2013; Garel and Petit-Romec, 2017; Gaspar et al. 2005). Although it is impossible to directly observe the investment horizon of a given investor, it is revealed over time through the investor's trading behavior. To compute our first measure of short-term investor ownership, we therefore follow Derrien et al.'s (2013) approach and capture an institutional investor's

investment horizon based on its portfolio turnover. Using quarterly data from 13F Thomson Files, we compute the portfolio turnover of each institutional investor as the price-weighted share of stocks that have been sold over the last 12 quarters. We then classify institutional investors as having either a short-term or a long-term horizon depending on their turnover as of the last quarter in 2006. Following Derrien et al. (2013), we classify institutional investors with portfolio turnover above (below) 35% as short-term investors (long-term investors). Finally, at the level of each bank, we compute the proportion of short-term investor ownership expressed as a percentage of the number of shares outstanding. We also use two additional measures of investor horizons at the bank level. The first is the weighted average of the portfolio turnover of a firm's investors, and the second is the weighted average of the portfolio churn ratios of a firm's investors computed following Cella et al. (2013). These variables are therefore inversely related to the average investment horizon of a bank's investors. A detailed definition of these three variables is available in the Appendix. For some of our transitioning banks (or for their BHC), we are not able to find information in the 13F files. Therefore, we drop those banks from the sample, which leaves us with 192 transitioning banks and 252 banks that remain private. Finally, following Holderness (2003), we define institutional investors that hold at least 5% of a firm's stocks as blockholders.

We then use these four variables to classify banks that made the private-to-public transition according to the extent to which they face short-term pressure. Specifically, we classify banks with short-term investor ownership, with average turnover or with average churn ratio above the median, as facing greater short-term pressure. Similarly, we classify banks with blockholder ownership below the median as facing greater short-term pressure. Finally, we split the transition dummy into two dummies to capture whether a transitioning bank faces high or low short-term pressure. *Transition high pressure* is a dummy variable that equals 1 if a bank becomes publicly held and has a higher proportion of short-term investors, higher

average turnover or churn ratio (i.e., above the median), or a lower portion of blockholders (i.e., below the median). Symmetrically, *Transition low pressure* is a dummy variable that equals 1 if a bank becomes publicly held and has a lower proportion of short-term institutional investors, lower shares turnover and churn ratio (i.e., below the median), and a higher portion of blockholders (i.e., above the median).

In Table 4, we reproduce our regression from Column 3 of Table 3, Panel B, replacing the transition dummy by the *Transition high pressure* and *Transition low pressure* dummies. The results show that among banks that were top performers in 1998, banks that became publicly held between the two crises do significantly worse than their counterparts that remained private only when they face greater short-term pressure (i.e., more short-term investor ownership, more average turnover, more churn ratio, and less blockholder ownership). By contrast, the dummy representing low short-term pressure from the market never turns out to be significant. Thus, banks that became publicly held but faced lower short-term pressure did not underperform compared with their top performer counterparts that remained private. Overall, the results from Table 4 lend empirical support to the idea that stock market listing induces short-term pressure that weighs negatively on the ability of a bank to persistently perform well across crises. We present only the results for the group of top performers for brevity reasons. In line with the results in Table 3, unreported tests reveal that the transition dummies never turn out to be significant for any of the other groups.[17]

[*Insert Table 4 about here*]

Finally, we explore whether banks that became publicly held and faced higher short-term pressure and their counterparts that remained private have different characteristics in the two pre-crisis periods. As we find only significant differences for the sample banks that were

[17] The results of these regressions are available on request.

among the best performers during the 1998 crisis, we limit our analysis to these banks. We perform a t-test for the difference in means for some bank level variables at the end of 2006 and at the end of 1997. Table 5 reports the results for each of our three measures of investor horizons. Positive values of the mean difference imply that transitioning banks (facing higher market pressure) have a higher mean value for the specific variable than privately held banks and vice versa. We observe that banks facing stronger short-term pressure tend to have significantly more asset growth, less capital, more short-term and wholesale funding in 2006. However, we find no significant difference between the two groups in terms of asset growth, bank capital, and short-term funding in 1997 (i.e., before the 1998 crisis),[18] except for short-term and wholesale funding when we use short-term investor ownership as a splitting variable.

Overall, the results from Table 5 provide suggesting evidence that short-term pressure from financial markets induces banks to change some important aspects of their business strategy that, in turn, are likely to be detrimental to their ability to perform well during crises. In particular, increasing asset growth, lower capital and the reliance on short-term debt are likely to be detrimental to a bank's ability to perform well during crises, as documented in previous studies (e.g., Berger and Bouwman, 2013; Fahlenbrach et al., 2016; Laeven and Majnoni, 2003). This result is in line with the idea that becoming publicly held encourages banks to increase risk (Falato and Scharfstein, 2016).

[*Insert Table 5 about here*]

3.3 Robustness

We conduct further empirical tests to examine whether our main results are sensitive to the empirical design that we have chosen. Table 6 shows the robustness tests. First, given that we

[18] For the variable *Short-Term investor Ownership*, we have 26 banks in the high group; 27 for the variable MTurnover and 28 for the MChurnRatio. For the variable *Blockholder ownership*, we have 35 banks.

compare public and private banks of similar size, a caveat is that our results may not generalize beyond large private banks.[19] In Table 6, Panel A, we therefore reproduce our regressions from Table 2, Panel B, for public banks and Table 2, Panel C, for private banks, but in this case, we do not apply any matching to the two samples. In the first four columns, we use Crisis ROA as a measure of performance, and in the last four columns, we use Crisis ROE. We find that our main results hold with this setting. In Columns 1 and 2, the worst performers drive the persistence of bank performance across crises for the sample of public banks. In Columns 3 and 4, both bottom and top performers drive the persistence of performance for private banks. These results are in line with our main results. The results using the ROE as a measure of performance in Columns 5 to 8 also confirm our main results. Second, we also run the same regression as previously but aggregate the data at the level of the top holder using the variable RSSD9348 in call reports as in Acharya and Mora (2015). Data for banks that are held by the same BHC are aggregated at this level. Banks that are not held by a BHC remain in the sample. This procedure leads to 274 entities in the publicly held group and 1,539 in the privately held group. In line with our approach at the bank-entity level, we keep only the BHCs (or stand-alone banks) that have the same identifier between 1998 Q2 and 2007 Q3. Panel B shows the results. Again, we find that the persistence of performance for publicly traded groups is driven by the worst performers doing badly across crises, while worst performers doing poorly and best performers doing well across crises is the pattern we find for private entities.

