This Time Is the Same: Using Bank Performance in 1998 to Explain Bank Performance During the Recent Financial Crisis

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Abstract

We investigate whether a bank's performance during the 1998 crisis, which was viewed at the time as the most dramatic crisis since the Great Depression, predicts its performance during the recent financial crisis. One hypothesis is that a bank that has an especially poor experience in a crisis learns and adapts, so that it performs better in the next crisis. Another hypothesis is that a bank's poor experience in a crisis is tied to aspects of its business model that are persistent, so that its past performance during one crisis forecasts poor performance during another crisis. We show that banks that performed worse during the 1998 crisis did so as well during the recent financial crisis. This effect is economically important. In particular, it is economically as important as the leverage of banks before the start of the crisis. The result cannot be attributed to banks having the same chief executive in both crises. Banks that relied more on short-term funding, had more leverage, and grew more are more likely to be banks that performed poorly in both crises.

Keywords: Financial crisis; systemic risk; bank returns; short-term funding; LTCM; Russian default

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"The worst financial crisis in the last fifty years"

Robert Rubin

1. Introduction

The crisis that Robert Rubin, then Secretary of the Treasury, called the worst in the last fifty years was the crisis of 1998. On August 17, 1998, Russia defaulted on its debt. This event started a dramatic chain reaction. As one observer puts it, "the entire global economic system as we know it almost went into meltdown, beginning with Russia's default."[1]

As Russia defaulted, a number of investors made large losses. This forced many of them to sell securities across many markets to raise cash. Initially, the impact of the default was limited because there was hope that the International Monetary Fund (IMF) would step in and bail out Russia. When it became clear that this would not happen, prices of emerging market securities fell sharply and stocks across the developed world soon followed suit. As security prices fell, the capital of investors and financial firms was eroded. Further, volatility increased. These developments led investors and financial institutions to reduce their risk. This caused a flight to safety, so that the prices of the safest and most liquid securities increased relative to the prices of other securities.

An example of the impact of the crisis ignited by the Russian default that is often cited is the collapse of the hedge fund managed by Long-Term Capital Management (LTCM). The fund's investors had made spectacular profits and the fund had almost never had a month with a negative return before the end of the spring of 1998. During the month of August 1998, the fund lost 44% of its capital. Eventually, in September, the Federal Reserve would coordinate a private bailout of this fund, which required an injection of $3.5 billion from more than 10 banks. The head of the LTCM hedge fund described the events of the time as a ten-sigma event.[2] Other financial institutions also made massive losses. For

[1] See Friedman, Thomas L., *The Lexus and the Olive Tree*, 1999, p. 212.
[2] See Sloan, Allan, and Rich Thomas, "Riding For a Fall", *Newsweek*, October 5, 1998, p. 56.

example, the market capitalization of both CitiGroup and Chase Manhattan fell by approximately 50% in the two months following the Russian default.

The impact of these events on securities with credit and liquidity risks was large. Because of the flight to safety, U.S. Treasury securities increased in value, but the compensation that investors required to bear the risk of other securities increased sharply. While interest rates were falling, riskier and less liquid securities saw their yields increase relative to the yields of Treasury bonds. The president of the Federal Reserve Bank of New York testified before Congress that "the abrupt and simultaneous widening of credit spreads globally, for both corporate and emerging-market sovereign debt, was an extraordinary event beyond the expectations of investors and financial intermediaries."[3] The Federal Reserve decreased the Federal Funds target rate three times in the two months that followed the rescue of LTCM.

The financial crisis that started in 2007 would eventually be described as the biggest financial crisis of the last 50 years, supplanting the crisis of 1998 for that designation. The comments we cite regarding the 1998 crisis are not different, however, from comments made in relation to the recent financial crisis. In particular, during the recent financial crisis investors made large losses in securities that had been designed to have a minimal amount of risk, and the unexpected losses in these securities led to fire sales, a withdrawal of liquidity from financial markets, and a flight to quality. The similarity between the crisis of 1998 and the recent financial crisis raises the question of how a bank's experience in one crisis is related to its experience in another crisis. There is increasing evidence in finance that past experiences of executives and investors affect their subsequent behavior and performance.[4] There is anecdotal evidence that the same is true for organizations. For instance, Lou Gerstner argues that the near-death experience of IBM in the early 1990s explains much of its subsequent success as it enabled him to "turn IBM into a market-driven rather than an internally focused, process-driven enterprise." (Gerstner (2002)). If an organization and its executives perform poorly in a crisis, it could be that they learn to do things differently and consequently cope better with the next crisis. Further and perhaps more importantly, an

[3] Testimony of William J. McDonough, President of the Federal Reserve Bank of New York, before the U.S. House of Representatives Committee on Banking and Financial Services, "Risks of Hedge Fund Operations", October 1, 1998.

[4] See, e.g., Bertrand and Schoar (2003), Malmendier and Nagel (2010) and Malmendier, Tate, and Yan (2011).

unexpected adverse event could lead an institution to assess payoff probabilities differently (for instance, as in Gennaioli, Shleifer, and Vishny (2011)) or reduce its risk appetite. Therefore, one hypothesis, the learning hypothesis, is that a bad experience in a crisis leads a bank to change its risk culture, to modify its business model, or to decrease its risk appetite so that it is less likely to face such an experience again. There is anecdotal evidence that executives claim they learned from the 1998 crisis. Lehman's CEO was the same in 1998 and 2006. He is quoted as having said in 2008 that "We learned a ton in '98".[5] A recent book on AIG describes one Goldman Sachs executive as having "never silenced that desire to do something about the next 1998, about never being dependent on short-term funding again."[6] The book goes on describing how that executive obtained authorization in 2004 for Goldman to lengthen the maturity of its funding. Credit Suisse performed relatively well during the recent crisis and one senior executive told one of the authors that the explanation is that they learned a lot from their difficulties in 1998.