[*Insert Table 6 about here*]

[19] Alternatively, they may not generalize to large publicly listed banks. However, our matching procedure in Section 2.4 excludes a large fraction of private banks but only a small fraction of public banks.

4. Conclusion

This paper explores empirically whether stock market listing influences the persistence of bank performance across crises. We have two key results. First, we find that for both publicly and privately held banks, bank performance during the 1998 crisis is a strong predictor of its performance in the 2007–2008 crisis. This indicates that the persistence of bank performance across crises, first documented by Fahlenbrach et al. (2012) for a sample of U.S. publicly traded banks, also applies to privately held banks. Second, while for publicly held banks the persistence is uniquely driven by bottom performers, we show that in the case of privately held firms, the persistence is also driven by a group of top performers that did well during the 1998 crisis and continued to do so during the 2007–2008 crisis. We further show that among banks that were top performers in 1998, banks that made a private-to-public transition between the two crises significantly underperformed their counterparts that remained private. This effect is more pronounced when banks that became publicly held face greater short-term pressure from financial markets. Additional tests provide suggestive evidence that banks that became publicly held and faced higher short-term pressure changed some important aspects of their business strategy (more asset growth, less capital, more short-term funding) that are likely to be detrimental to their ability to perform well in crisis periods. This result is consistent with the idea that stock market listing induces short-term pressure that creates distortions in some banks' business model and weighs negatively on their ability to persistently perform well during crises.

References

Acharya, V.V., Mora, N., 2015. A Crisis of Banks as Liquidity Providers: A Crisis of Banks as Liquidity Providers. The Journal of Finance 70, 1–43. https://doi.org/10.1111/jofi.12182

Aebi, V., Sabato, G., Schmid, M., 2012. Risk management, corporate governance, and bank performance in the financial crisis. Journal of Banking and Finance 36, 3213–3226. https://doi.org/10.1016/j.jbankfin.2011.10.020

Asker, J., Farre-Mensa, J., Ljungqvist, A., 2014. Corporate Investment and Stock Market Listing: A Puzzle? Review of Financial Studies 28, 342–390.

Beltratti, A., Stulz, R.M., 2012. The credit crisis around the globe: Why did some banks perform better? Journal of Financial Economics 105, 1–17. https://doi.org/10.1016/j.jfineco.2011.12.005

Berger, A.N., Bouwman, C.H., 2009. Bank liquidity creation. Review of Financial Studies 22, 3779–3837.

Berger, A.N., Bouwman, C.H.S., 2013. How does capital affect bank performance during financial crises? Journal of Financial Economics 109, 146–176. https://doi.org/10.1016/j.jfineco.2013.02.008

Berger, A.N., Roman, R.A., 2015. Did TARP banks get competitive advantages? Journal of Financial and Quantitative Analysis 50, 1199–1236.

Bernstein, S., 2015. Does Going Public Affect Innovation? The Journal of Finance 70, 1365–1403. https://doi.org/10.1111/jofi.12275

Brav, O., 2009. Access to capital, capital structure, and the funding of the firm. The Journal of Finance 64, 263–308.

Bushee, B.J., 1998. The influence of institutional investors on myopic R&D investment behavior. Accounting Review 73, 305–333.

Cella, C., Ellul, A., Giannetti, M., 2013. Investors' horizons and the amplification of market shocks. Review of Financial Studies 26, 1607–1648.

Chen, X., Harford, J., Li, K., 2007. Monitoring: Which institutions matter? Journal of Financial Economics 86, 279–305. https://doi.org/10.1016/j.jfineco.2006.09.005

Demirguc-Kunt, A., Detragiache, E., Merrouche, O., 2013. Bank capital: Lessons from the financial crisis. Journal of Money, Credit and Banking 45, 1147–1164.

Derrien, F., Kecskés, A., Thesmar, D., 2013. Investor horizons and corporate policies. Journal of Financial and Quantitative Analysis 48, 1755–1780.

Edmans, A., 2009. Blockholder trading, market efficiency, and managerial myopia. The Journal of Finance 64, 2481–2513.

Edmans, A., Holderness, C., 2016. Blockholders: A Survey of Theory and Evidence. Working paper.

Ellul, A., Yerramilli, V., 2013. Stronger Risk Controls, Lower Risk: Evidence from U.S. Bank Holding Companies. The Journal of Finance 68, 1757–1803. https://doi.org/10.1111/jofi.12057

Erkens, D.H., Hung, M., Matos, P., 2012. Corporate governance in the 2007–2008 financial crisis: Evidence from financial institutions worldwide. Journal of Corporate Finance 18, 389–411. https://doi.org/10.1016/j.jcorpfin.2012.01.005

Fahlenbrach, R., Prilmeier, R., Stulz, R., 2016. Why does fast loan growth predict poor performance for banks? National Bureau of Economic Research No. w22089.

Fahlenbrach, R., Prilmeier, R., Stulz, R.M., 2012. This time is the same: Using bank performance in 1998 to explain bank performance during the recent financial crisis. The Journal of Finance 67, 2139–2185.

Fahlenbrach, R., Stulz, R.M., 2011. Bank CEO incentives and the credit crisis. Journal of Financial Economics 99, 11–26.

Falato, A., Scharfstein, D., 2016. The Stock Market and Bank Risk-Taking. National Bureau of Economic Research.

Gao, H., Harford, J., Li, K., 2013. Determinants of corporate cash policy: Insights from private firms. Journal of Financial Economics 109, 623–639.

Garel, A., Petit-Romec, A., 2017. Bank capital in the crisis: It's not just how much you have but who provides it. Journal of Banking and Finance 75, 152–166.
Gaspar, J.-M., Massa, M., Matos, P., 2005. Shareholder investment horizons and the market for corporate control. Journal of Financial Economics 76, 135–165.
Holderness, C., 2003. Survey of blockholders and corporate control. Economic Policy Review 9, 51–64.
Kashyap, A.K., Rajan, R., Stein, J.C., 2002. Banks as liquidity providers: An explanation for the coexistence of lending and deposit-taking. The Journal of Finance 57, 33–73.
Kashyap, A.K., Stein, J.C., 2000. What do a million observations on banks say about the transmission of monetary policy? American Economic Review 407–428.
Köhler, M., 2015. Which banks are more risky? The impact of business models on bank stability. Journal of Financial Stability 16, 195–212. https://doi.org/10.1016/j.jfs.2014.02.005
Laeven, L., Majnoni, G., 2003. Loan loss provisioning and economic slowdowns: too much, too late? Journal of Financial Intermediation 12, 178–197. https://doi.org/10.1016/S1042-9573(03)00016-0
Michaely, R., Roberts, M.R., 2012. Corporate dividend policies: Lessons from private firms. Review of Financial Studies 25, 711–746.
Minton, B.A., Taillard, J.P., Williamson, R., 2014. Financial Expertise of the Board, Risk Taking, and Performance: Evidence from Bank Holding Companies. Journal of Financial and Quantitative Analysis 49, 351–380. https://doi.org/10.1017/S0022109014000283
Rosenbaum, P.R., Rubin, D.B., 1985. Constructing a control group using multivariate matched sampling methods that incorporate the propensity score. The American Statistician 39, 33–38.
Stein, J.C., 1996. Rational capital budgeting in an irrational world. National Bureau of Economic Research.

Table 1 Summary statistics

This table presents summary statistics of all banks in the matched sample. Variables are defined in the Appendix.

	All banks						Publicly held			Privately held			Mean diff.
Variable	N	Mean	SD	p1	p50	p99	N	Mean	SD	N	Mean	SD	p-val
Ln(Assets)	774	13.43	0.84	11.97	13.38	15.85	387	13.41	0.80	387	13.44	0.87	0.61
Crisis ROA 98	774	0.63	0.34	-0.64	0.64	1.52	387	0.61	0.34	387	0.64	0.33	0.18
Crisis ROA 07/08	774	0.91	1.42	-5.41	1.19	3.36	387	0.74	1.43	387	1.07	1.39	0.00
Crisis ROE 98	774	7.03	3.71	-5.09	7.09	16.83	387	6.94	3.76	387	7.12	3.67	0.50
Crisis ROE 07/08	774	10.17	14.35	-48.03	12.25	41.21	387	8.57	14.33	387	11.76	14.21	0.00
Equity ratio	774	8.77	1.91	5.84	8.35	17.63	387	8.49	1.60	387	9.04	2.14	0.00
NPL ratio	774	0.66	0.71	0	0.44	3.49	387	0.59	0.60	387	0.73	0.80	0.01
ROA pre-crisis	774	1.75	0.79	-0.03	1.65	4.79	387	1.67	0.73	387	1.82	0.85	0.01
ROE pre-crisis	774	19.66	9.21	-0.23	18.59	49.56	387	18.90	8.72	387	20.42	9.63	0.02
Liquid assets ratio	774	19.59	10.88	2.01	18.11	54.5	387	19.32	10.63	387	19.86	11.13	0.49
Loan ratio	774	70.63	12.22	35.97	72.35	92.23	387	71.02	12.76	387	70.24	11.66	0.38
Deposits ratio	774	80.15	7.64	54.73	81.41	91.78	387	79.01	7.48	387	81.29	7.62	0.00
Tier 1 ratio	774	11.71	3.35	7.97	10.64	26.94	387	11.27	2.56	387	12.15	3.95	0.00
Asset growth	774	3.37	3.26	-0.89	2.54	16.85	387	3.57	3.42	387	3.16	3.09	0.08
ST funding	774	20.62	9.34	5.28	19.39	53.28	387	20.93	8.93	387	20.31	9.73	0.36
WS funding	774	25.92	10.99	6.47	24.82	62.42	387	26.65	10.11	387	25.20	11.77	0.07
RE loans ratio	774	74.85	13.58	31.27	77.26	96.74	387	76.19	12.52	387	73.50	14.45	0.01
BHC	774	0.95	0.22	0	1	1	387	0.98	0.14	387	0.91	0.28	0.00

Table 2 Performance of banks in the 2008 crisis and performance during the 1998 crisis

This table shows results from cross-sectional regressions of the last financial crisis ROA and ROE on the Crisis ROA and ROE during the 1998 crisis in Panel A. In Panels B and C, the variable Crisis ROA 98 and Crisis ROE 98 are split into quintiles. ROA and ROE pre-crisis are computed over the five quarters before 2006 Q4. All other control variables are computed at 2006 Q4. The variable definitions are provided in the Appendix. The sample is indicated in the table.

PANEL A VARIABLES	(1) Crisis ROA 07/08	(2) Crisis ROA 07/08	(3) Crisis ROA 07/08	(4) Crisis ROE 07/08	(5) Crisis ROE 07/08	(6) Crisis ROE 07/08
	Publicly held	Privately held	All	Publicly held	Privately held	All
Crisis ROA 98	**0.732*** **	**1.434*** **	**1.427*** **			
	(0.223)	**(0.310)**	**(0.283)**			
Crisis ROE 98				**0.700*** **	**1.263*** **	**1.232*** **
				(0.237)	**(0.252)**	**(0.237)**
Crisis ROA 98*Publicly held			**-0.715** **			
			(0.319)			
Crisis ROE 98*Publicly held						**-0.516***
						(0.284)
Publicly held			0.229			1.351
			(0.236)			(2.397)
ROA pre-crisis	0.198	0.245*	0.229**			
	(0.162)	(0.132)	(0.101)			
ROE pre-crisis				0.363***	0.277**	0.318***
				(0.124)	(0.111)	(0.083)
Tier 1 ratio	0.030	0.007	0.015	-0.006	0.045	0.050
	(0.037)	(0.023)	(0.017)	(0.290)	(0.205)	(0.150)
NPL ratio	-0.538***	-0.265***	-0.371***	-5.455***	-3.098***	-4.022***
	(0.159)	(0.089)	(0.082)	(1.444)	(0.861)	(0.773)
Ln(Assets)	-0.286***	-0.235***	-0.256***	-3.671***	-2.767***	-3.181***
	(0.095)	(0.084)	(0.061)	(0.916)	(0.870)	(0.621)
Deposits ratio	-0.000	0.026***	0.013**	-0.082	0.256***	0.095
	(0.008)	(0.010)	(0.007)	(0.081)	(0.097)	(0.065)
Loan concentration	-2.010***	-2.061***	-1.987***	-21.908***	-21.265***	-21.173***
	(0.444)	(0.457)	(0.319)	(4.178)	(4.369)	(3.111)
Loan ratio	0.005	-0.017**	-0.006	-0.031	-0.215***	-0.113**
	(0.007)	(0.007)	(0.005)	(0.067)	(0.067)	(0.045)
BHC	-0.177	0.208	0.098	-2.003	1.671	0.566
	(0.268)	(0.245)	(0.209)	(2.766)	(2.360)	(2.046)
Constant	4.938***	3.133	3.709***	74.028***	41.688**	54.244***
	(1.831)	(1.993)	(1.357)	(16.422)	(19.719)	(13.206)
Observations	387	387	774	387	387	774
Cluster SE	Bank	Bank	Bank	Bank	Bank	Bank
Adj. R^2	0.133	0.289	0.213	0.200	0.303	0.251