Another hypothesis, the business model hypothesis, is that the bank's susceptibility to crises is the result of its business model and that it does not change its business model as a result of a crisis experience, either because it would not be profitable to do so or for other reasons. For instance, recent work by Adrian and Shin (2009) shows that broker-dealers increase their leverage in good times. Such an outcome may be the result of them having the best business opportunities during credit booms, but it also makes them more vulnerable if a credit boom is followed by a crisis. With this hypothesis, crisis exposure exhibits persistence, so that a bank's experience in one crisis is a good predictor of its experience in a subsequent crisis.

We empirically test these two hypotheses against the null hypothesis that every crisis is unique, so that a bank's past crisis experience does not offer information about its experience in a future crisis. We find evidence that is strongly supportive of the business model hypothesis. We show that the stock market performance of banks in the recent crisis is positively correlated with the performance of banks in the

[5] "At Lehman, allaying fears about being the next to fall," by Jenny Anderson, New York Times, March 18, 2008.
[6] See Boyd (2011), p. 192.

1998 crisis. This result holds whether we include investment banks in the sample or not. Our key result is that for each percentage point of loss in the value of its equity in 1998, a bank lost an annualized 66 basis points during the financial crisis from July 2007 to December 2008. This result is highly significant statistically. When we estimate a regression of the performance of banks during the financial crisis on their performance in 1998 as well as on characteristics of banks in 2006, we find that the return of banks in 1998 remains highly significant. For instance, the economic significance of the return of banks in 1998 in explaining the return of banks during the financial crisis is of the same order of magnitude as the economic significance of a bank's leverage at the start of the crisis. Our results cannot be explained by differences in the exposure of banks to the stock market.

From the perspective of bank performance, the crisis of 1998 and the financial crisis are the same in the sense that banks that had a near-death experience in 1998 had it again during the financial crisis – except that during the financial crisis, the outcome was worse for the banks and the economy. An important question is whether poor performance in one crisis makes it more likely that an institution will fail in the next crisis. We find that banks that performed poorly in 1998 were more likely to fail in the recent financial crisis. The effect of bank performance in 1998 on the probability of failure is extremely strong. A one standard deviation lower return during the 1998 crisis is associated with a statistically highly significant 5 percentage points higher probability of failure during the credit crisis of 2007/2008. Relative to the average probability of failure of 7.5% for the sample banks, this represents an increase of 67% in failure probability. Again, this result holds whether we include or exclude investment banks in the sample.

A natural question to ask is whether the correlation we document is affected by cases where the executive in charge during the financial crisis was also involved with the bank in 1998. It could be that personality traits of the executive rather than the bank's business model are responsible for the bank being positioned similarly for both crises. We investigate this possibility and find it does not explain our results. Another possible explanation for our results is that banks remember a different aspect of the 1998 crisis. Banks recovered rapidly from the 1998 crisis. Investors who took positions in more risky fixed-income

securities at the bottom of the crisis made large profits. It is possible that banks that recovered strongly from the crisis remembered that experience subsequently and found it unnecessary to change their business model as a result of their strong rebound. We do not find evidence supportive of this explanation.

Our results hold when we control for characteristics that are commonly used as determinants of stock performance of financial institutions. However, controlling for such characteristics may lead us to understate the economic importance of the crisis persistence of banks in that these characteristics may result from the same unobserved characteristics of the business model that lead to poor performance during crises. We explore further whether the banks that perform poorly in the 1998 crisis as well as in the recent financial crisis have other common characteristics. We find that they do. We show that we can predict poor performers in both crises using some bank characteristics in 1997 as well as the same characteristics in 2006. In particular, the poor performers have greater reliance on short-term finance and grow more in the three years preceding the crisis. Whereas the existing literature has emphasized the role of short-term finance in making financial institutions vulnerable (e.g. Adrian and Shin (2010), Brunnermeier (2009), and Gorton (2010)), we are not aware of work that has shown that faster growing banks are more vulnerable to crises.

Our paper is related to several recent papers on the financial crisis. Cheng, Hong, and Scheinkman (2010) examine whether excessive executive compensation, measured as size and industry-adjusted total compensation, is related to several risk measures of banks. They find evidence that excess compensation is correlated with risk taking and suggest that institutional investors both pushed managers towards a risky business model and rewarded them for it through higher compensation. Fahlenbrach and Stulz (2011) show that banks where the incentives of CEOs were better aligned with those of shareholders did not perform better during the crisis. Gandhi and Lustig (2010) show that a long-short portfolio where the largest banks are bought and the smallest are sold underperforms the market by approximately 8% from 1970 to 2005. Ellul and Yerramilli (2010) find in a sample of 74 U.S. bank holding companies that those companies with strong and independent risk management functions tend to have lower enterprise-wide

risk. Our paper is also related to the literature on measurement of the systemic risk exposure of individual banks. Acharya et al. (2010) propose a model-based measure of systemic risk that they call marginal expected shortfall. Their measure is the average return of a bank during the 5% worst days for the market in the year prior to the onset of the crisis. Our measure, the return during the crisis of 1998, which represents a true tail event, can also be interpreted as measuring systemic risk. De Jonghe (2010) uses extreme value theory to generate a market-based measure of European banks' exposure to risk and examines how this measure correlates with interest income and components of non-interest income such as commissions and trading income. Finally, Adrian and Brunnermeier (2010) develop a model to estimate the systemic risk contribution of financial institutions, ΔCoVaR. Their focus is on increasing comovement across institutions during financial crises. In contrast, we show comovement across financial crises at the financial institution level.

The remainder of the paper is organized as follows. Section 2 gives a brief overview of the events that hit financial markets in the summer and autumn of 1998. Section 3 describes our sample construction, offers summary statistics and contains the main empirical analysis. Section 4 discusses the results and Section 5 shows robustness tests. Section 6 concludes.

2. Timeline of events in 1998

Russia had a large domestic currency debt as well as a large foreign currency sovereign debt. In 1998, it was facing increasing problems in refinancing its debt as well as in raising funds to operate the government. However, financial markets generally believed that Russia was too big to fail and that the IMF and the Western countries would make sure that it would not default. Many hedge funds and proprietary trading desks had made large bets on the belief that Russia would not default, buying large amounts of its domestic debt and hedging it against currency risk. On August 13, 1998, the Russian stock and bond markets collapsed on fears of currency devaluation and dwindling cash reserves of the central bank. Moody's and Standard and Poor's downgraded Russia's long-term debt on the same day. On August 17, 1998 Russia defaulted on ruble-denominated debt, stopped pegging the Russian ruble to the

dollar, and declared a moratorium on payments to foreign creditors. The currency collapsed as did the banking system. Investors reassessed the risk of sovereign countries. Levered investors who made large losses due to Russia's default were forced to sell securities. Banks that had large exposures to Russia and other troubled countries suffered losses. Sovereign spreads increased dramatically. Liquidity withdrew from securities markets.

As liquidity withdrew, hedge funds focused on arbitrage in fixed-income markets made large losses. The Federal Reserve Bank of New York orchestrated a bailout of Long-Term Capital Management (LTCM), a Connecticut-based hedge fund founded by John W. Meriwether with approximately $5 billion in equity and $100 billion in assets in the beginning of 1998 (Loewenstein (2000)). LTCM's net asset value dropped by 44% during the month of August. By the end of August, its leverage had increased to 55 to 1 (Loewenstein (2000)). A bankruptcy of LTCM was considered to be very costly for big U.S. banks, either directly through defaults on loans or indirectly because many of the highly levered derivatives positions of LTCM had banks as counterparties and any fire sales of collateral would likely have destroyed substantial value because of the size of the positions of LTCM. During mid-September, after continued losses, Goldman Sachs, AIG, and Berkshire Hathaway started to work on a rescue package. This package was rejected on September 23, 1998, and on the same day, a rescue package orchestrated by the New York Fed was accepted. Eleven banks contributed $300 million, one contributed $125 million, and two contributed $100 million.

The impact of these events on securities with credit and liquidity risks was extremely large. Because of the flight to safety, U.S. Treasury securities increased in value, but the compensation that investors required to bear the risk of other securities increased sharply. While interest rates were falling, riskier and less liquid securities saw their yields increase relative to the yields of Treasury bonds. By mid-October, the U.S. stock market had lost approximately 20% of its value, with equity volatility and credit spreads at historically high levels. The Federal Reserve responded by decreasing its target rate by three quarters of a percent in total within two months of the rescue of LTCM.

We do not review the timeline of events for the financial crisis here because it is widely known (e.g., Brunnermeier (2009) or Gorton and Metrick (2010)). The events of 1998 parallel those of the financial crisis. During the financial crisis, investors made large losses in securities that had been engineered to have a minimal amount of risk. The unexpected losses in these securities led to fire sales and to a withdrawal of liquidity from financial markets.

3. Empirical analysis

This section provides information on the construction of our sample, defines the principal variables we use in the statistical analysis, and shows our main results.

3.1. Sample construction

The starting point for our sample are all companies with SIC codes between 6000 and 6300 that existed in July 1998 in the Center for Research in Security Prices (CRSP) and Standard & Poor's Compustat databases. We first exclude companies with foreign incorporation because our focus is on U.S. firms. We then reduce the sample to all those firms that also existed with the same Compustat identifier (gvkey) or permanent CRSP company identifier (permco) in Compustat and/or CRSP at the end of 2006. We automatically include firms in our sample that have the same gvkey, same permco, and the same or a very similar name in 1998 and 2006.[7] We manually examine firms that match on either the gvkey or permco criterion, but where names do not match. We include all firms where the identifiers are the same, but the name of the corporation changed (e.g., from PNC Bank Corporation (1998) to PNC Financial Services Group Inc. (2006) or Countrywide Credit Industries Inc. (1998) to Countrywide Financial Corporation (2006)).[8]

[7] We use the SAS command `spedis` to compare names and accept all banks as having similar names if the command returns a spelling distance smaller than 30.

[8] Some firms changed their names because of a new geographic orientation or a change in the business model, yet kept CRSP and Compustat identifiers. One may argue whether these are really the same firms in 1998 and 2006, but we decided to leave them in the sample to reduce as much as possible subjective classifications on our part. Note that including these firms will hurt our identification strategy.

We allow firms to merge between 1998 and 2006. For most of our sample mergers and acquisitions, the new entity and the acquirer have the same name. In some mergers and acquisitions, the new entity's name is a mix of the names of the target and acquirer. In several other cases, the acquiring company takes on the name of the target. In a few cases, the new entity has an entirely different name. As long as either Compustat's gvkey or CRSP's permco is the same in 1998 and 2006, we include the merger in our sample. Should our statistical analysis require data pre-merger, we always use, to be consistent, data from the entity that is defined in the CRSP database as the acquiring entity.[9]

In the last step, we follow Fahlenbrach and Stulz (2011) and exclude firms that are not in the traditional banking industry, such as investment advisors (SIC 6282), online brokerages, or payment processors. Our final sample contains 347 firms with complete return data for 1998 and 2006. For increased transparency, we list sample firms in Appendix 1.