Robust standard errors are in parentheses. *** p<0.01, ** p<0.05, * p<0.1

PANEL B VARIABLES	(1) Crisis ROA 07/08	(2) Crisis ROA 07/08	(3) Crisis ROE 07/08	(4) Crisis ROE 07/08
Sample :		Publicly held banks		
Crisis ROA 98-q1	**-0.575*** **	**-0.676*** **		
	(0.184)	**(0.209)**		
Crisis ROA 98-q2	-0.549**	-0.657***		
	(0.234)	(0.251)		
Crisis ROA 98-q4	-0.110	-0.332		
	(0.184)	(0.201)		
Crisis ROA 98-q5	0.182	0.042		
	(0.173)	(0.189)		
Crisis ROE 98-q1			**-4.797****	**-4.210***
			(2.329)	**(2.390)**
Crisis ROE 98-q2			-2.927	-1.710
			(2.202)	(2.276)
Crisis ROE 98-q4			-0.401	0.335
			(2.436)	(2.081)
Crisis ROE 98-q5			3.429	2.687
			(2.156)	(1.955)
ROA pre-crisis		0.182		
		(0.161)		
ROE pre-crisis				0.358***
				(0.130)
Tier 1 ratio		0.038		-0.002
		(0.034)		(0.289)
NPL ratio		-0.531***		-5.360***
		(0.150)		(1.456)
Ln(Assets)		-0.309***		-3.531***
		(0.101)		(0.921)
Deposits ratio		-0.000		-0.080
		(0.009)		(0.083)
Loan concentration		-1.997***		-22.179***
		(0.426)		(4.197)
Loan ratio		0.003		-0.033
		(0.007)		(0.069)
BHC		-0.227		-1.845
		(0.311)		(2.998)
Constant	0.954***	6.084***	9.517***	77.514***
	(0.090)	(1.936)	(1.630)	(16.482)
Observations	387	387	387	387
Cluster SE	Bank	Bank	Bank	Bank
Adj. R^2	0.035	0.141	0.028	0.185

Robust standard errors are in parentheses. *** p<0.01, ** p<0.05, * p<0.1

PANEL C VARIABLES	(1) Crisis ROA 07/08	(2) Crisis ROA 07/08	(3) Crisis ROE 07/08	(4) Crisis ROE 07/08
Sample		Privately held banks		
Crisis ROA 98-q1	**-0.867*** **	**-0.640*** **		
	(0.221)	**(0.191)**		
Crisis ROA 98-q2	-0.194	-0.201		
	(0.166)	(0.155)		
Crisis ROA 98-q4	0.103	0.054		
	(0.185)	(0.171)		
Crisis ROE 98-q5	**0.519** **	**0.523** **		
	(0.202)	**(0.202)**		
Crisis ROE 98-q1			**-9.348*** **	**-6.890*** **
			(2.209)	**(1.982)**
Crisis ROE 98-q2			-4.074**	-4.254***
			(1.575)	(1.442)
Crisis ROE 98-q4			-1.088	0.036
			(2.055)	(1.780)
Crisis ROE 98-q5			**4.169** **	**4.661*** **
			(1.754)	**(1.692)**
ROA pre-crisis		0.309**		
		(0.134)		
ROE pre-crisis				0.334***
				(0.107)
Tier 1 ratio		0.010		0.129
		(0.023)		(0.208)
NPL ratio		-0.281***		-3.114***
		(0.099)		(0.923)
Ln(Assets)		-0.227***		-2.618***
		(0.087)		(0.873)
Deposits ratio		0.024**		0.269***
		(0.010)		(0.100)
Liquid assets ratio		-2.124***		-21.670***
		(0.476)		(4.410)
Loan ratio		-0.017**		-0.228***
		(0.007)		(0.068)
BHC		0.206		1.229
		(0.251)		(2.309)
Constant	1.163***	4.050**	13.846***	48.382**
	(0.114)	(2.043)	(0.969)	(19.936)
Observations	387	387	387	387
Cluster SE	Bank	Bank	Bank	Bank
Adj. R^2	0.098	0.252	0.091	0.276

Robust standard errors are in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Table 3 Tests on the performance of banks that were privately held during the 1998 crisis but become publicly held or part of a public BHC before the 2008 crisis.

This table shows in Panel A the summary statistics for the sample of banks transitioning from private to public status between 1999 Q1 and 2006 Q4 and a matched sample of banks that remained privately held. Panel B shows in columns 1 and 2 the cross-sectional regressions of the Crisis ROA 07/08 on a dummy variable *Transition* that takes the value of 1 if the bank transitions from private to public status between 1999 Q1 and 2006 Q4 and 0 otherwise, the interaction term of the *Crisis ROA98* and *Transition*, and some pre-crisis control variables. In columns 3 and 4, we split the matched sample of transitioning and private banks into three using the terciles of the variable *Crisis ROA 98*. We then run regressions for banks in the top and lowest terciles separately.