We obtain stock returns from the Center for Research in Security Prices (CRSP), accounting data and information on investment securities, trading securities, assets held for sale, and deposits from Standard and Poor's Compustat, and Tier 1 capital ratios as well as net interest income and non-interest income from Compustat banking. We collect the names of the CEOs of sample firms from CompactDisclosure in 1998 and the Corporate Library in 2006 as well as a manual search of proxy statements for firms not covered by these data sources. Thomson Reuters' SDC Platinum provides data on merger dates and transaction prices. We obtain information on notional amounts of derivatives from FR Y-9 statements for bank holding companies from the Wharton Research Data Services (WRDS) Bank Regulatory database. For the use of commercial paper, we combine information from Compustat and FR Y-9 statements.

[9] Some of the biggest banks in the United States today were the result of mergers during our sample period (e.g., Traveler's Group acquired CitiCorp to form CitiGroup. Chase Manhattan Corp. acquired J.P. Morgan & Co to form JP Morgan Chase. NationsBank Corp acquired BankAmerica with the new entity operating under the name Bank of America. Norwest acquired Wells Fargo with the new entity operating under the name Wells Fargo). Because some readers may worry about whether the way we calculate 1998 crisis returns for these big mergers affects our results, we have verified that our main results hold if we exclude all banks which do not have the same name in 1998 and 2006. This requirement reduces the sample to 288 firms. Our results remain qualitatively and quantitatively similar.

3.2. Main dependent and independent variables

We investigate the determinants of returns of individual banks using buy-and-hold returns from July 1, 2007, to December 31, 2008. Admittedly, the crisis did not end in December 2008. Bank stocks lost substantial ground in the first quarter of 2009. However, the losses in 2009 were at least partly affected by uncertainty about whether banks would be nationalized so that we stop calculating the buy-and-hold returns in December 2008.[10] Not all our sample banks survive until December 2008. If banks delist or merge prior to December 2008, we put proceeds in a cash account until December 2008.[11]

Some of our regressions use an indicator variable equal to one if a firm failed during the financial crisis as the dependent variable. Firms are considered to have failed if they are on the list of failed banks maintained by the Federal Deposit Insurance Corporation (FDIC), if they are not on the FDIC list but have filed for Chapter 11, if they merged at a discount, or if they were forced to delist by their stock exchange. We obtain information on the price per share paid as well as the announcement date for a merger from Thomson Reuters' SDC Platinum database. A merger is judged to have occurred at a discount if the price paid per share is lower than the target's stock price at market close one trading day before the announcement date. An example of a merger that occurred at a discount is the acquisition of Bear Stearns by JPMorgan Chase. Factiva news searches were performed to determine whether a delisting was voluntary or forced. We attempted to ensure that voluntary delisters did not delist to preempt an imminent forced delisting. Most voluntary delisters cited reporting obligations and other regulatory compliance costs as the main reason for delisting. Among the banks that were forced to delist, two failed to meet the market capitalization requirements of the NYSE and Nasdaq, respectively; one failed to submit an audited 2006 10-K by the final deadline set by the NYSE; and one saw its trading halted and was later delisted by NYSE Alternext after having failed to meet a deadline to raise capital or sell itself to an investor as required by the OTS in a cease-and-desist order.

[10] However, we have also estimated regressions with buy-and-hold returns from July 2007 until December 2009. See Section 5 for results.

[11] We have verified that our results are qualitatively and quantitatively similar if proceeds are put in a bank industry index (using the Fama-French 49 "bank" industry).

Our main explanatory variable is the return during the latter half of 1998. We construct the return during the crisis of 1998 as follows. We fix, admittedly somewhat arbitrarily, the start of the crisis to be August 3, 1998 (the first trading day of August 1998). We then search, for each sample firm, for the date between August 3 and December 31, 1998 on which the firm attains its lowest (split- and dividend-adjusted) stock price. Finally, we use daily return data to calculate buy-and-hold returns from August 3, 1998 to the low in 1998. We also calculate a rebound buy-and-hold return, which is the six-month buy-and-hold return following the lowest price of 1998.

Figure 1 shows returns to an equal-weighted and value-weighted index of sample banks as well as the return to the value-weighted CRSP index between January 1998 and December 2009. Two things are noteworthy. First, large banks (the dashed line) emerged from the crisis in 1998 faster than small banks, but small banks (the solid line) tended to do better during much of 2000 – 2009. Second, not only banks, but also the overall market (the dotted line) experienced severe losses during both the crisis of 1998 and the recent credit crisis. Because of the latter point, we include a bank's equity beta as a measure of systematic risk exposure in all of our regressions. We measure a bank's equity beta by estimating a market model of weekly bank returns in excess of 3-month T-bills from January 2004 to December 2006, where the market is represented by the value-weighted CRSP index.

We follow Acharya et al. (2010) and approximate a bank's leverage as the quasi-market value of assets divided by the market value of equity. The quasi-market value of assets is defined as book value of assets minus book value of equity plus the market value of equity. All other control variables are described in the table captions.

3.3. Summary statistics

Table 1 shows sample summary statistics. The median and mean annualized return for sample banks was minus 30% (minus 31%) from July 2007 to December 2008. Twenty-six sample banks failed between July 2007 and December 2009, which corresponds to 7.49 percent of all sample observations. The median and mean return from August 3, 1998 to the lowest stock price in 1998 was approximately

minus 24%, and minus 26%, respectively. Banks attained their lowest stock price on average 50 trading days after August 3, 1998 (early October 1998). Banks performed quite well during the six months following their 1998 crisis, with median and mean rebound returns of 12% and 18%, respectively.

For 43% of sample observations, we observe the same CEO in office in 1998 and 2006. The average bank has $40.4 billion in assets at the end of 2006, but the median bank has only $2 billion in assets. These numbers are substantially smaller than the mean ($129 billion) and median ($15.5 billion) total bank assets one would obtain from banks that are in the S&P 1500 (e.g., Fahlenbrach and Stulz (2011)). The average bank in our sample has a book-to-market ratio of 0.6 and a market capitalization of $5.4 billion. The average leverage is 7.6.

Finally, the median and average equity beta of sample firms is equal to 0.77 and 0.70, respectively. Banks did well in 2006, with median and mean returns of 10% and 12%, respectively. The median and mean Tier 1 capital ratios are both in excess of 10%, so that they are well above the statutory requirements. The minimum Tier 1 capital ratio is 5.73%, which exceeds the minimum capital requirement.

3.4. Do bank returns during the events of 1998 help predict bank returns during the financial crisis?

We now test the three hypotheses we discussed in the introduction. The learning hypothesis implies that the crisis return of the recent crisis is negatively related to the crisis return of 1998, while the business model hypothesis implies a positive relation. The null hypothesis is that the returns during the two crises are unrelated. Table 2 shows strong support for the business model hypothesis. The crisis return of 1998 has strong predictive power for the returns during the recent financial crisis. Banks that did poorly during the crisis of 1998 again did poorly during the recent financial crisis. The effect appears both economically and statistically significant. In the cross-section of banks, a one standard deviation higher return during the crisis of 1998 is associated with an 8.2% lower return (0.655 x 0.125) during the recent financial crisis. After controlling for the rebound return in 1998, the return during the calendar year 2006, the

equity beta, the book-to-market ratio, the log of market value, and leverage (all measured at the end of fiscal year 2006), the effect is a 6.1% lower return during the recent crisis for a one standard deviation lower return during the events of 1998. Relative to the sample mean for the annualized crisis return 2007/2008 of minus 31%, this corresponds to a drop of 20%. For comparison, a one standard deviation increase in leverage is associated with a 7.0% lower return (-0.0206 x 3.395) during the recent financial crisis. The effect is not driven by investment banks. In column 5, where we include regulatory capital and thus exclude non-depository institutions, we find economically and statistically similar results. We do not find support for the hypothesis that banks with stronger rebound returns remembered only that aspect of the 1998 crisis subsequently and took more risks as a result. This hypothesis predicts a negative coefficient on rebound returns. Once we control for other return characteristics in columns 3 to 5, the coefficient on the six-month rebound return is indistinguishable from zero.

Most of the control variables in column 4 have the expected sign, except for the coefficient on beta. Similar to Beltratti and Stulz (2011), we find that banks that did well in 2006 have poor crisis returns. Smaller banks did better during the recent crisis, as did banks with lower leverage (see, e.g., Acharya et al. (2010)). Surprisingly, the equity beta has a positive coefficient – banks with larger exposure to the market had better returns during the crisis.[12] Coefficients of control variables in column 5, based on a regression which excludes institutions that do not report Tier 1 capital, are qualitatively similar, but generally of lower significance. Banks with more Tier 1 capital did better during the financial crisis.

Our results so far are equally consistent with banks that did well in 1998 again doing well in 2007/2008 and with banks doing poorly in 1998 again doing poorly in 2007/2008. In Table 3, we analyze whether there are asymmetries in the relation between crisis returns in 1998 and returns during the recent crisis. We split banks into quintiles based on their crisis returns of 1998 and create indicator variables for

[12] This result is contrary to the findings reported in Acharya et al. (2010), who find a negative coefficient on beta in regressions of crisis returns on beta and controls. Two things help explain the difference in results. Acharya et al. (2010) measure beta over the period July 2006 to June 2007, while we measure beta over 2004-2006. When we estimate beta over the same time period as Acharya et al. (2010), we find that beta is indistinguishable from zero. Acharya et al. (2010) also have a smaller sample as they require financial institutions to have a market capitalization of at least $5 billion. When we restrict our sample to the 100 largest banks in our sample, and measure beta from July 2006 to June 2007, we find a statistically significantly negative coefficient on beta of -0.25 (compared to -0.29 in Acharya et al. (2010)).

each of the five groups. Quintile 1 contains all observations whose return during the crisis of 1998 is among the 20% lowest. For consistency, we proceed similarly with the rebound returns in 1998. Table 3 reports results of regressions in which we replace the 1998 crisis and rebound returns with the quintile indicator variables. The omitted group is quintile 5, the quintile of banks that did best during the crisis and rebound period, respectively. Table 3 shows that banks that performed extremely poorly during the crisis of 1998 did so again during 2007/2008. We report in column 1, which does not include other control variables, that being in the bottom quintile in 1998 is associated with an almost 23% lower return during the financial crisis of 2007/2008. Only the coefficient on the lowest 1998 crisis quintile indicator variable is statistically significant, and it is much larger than the other coefficients.[13]

Controlling for leverage, beta, size, and returns in 2006 attenuates the effect to a certain extent. However, in column 2, which includes the same control variables as the regressions reported in Table 2, the coefficient on the bottom 1998 crisis quintile indicator is still an economically significant -17% and is also statistically significant at the one percent level. Column 3 of Table 3 shows that the effect is not driven by investment banks. Requiring institutions to report Tier 1 capital (and thus excluding investment banks) leads to a statistically and economically significant minus 15.6% lower crisis return if the 1998 return fell into the lowest quintile. Columns 4 and 5 of Table 3 show that controlling for the 1998 rebound return quintiles does not change the results for the 1998 crisis quintile indicator variables. Returns during the recent financial crisis are 16.9% lower if the firm is in the bottom quintile of 1998 returns (sample of all banks, column 4). None of the quintile indicator variables for rebound returns is statistically significant. Results for the sample that excludes non-depository institutions yield a similar picture for the bottom quintile crisis returns.