Panel A: Summary statistics after matching

	Mean difference	N	SE	p-val	Privately held obs.	Privately held mean	Publicly held obs.	Publicly held mean
Ln(Assets)	0.011	504	0.077	0.886	252	13.416	252	13.405
Crisis ROA 07/08	0.416	504	0.140	0.003	252	1.042	252	0.627
Crisis ROA 98	0.048	504	0.032	0.130	252	0.641	252	0.593
ROA pre-crisis	0.134	504	0.073	0.066	252	1.867	252	1.734
Tier 1 ratio	0.848	504	0.308	0.006	252	12.124	252	11.277
NPL ratio	0.202	504	0.062	0.001	252	0.765	252	0.563
Deposits ratio	2.206	504	0.657	0.001	252	81.387	252	79.181
Loan concentration	-0.049	504	0.013	0.000	252	0.600	252	0.649
Loan ratio	-1.574	504	1.085	0.148	252	70.393	252	71.967
BHC	-0.071	504	0.020	0.000	252	0.909	252	0.980

PANEL B	(1)	(2)	(3)
VARIABLES	Crisis ROA 07/08	Crisis ROA 07/08	Crisis ROA 07/08
Sample :	Worst tercile in 1998	2nd tercile in 98	Best tercile in 1998
Transition	**-0.097**	**-0.264**	**-0.591*** **
	(0.255)	**(0.235)**	**(0.177)**
ROA pre-crisis	0.122	-0.033	0.450**
	(0.235)	(0.252)	(0.196)
Tier 1 ratio	-0.025	-0.064	0.046*
	(0.052)	(0.054)	(0.024)
NPL ratio	-0.533**	-0.472**	-0.464***
	(0.207)	(0.234)	(0.150)
Ln(Assets)	-0.248	-0.258*	-0.324**
	(0.172)	(0.147)	(0.128)
Deposits ratio	0.040**	0.008	0.000
	(0.019)	(0.015)	(0.012)
Loan concentration	-2.705***	-2.631***	-0.875
	(0.688)	(0.808)	(0.806)
Loan ratio	-0.012	-0.012	-0.011
	(0.012)	(0.012)	(0.008)
BHC	-0.164	-0.507	0.294
	(0.377)	(0.356)	(0.311)
Constant	3.651	7.823***	5.824**
	(3.955)	(2.875)	(2.313)
Observations	168	168	168
Cluster SE	Bank	Bank	Bank
Adj. R^2	0.157	0.112	0.241

Robust standard errors are in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Table 4 Evidence from short-term pressure

This table shows the cross-sectional regressions of the Crisis ROA 07/08 on some pre-crisis characteristics. We split the matched sample of transitioning and private banks into three using the terciles of the variable Crisis ROA 98. We then run regressions for banks in each tercile separately. We only show the regressions of the banks in the top tercile in line with the results in Table 3. The variable *Transition* takes the value of 1 if the bank transitions from private to public status between 1999 Q1 and 2006 Q4 and 0 otherwise. The variable Transition high pressure takes the value of 1 for banks for which the variable Short-Term Ownership is above the median of the sample of transitioning banks and 0 otherwise (column 1), the value of 1 if *MTurnover* is above the median of the sample of transitioning banks and 0 otherwise (column 2), the value of 1 if *MChurnRatio* is above the median of the sample of transitioning banks and 0 otherwise (column 3), and, the value of 1 if *Blockholder ownership* is below the median of the sample of transitioning banks and 0 otherwise (column 4). The variable *Transition low pressure* takes the value of 1 for banks that have a value of the variable ST Ownership that is below the median of the sample of transitioning banks and 0 otherwise (column 1), the value of 1 if *MTurnover* is below the median of the sample of transitioning banks and 0 otherwise (column 2), the value of 1 if *MChurnRatio* is below the median of the sample of transitioning banks and 0 otherwise (column 3), and the value of 1 if *Blockholder ownership* is above the median of the sample of transitioning banks and 0 otherwise (column 4) . We compute the median for each splitting variable using all the banks in the *Transitioning* group.

	(1)	(2)	(3)	(4)
VARIABLES	Crisis ROA 07/08	Crisis ROA 07/08	Crisis ROA 07/08	Crisis ROA 07/08
Short-term pressure is measured by	*Short-Term investor Ownership*	*MTurnover*	*MChurnRatio*	*Blockholder ownership*
Sample	Best tercile in 98	Best tercile in 98	Best tercile in 98	Best tercile in 98
Transition high pressure	**-0.599****	**-0.727****	**-0.815****	**-0.643****
	(0.272)	**(0.332)**	**(0.314)**	**(0.259)**
Transition low pressure	**-0.478**	**-0.357**	**-0.259**	**-0.333**
	(0.288)	**(0.216)**	**(0.226)**	**(0.296)**
ROA pre-crisis	0.486**	0.484**	0.466**	0.491**
	(0.213)	(0.207)	(0.207)	(0.206)
Tier 1 ratio	0.025	0.026	0.027	0.028
	(0.026)	(0.023)	(0.023)	(0.024)
NPL ratio	-0.304**	-0.313**	-0.315**	-0.307**
	(0.146)	(0.152)	(0.150)	(0.150)
Ln(Assets)	-0.365**	-0.347**	-0.332**	-0.387***
	(0.145)	(0.143)	(0.144)	(0.144)
Deposits ratio	-0.009	-0.007	-0.005	-0.007
	(0.013)	(0.012)	(0.012)	(0.012)
Loan concentration	-0.751	-0.696	-0.792	-0.757
	(0.947)	(0.955)	(0.935)	(0.946)
Loan ratio	-0.020*	-0.018*	-0.017*	-0.020**
	(0.011)	(0.010)	(0.010)	(0.010)
BHC	0.281	0.258	0.253	0.266
	(0.351)	(0.341)	(0.339)	(0.354)
Constant	7.598***	7.096***	6.720**	7.737***
	(2.866)	(2.650)	(2.697)	(2.574)
Observations	148	148	148	148
Cluster SE	Bank	Bank	Bank	Bank
Adj. R^2	0.180	0.186	0.194	0.184

Table 5 Evidence from market pressure: pre-crises characteristics

This table compares the mean differences for bank-level variables measured at the end of 2006 and at the end of 1997 between banks that transition from privately to publicly held with higher short-term pressure and their counterparts that remained private. The banks in this table are the same as those in Table 4. For the variable *Short-Term investor Ownership*, we have 26 banks in the high group; 27 for the variable MTurnover and 28 for the MChurnRatio. For the variable *Blockholder ownership*, we have 35 banks in the high short-term pressure group. Mean difference is computed as follows: mean of banks that transition with high short-term pressure – mean of banks that remained private. Therefore, a positive value means that the banks that transition from privately held to publicly held with high short-term pressure have a higher value than banks that remained private and vice versa.