Commentators have argued during the recent financial crisis that some banks may have known that they were too big to fail, and that this might have created incentives to take on more risks than socially optimal. Similarly, if banks knew that they were too big to fail, they may have felt less compelled to

[13] Wald tests reject the hypothesis of joint equality of 1998 crisis return quintile coefficients for all specifications that contain banks and investment banks.

change their business model after the 1998 crisis, because they were reasonably certain to receive federal assistance during the next crisis. Alternatively, it may be harder to change the business model of a large bank. In Table 4, we split the sample of banks into two groups, based on the median value of total assets in 2006, and repeat the regressions of Table 2, columns 3 and 4. We find that the predictive power of 1998 crisis returns is concentrated in large banks. Columns 1 and 2 show that there is no predictive power of 1998 crisis returns in the sample of small banks. Columns 3 and 4 repeat the regressions for the sample of large banks only. A one standard deviation higher 1998 crisis return for large banks is associated with about 11% higher annualized crisis returns in 2007/2008.[14] However, in regressions not reported in Table 4, we analyze whether the effect is concentrated in the largest banks (those with assets in excess of $50 billion) and find that there is no difference in the coefficient of 1998 crisis returns for these and all other banks. Columns 5 through 7 report regressions that use the entire sample, and include interaction terms of the crisis return 1998 and rebound return 1998 with an indicator variable equal to one if the bank is of above median size. The results in columns 5 and 6 are qualitatively and quantitatively similar to those reported in columns 1 through 4. Column 7 reports results that focus on depository institutions only, and shows that our results are not driven by investment banks. The crisis returns of 1998 have strong predictive power for crisis returns during the financial crisis for large banks that report Tier 1 capital.

Table 5 examines whether the predictive power of 1998 crisis returns is different for banks which had the same CEO in 1998 and 2006. A different correlation could arise for at least two different reasons. First, a bank CEO whose strategy led to large realized tail risk in 1998 (and who survived in his job) may have gotten more cautious and may have reduced, relative to other banks, the risk exposure of his bank during the build-up of the recent financial crisis. This hypothesis would predict a statistically significant negative coefficient on an interaction term of the 1998 crisis return with a same CEO indicator variable. On the other hand, a CEO may have certain personality traits and attitudes towards risk that are time-invariant. In that case, and to the extent that banks do not always hire CEOs with similar traits, it could be

[14] One may be concerned that small banks' business model is more local so that they would not have had any direct exposure to the kind of assets that were affected in the 1998 financial crisis, which originated in Russia. However, it turns out that the average 1998 crisis return among large banks is -25.8%, compared to -26.0% for small banks. Hence, on average, large and small banks seem to have been affected equally by the financial crisis of 1998.

that the executive's ideas on how to run a bank rather than the bank's business model itself explain our results. If that were the case, we would expect a statistically significant positive coefficient on the interaction term. Table 5 shows the results. The interaction variable same CEO x crisis return 1998 is not statistically significantly different from zero in any specification. We cannot reject the hypothesis that the predictive power of 1998 returns is the same in banks with and without the same CEO in 1998 and 2006.

3.5. Do bank returns during the events of 1998 help predict failure during the financial crisis?

The analysis so far has focused on stock returns. An important question to address is whether poor performance in a crisis makes it more likely that the bank itself will be unable to survive a subsequent crisis. If banks that perform poorly in a crisis have inherently more exposure to systemic risk, these banks are more likely to fail during the next crisis. Table 6 shows the status of sample banks by the end of 2009.[15] We classify 321 banks or 92.5% of our sample banks as having survived the crisis. Of those, 280 were listed on a major U.S. stock exchange at the end of 2009. Thirty-four banks merged during the period July 2007 to December 2009 at a premium. We define a merger to have happened at a premium if the price per share paid during the transaction is higher than the closing price per share on the last day prior to the merger announcement. Seven sample banks voluntarily delisted to avoid regulatory compliance costs. We observe 26 bank failures, which we define as banks being closed by the FDIC or OTS (15 observations), banks merging at a discount (5 observations), forced delistings by an exchange (4 observations), or chapter 11 filings (2 observations).[16] Classifying bank mergers at a discount as failures captures the cases of Bear Stearns (discount of 67%) and Countrywide Financial (discount of 8%), among others.

Table 7 shows the results of probit regressions of bank failures on the same explanatory variables we used before. All specifications report marginal effects. Poor crisis returns in 1998 are associated with a

[15] We chose to extend the time period for failures to the end of 2009, because banks may be closed by the FDIC or OTS with a delay. Of the 26 banks we classify as failures, 11 failed during 2009.

[16] For some failures, such a classification is not clear-cut. For example, Washington Mutual Bank was seized by the Office of Thrift Supervision, and its bank holding company, Washington Mutual, Inc., filed for chapter 11. In Table 6, we classify the Washington Mutual failure as "Closed by FDIC/OTS", because the seizure preceded the Chapter 11 filing by one day.

significantly higher probability of failure during the recent credit crisis. The effects are economically large. In the most comprehensive specification in column 4, a one standard deviation lower return during the 1998 crisis is associated with a statistically significant 5.0% (-0.3994 x 0.125) higher probability of failure during the credit crisis of 2007/2008. Relative to the average probability of failure for our sample of 7.5%, this corresponds to an economically highly significant increase in the probability of failure of 67%. Regarding the control variables, it appears that larger banks were more likely to fail. Somewhat surprisingly, neither leverage nor beta has explanatory power in the probit regressions.

Perhaps not surprisingly, non-depository institutions had higher failure rates (4/18=22%). However, column 5, which excludes non-depository institutions, shows that the results are quantitatively and qualitatively similar for regressions using the sample of depository institutions.

Overall, the results of the probit regressions are consistent with the return results of Tables 2 through 5. We show in Tables 2 to 5 that poor returns during the 1998 crisis had predictive power for the 2007/2008 crisis return, and Table 7 corroborates this finding by showing that poor returns in 1998 predict bank failure during the recent crisis. It is important to note that this result is consistent with banks maximizing shareholder wealth in choosing their business model and their risk appetite, in that the expected gains from positioning themselves as they did may have exceeded the expected costs for shareholders from the resulting increase in the probability of failure.

4. Discussion and interpretation

We have shown strong evidence in support of the business model hypothesis in Section 3. To make some progress towards an explanation of our key finding, we now examine the characteristics of sample banks that were in the bottom tercile of performance in both 1998 and 2007/2008. There were 51 such banks. We focus on three main areas. We measure the degree to which banks relied on leverage, and in particular short-term funding. We examine market leverage, defined as before, as well as whether the bank had an S&P rating and the ordinal measure of the institution's rating. We define short-term funding as debt with maturity of less than one year, divided by total liabilities (i.e., the sum of short-term debt,

long-term debt, deposits, and other liabilities (Compustat acronym LT)). The data source for these measures is Compustat. We also analyze an indicator variable equal to one if the firm uses commercial paper, and zero otherwise. These data come from Compustat and FR Y-9, the consolidated financial statements for bank holding companies. The second area we focus on is the rate at which banks grew their balance sheets prior to the two crises. We measure asset growth as the annualized growth rate of total assets during the three years preceding the 1998 crisis and the three years preceding the recent financial crisis, respectively. Finally, we examine the degree to which banks derived their income from non-traditional banking business. We focus on the fraction of income that is non-interest income as well as the fraction of total assets that consists of investment securities, assets held for sale, and trading securities, respectively. In addition, we analyze the total notional amount of derivatives outstanding. This analysis is in the spirit of De Jonghe (2010) who examines, for a sample of European banks, how a measure of systemic risk correlates with interest income and components of non-interest income such as commissions and trading income.

Table 8 shows summary statistics of key variables for bottom tercile performers at the end of fiscal year 2006 and at the end of fiscal year 1997, the last fiscal year ends available prior to the respective crisis. Panels A and B show results for all banks, while panels C and D show results for depository institutions only.

It is striking that bottom performers in both crises grew substantially faster than other financial institutions during the three years before the start of the crisis. Before the most recent crisis, bottom performers grew more than the other financial institutions by 70%. During the three years prior to the 1998 crisis, they grew more than the other financial institutions by 45%. Adding the 2004-2006 asset growth rate to the regressions of Table 2, the coefficients on the 1998 return are still significant, but their economic magnitude and statistical significance falls by 25 percent.

Bottom performers had an approximately 30% higher leverage than other institutions prior to both crises, with the differences being strongly statistically significant. Bottom performers relied, relative to all other institutions, much more heavily on commercial paper and other short-term funding prior to the

crises of 1998 and 2007/2008. On average, 18% (27%) of liabilities were financed short-term in 2006 (1997) for bottom performers, relative to 8.5% (9%) in other financial institutions. These differences are again highly statistically significant. In addition, bottom performers relied statistically significantly less on financing through customer deposits,[17] which account for an average of 65% (59%) of their liabilities in 2006 (1997), as compared to 79% (84%) for other financial institutions. This evidence demonstrates that the funding fragility that Gorton (2010) finds to have played a critical role in the propagation of the recent crisis and that Beltratti and Stulz (2011) show to be negatively associated with bank performance during the recent crisis was also an important determinant of the performance of financial institutions in the 1998 crisis. However, this difference in liability structure does not appear to explain our main result. In particular, if we add 2006 short-term funding to the principal regressions of Table 2, the coefficients of the 1998 return are unaffected. Relatively more of the poorly performing institutions are rated, but given there is a rating, the ordinal measure of the ratings is not different across poorly performing and other institutions.

Overall, there seems to be a clear difference in the liability structure of the firms that performed poorly prior to both crises. This difference in liability structure is not driven by the non-depository institutions, as panels C and D of Table 8, which focus on depository institutions only, show.

We also examine differences in investment and trading positions and assets held for sale. Poorly performing institutions held fewer investment securities prior to both crises. There is some evidence that they also had larger trading positions and more assets held for sale, but these effects are economically small. Panels C and D also examine, for depository institutions, differences in non-interest income and the size of the derivatives positions. Bottom performers relied significantly less on non-interest income in 2006, but we find no difference in 1997. There are no differences in the total notional amount of derivatives positions.[18]

[17] These include deposits by individuals, partnerships, and corporations.

[18] Note, however, that we do not know whether these derivatives are used for hedging or speculation. Hence, while the notional amounts are quite similar, the *use* of these derivatives and its consequences for the income statement could be very different (for more discussion, see Gorton and Rosen (1995)).