	Short-Term investor Ownership					*MTurnover*					*MChurnRatio*					*Blockholder ownership*				
Variables in:		2006		1997			2006		1997			2006		1997			2006		1997	
	N	Mean difference	p-value	Mean difference	p-value	N	Mean difference	p-value	Mean difference	p-value	N	Mean difference	p-value	Mean difference	p-value	N	Mean difference	p-value	Mean difference	p-value
ST funding	115	6.23	0.00	4.65	0.02	116	4.30	0.03	2.02	0.22	117	4.23	0.04	1.41	0.39	124	2.94	0.08	2.59	0.12
WS funding	115	10.00	0.00	4.35	0.04	116	7.74	0.00	1.69	0.35	117	7.00	0.00	1.12	0.53	124	6.67	0.00	2.57	0.15
Liquid assets ratio	115	-0.99	0.73	0.83	0.78	116	-4.22	0.09	-2.73	0.32	117	-5.46	0.03	-3.14	0.25	124	0.78	0.77	0.32	0.90
Deposits ratio	115	-2.56	0.10	1.31	0.35	116	-2.38	0.11	1.43	0.31	117	-2.22	0.13	1.53	0.27	124	-3.45	0.01	1.45	0.20
Equity ratio	115	-1.25	0.02	0.24	0.77	116	-1.46	0.01	-0.25	0.76	117	-1.56	0.00	-0.30	0.70	124	-0.90	0.08	-0.34	0.60
Tier 1 ratio	115	-1.29	0.26	0.78	0.67	116	-2.72	0.01	-1.10	0.53	117	-2.74	0.01	-1.24	0.47	124	-0.76	0.45	-1.09	0.44
Asset growth	115	1.77	0.00	-0.14	0.86	116	1.68	0.01	-0.01	0.99	117	1.74	0.00	0.11	0.88	124	0.47	0.38	-0.12	0.84
RE loans	115	3.18	0.32	-0.18	0.96	116	5.15	0.10	0.56	0.86	117	2.11	0.49	-2.45	0.47	124	2.27	0.42	1.17	0.71

Table 6 Robustness tests: no matching and aggregated data at BHC level

This table shows results from cross-sectional regressions of the last financial crisis ROA and ROE on the Crisis ROA and ROE during the 1998 crisis. The variables Crisis ROA 98 and Crisis ROE 98 are split into quintiles. ROA and ROE pre-crisis are computed over the five quarters before 2006 Q4. All the other control variables are computed at 2006 Q4. The variable definitions are provided in the Appendix. The sample is indicated in the table. In Panel A, we use the whole sample of banks. In Panel B, the sample contains bank data aggregated at the level of the top holder (RSSD9348) for multibank holding companies.

PANEL A	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
VARIABLES	Crisis ROA 07/08	Crisis ROA 07/08	Crisis ROA 07/08	Crisis ROA 07/08	Crisis ROE 07/08	Crisis ROE 07/08	Crisis ROE 07/08	Crisis ROE 07/08
Crisis ROA 98-q1	**-0.379***	**-0.379****	**-0.617*****	**-0.532*****				
	(0.193)	**(0.189)**	**(0.081)**	**(0.075)**				
Crisis ROA 98-q2	-0.355*	-0.407**	-0.145**	-0.134**				
	(0.213)	(0.206)	(0.063)	(0.055)				
Crisis ROA 98-q4	0.182	0.081	0.079	-0.074				
	(0.165)	(0.159)	(0.074)	(0.067)				
Crisis ROE 98-q5	**0.275**	**0.086**	**0.477*****	**0.140***				
	(0.178)	**(0.185)**	**(0.081)**	**(0.081)**				
Crisis ROE 98-q1					**-5.739*****	**-5.615*****	**-4.835*****	**-4.504*****
					(1.826)	**(1.863)**	**(0.859)**	**(0.783)**
Crisis ROE 98-q2					-4.234**	-4.078**	-0.753	-0.509
					(1.859)	(1.842)	(0.687)	(0.637)
Crisis ROE 98-q4					0.057	-0.765	1.502*	0.613
					(1.849)	(1.648)	(0.791)	(0.704)
Crisis ROE 98-q5					**0.431**	**-1.230**	**5.962*****	**2.914*****
					(1.719)	**(1.688)**	**(0.899)**	**(0.853)**
ROA pre-crisis		0.284**		0.473***				
		(0.139)		(0.050)				
ROE pre-crisis						0.384***		0.440***
						(0.106)		(0.044)
Tier 1 ratio		0.017		0.003		-0.049		-0.062
		(0.030)		(0.008)		(0.291)		(0.074)
NPL ratio		-0.575***		-0.217***		-5.771***		-2.445***
		(0.143)		(0.042)		(1.382)		(0.406)
Ln(Assets)		-0.162***		-0.184***		-2.281***		-2.020***
		(0.048)		(0.043)		(0.499)		(0.449)
Deposits ratio		0.002		0.005		-0.055		0.092**
		(0.008)		(0.004)		(0.077)		(0.039)
Loan concentration		-2.107***		-1.669***		-22.600***		-16.052***
		(0.368)		(0.174)		(3.927)		(1.776)
Loan ratio		-0.002		-0.011***		-0.058		-0.185***
		(0.005)		(0.002)		(0.054)		(0.023)
BHC		-0.351		-0.060		-2.904		-0.380
		(0.297)		(0.072)		(2.760)		(0.737)
Constant	0.810***	4.406***	1.206***	4.330***	10.508***	64.360***	12.133***	47.936***
	(0.122)	(1.410)	(0.043)	(0.790)	(1.041)	(13.690)	(0.494)	(8.261)
Observations	512	512	1,947	1,947	512	512	1,947	1,947
Sample	Public	Public	Private	Private	Public	Public	Private	Private
Cluster SE	Bank	Bank	Bank	Bank	Bank	Bank	Bank	Bank
Adj. R^2	0.028	0.141	0.085	0.264	0.024	0.188	0.074	0.269

Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

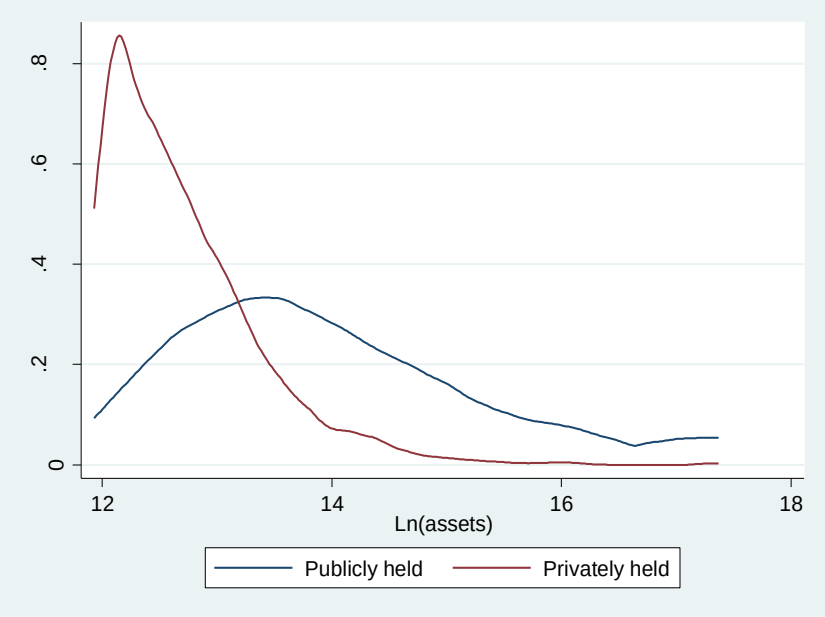
PANEL B	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
VARIABLES	Crisis ROA 07/08	Crisis ROA 07/08	Crisis ROA 07/08	Crisis ROA 07/08	Crisis ROE 07/08	Crisis ROE 07/08	Crisis ROE 07/08	Crisis ROE 07/08
Crisis ROA 98-q1	**-0.757*** **	**-0.698*** **	**-0.480*** **	**-0.429*** **				
	(0.256)	**(0.265)**	**(0.078)**	**(0.072)**				
Crisis ROA 98-q2	-0.154	-0.227	-0.151**	-0.146**				
	(0.199)	(0.200)	(0.067)	(0.058)				
Crisis ROA 98-q4	-0.117	-0.089	0.044	-0.050				
	(0.197)	(0.185)	(0.076)	(0.071)				
Crisis ROE 98-q5	**-0.093**	**-0.085**	**0.532*** **	**0.332*** **				
	(0.223)	**(0.213)**	**(0.084)**	**(0.104)**				
Crisis ROE 98-q1					**-6.951*** **	**-5.626** **	**-3.126*** **	**-3.017*** **
					(2.609)	**(2.736)**	**(0.884)**	**(0.825)**
Crisis ROE 98-q2					0.585	0.312	-0.453	-0.247
					(2.072)	(2.107)	(0.757)	(0.650)
Crisis ROE 98-q4					0.317	0.443	1.126	0.559
					(2.440)	(2.188)	(0.840)	(0.721)
Crisis ROE 98-q5					**-2.217**	**-2.048**	**6.233*** **	**3.203*** **
					(2.416)	**(2.357)**	**(0.951)**	**(0.925)**
ROA pre-crisis		0.043		0.212***				
		(0.068)		(0.081)				
ROE pre-crisis						0.164		0.468***
						(0.114)		(0.046)
Tier 1 ratio		0.016		0.021***		0.114		0.126*
		(0.030)		(0.008)		(0.255)		(0.076)
NPL ratio		-0.511***		-0.228***		-5.633***		-2.216***
		(0.149)		(0.037)		(1.519)		(0.389)
Ln(Assets)		-0.089		-0.093**		-1.094		-1.349***
		(0.064)		(0.044)		(0.685)		(0.466)
Deposits ratio		0.007		0.009**		0.040		0.052
		(0.012)		(0.004)		(0.117)		(0.044)
Loan concentration		-1.881***		-1.400***		-20.535***		-13.640***
		(0.531)		(0.177)		(5.650)		(1.898)
Loan ratio		-0.005		-0.003		-0.077		-0.119***
		(0.008)		(0.003)		(0.082)		(0.027)
BHC		-0.697		0.096		-4.104		0.213
		(0.454)		(0.090)		(3.609)		(0.910)
Constant	0.954***	3.928**	1.239***	2.224***	9.426***	42.936**	11.989***	32.979***
	(0.146)	(1.733)	(0.047)	(0.795)	(1.681)	(17.105)	(0.566)	(8.476)
Observations	274	274	1,539	1,539	274	274	1,539	1,539
Sample	Public	Public	Private	Private	Public	Public	Private	Private
Cluster SE	Top holder	Top holder	Top holder	Top holder	Top holder	Top holder	Top holder	Top holder
Adj. R^2	0.036	0.117	0.092	0.269	0.035	0.134	0.069	0.273

Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

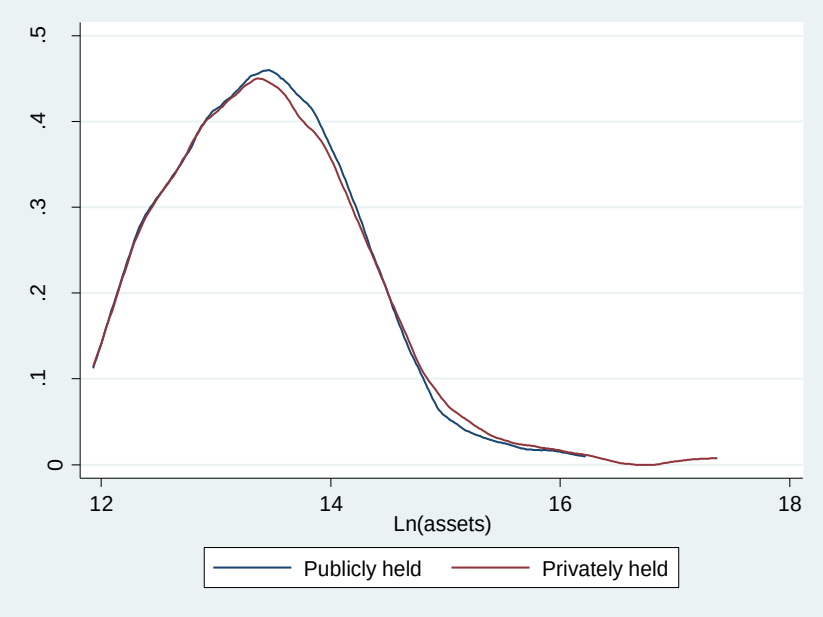
Figure 1 Comparing size distribution of private and public banks

This figure shows a kernel density distribution graph of the natural logarithm of total assets for the whole sample of banks before matching (on the left) and for the sample of matched banks (on the right).

a) Before matching



b) After matching



Appendix Variable definitions

Variable name	Description
Crisis ROA 07/08 (%)	Cumulated quarterly net income (RIAD4340) for the period 2007 Q3–2008 Q3 divided by total assets (RCFD2170) as of 2007 Q2
Crisis ROE 07/08 (%)	Cumulated quarterly net income (RIAD4340) for the period 2007 Q3–2008 Q3 divided by total equity (RCFD 3210) as of 2007 Q2
Crisis ROA 98 (%)	Cumulated quarterly net income (RIAD4340) for the period 1998 Q3–1998 Q4 divided by total assets (RCFD2170) as of 1998 Q2
Crisis ROE 98 (%)	Cumulated quarterly net income (RIAD4340) for the period 1998 Q3–1998 Q4 divided by total equity (RCFD 3210) as of 1998 Q2
ROA pre-crisis (%)	Cumulated quarterly net income (RIAD4340) for the period 2005 Q4–2006 Q4 divided by total assets (RCFD2170) as of 200 5Q3
ROE pre-crisis (%)	Cumulated quarterly net income (RIAD4340) for the period 2005 Q4–2006 Q4 divided by total equity (RCFD 3210) as of 2005 Q3
Tier 1 ratio (%)	Core Tier 1 equity (RCFD8274) to the risk weighted assets (RCFDA223)
NPL ratio (%)	Non-performing loans (RCFD1407+ RCFD1403) to total loans (RCFD2122)
Ln(Assets)	Natural logarithm of total assets
Deposits ratio (%)	Total deposits (RCFD2200) to total assets
Loan Concentration	Loan share-based HHI index (loans secured by real estate, commercial and industrial loans, agricultural loans, consumer loans)
Liquid Assets ratio (%)	Liquid assets (RCFD1773+ RCFD0010) to total assets
Loan ratio (%)	Loans (RCFD2122) to total loans
BHC	Binary variable that takes the value of 1 if a bank is held by a bank holding company and 0 otherwise
Equity ratio (%)	Core Tier 1 equity to total assets
Asset growth (%)	Quarterly growth rate of the variable total assets over three years
RE loans ratio (%)	Real estate loans (RCFD1410) to total loans
ST Funding (%)	Short-Term debt (RCON2604+RCFN2200+RCFD2800+RCFD2332+RCFD3548) for 1997 and RCON2604+RCFN2200+RCONB993+RCFDB995+RCFDB571+RCFD3548 for 2006) divided by total assets
WS Funding (%)	Wholesale debt (RCON2604+RCFD3200+RCFD2800+RCFD3190+RCFN2200 +RCFD3548 for 1997 and RCON2604+RCFD3200+RCONB993+RCFDB995+RCFD3190+RCFN2200+RCFD3548 for 2006) divided by total assets
Short-Term investor Ownership (%)	Measured as 1-% Long-Term ownership .We compute the proportion of long- and short-term institutional investor ownership at the end of 2006. Using quarterly data from 13-F Thomson Files, we compute the portfolio turnover as the price-weighted share of stocks that have been sold over the last 12 quarters (three-year period). Formally, we compute the portfolio turnover using the following formula: $$Turnover_{j,t} = \sum_{i=1}^{n} \frac{SoldShares_{i,t} * SharePrice_{i,t-12}}{TotalPorfolioValue_{i,t-12}},$$ where n is the number of different stocks contained in investor j at quarter t. We then average the final measure over four quarters. The final measure of investor j turnover for quarter t is defined as follows:

	$$AVGTURNOVER_{j,t} = \frac{1}{4} \times \sum_{t=-3}^{0} Turnover_{j,t}.$$
MTurnover	Averaged investor portfolios turnover (TURNOVER) of a given bank: $$MTURNOVER_{i,t} = \sum_{j=1}^{j=n} \frac{AVGTURNOVER_{j,t} \times SHARESHELD_{i,t-1}}{SHARESOUT_{i,t-1}}.$$
MChurnRatio	Averaged j investor portfolios churn ratio of a given bank i. It measures how frequently institutional investors rotate the stocks in their portfolio and is constructed as in Gaspar et al. (2005). We compute it over a three-year period: $$CHURNRATIO_{j,t} = 2 \times \sum_{i=1}^{n} \lvert Shares_{i,t} \times Price_{i,t} - Shares_{i,t-12} \times Price_{i,t-12} - Shares_{i,t} \times (Price_{i,t} - Price_{i,t-12}) \rvert / (\sum_{i=1}^{n} Shares_{i,t} \times Price_{i,t} - Shares_{i,t-12} \times Price_{i,t-12})$$ $$MCHURNRATIO_{i,t} = \sum_{i=1}^{j=n} \frac{CHURNRATIO_{j,t} \times SHARESHELD_{j,t-1}}{SHARESOUT_{i,t-1}}.$$
Blockholder ownership	Institutional blockholding, or the percentage of shares outstanding held by a firm's institutional investors whose holdings are greater than 5% of the firm shares outstanding