Many of the variables we analyze in Table 8 are correlated, and we do not control for important bank characteristics such as bank size. To better assess how bank characteristics are correlated with banks' crisis performance, we report in Table 9 probit regressions explaining whether a financial institution is in the bottom performer group during both crises. Panel A uses 2006 firm characteristics as independent variables, while Panel B uses 1997 firm characteristics. It might seem odd to use bank characteristics in 2006 to help understand whether a bank performed poorly in the 1998 crisis as well as in the more recent crisis. However, the purpose of the experiment is to assess how bank characteristics are related to crisis performance. The idea in using the 2006 characteristics is to assess whether bank characteristics at a point in time are useful in predicting how a bank will fare in a crisis. According to model (1) in Panel A, poor performance is correlated with short-term funding independent of leverage. At the sample mean, a one standard deviation change in short-term funding is associated with a 6.7% (0.6214 x 0.108) larger probability of being in the bottom performer group. This is large relative to an unconditional probability of 14.7% of being in that group. Further, model (1) shows an extremely strong effect of asset growth. A one standard deviation increase in asset growth is associated with a 7.8% (0.7835 x 0.099) increase in the probability of being a bottom performer. Model (2) shows that deposits, which are highly negatively correlated with short-term funding, are associated with a lower probability of membership in the bottom performer group, but this result is statistically weaker.[19] Leverage is significantly positive in all regressions, and the return in 2006 is significantly positive in model (1). Model (3) adds the amount of investment securities, trading securities, and assets held for sale on the balance sheet as explanatory variables. The amount of investment securities held is significantly negatively associated with the probability of being a bottom performer, with a 7.5% (-0.6184 x 0.121) decrease in probability for a one standard deviation change in investment securities. Trading securities and assets held for sale are not significant. Model (4) examines non-interest income. Interestingly, banks with a higher fraction of non-interest income are less likely to become members of the bottom performer group. A one standard deviation increase in the percentage of non-interest income is associated with a 5.1% (-0.3801 x 0.133)

[19] The correlation between deposits and short-term funding is -75.6% in 2006 and -84.7% in 1997.

smaller probability of being a bottom performer. Models (5) and (6) focus on commercial banks and add the use of derivatives and commercial paper. Coefficients on these two variables are not statistically significantly different from zero.

Panel B examines whether the same characteristics measured in 1997 can help explain bank's bottom performer status. Because of data availability, the number of observations in each regression is substantially reduced, and income variability and the rating variable are omitted entirely. The results for 1997 firm characteristics in Panel B are weaker but generally consistent with the results using 2006 characteristics.

The above results suggest that the correlation between returns during the 1998 financial crisis and the recent financial crisis is at least partly due to a business model that relies on higher leverage, more short-term funding, and stronger asset growth during the boom preceding a crisis. If this is the case, we should expect to find that returns during the 1998 crisis predict the levels of these firm characteristics in 2006, the year prior to the recent crisis. In Table 10, we analyze the predictive power of 1998 crisis returns for leverage, the Tier 1 capital ratio, short-term funding, and asset growth prior to the recent crisis. We also add the distance to default. Following Laeven and Levine (2009), we measure the distance to default as the natural logarithm of (ROA+CAR)/volatility(ROA), where ROA is the return on assets and CAR is the capital to assets ratio. We measure the volatility of ROA on a quarterly basis from 2003 through 2006.

Table 10 shows that banks that did poorly in 1998 have significantly higher leverage in 2006. A one standard deviation change in the 1998 crisis return results in a 0.47 (-3.7974 x 0.125) unit change in leverage, or 6.2% relative to the mean. This result is essentially the same whether or not non-depository institutions are included. Interestingly, banks that rebounded more strongly after the 1998 crisis also appear to have higher leverage in 2006. Tier 1 capital and distance to default can only be measured for depository institutions. Banks that did poorly in 1998 have less Tier 1 capital and a shorter distance to default in 2006, although the latter result is not statistically significant. Model (5) shows that banks that rebounded strongly in 1998 use more short-term funding in 2006, but this result is entirely driven by non-depository institutions. When we focus on depository institutions (model (6)), it is again the poor

performers of 1998 who used more short-term funding. Models (7) and (8) also show that banks that performed poorly in 1998 grew their assets more strongly during 2004 through 2006.[20] In model (7), a one standard deviation worse 1998 crisis return is associated with a 1.9 percentage points (0.1505 x 0.125) higher asset growth, or 17.3% relative to the mean. In sum, the results of Table 10 are consistent with the interpretation that the 1998 crisis return captures aspects of a bank's business model.

5. Robustness

Our main sample consists of only 347 observations. Hence, there is the danger of outliers driving some of our results. We have estimated several additional regressions to test the robustness of the main results in Tables 2 and 4. We have estimated median regressions, in which the sum of the absolute value of residuals rather than the sum of the squared residuals is minimized and thus the problem of outliers is reduced. Our results are robust to this additional specification. Table 11, columns 1 and 2, reports the results from median regressions using the main specification from Table 2. The coefficients of the principal variable of interest, the crisis return of 1998 remains economically strongly significant, although the statistical significance is reduced to the twelve percent level for all banks and the five percent level for the sample without investment banks. The results are also robust if we use either truncated or winsorized returns for the financial crisis and/or explanatory variables to reduce the danger of outliers driving results.

We have also estimated regressions in which we changed the time period over which we measure returns during the recent financial crisis. When we define crisis returns during the recent crisis as returns from July 2007 to December 2009, the predictive power of 1998 returns continues to be statistically significant, but loses approximately one third of its economic significance.

Our principal tests calculate buy-and-hold returns during the crisis of 1998 from August 3, 1998 to the day each bank attains the lowest stock price. Hence, banks' buy-and-hold returns are not calculated over the same time horizon. To alleviate concerns about this issue, we have re-estimated regressions in

[20] Since asset growth is measured during 2004 through 2006, the control variables for the asset growth regressions are measured at the end of 2003. For the other regressions, control variables are measured at the end of 2005.

which we define crisis returns during the crisis of 1998 as starting for all banks in August 1998 and ending either at the beginning of October 1998 or at the beginning of November 1998. Table 11, columns 3 and 4 show that the redefined 1998 crisis returns using a common cutoff for all banks of October 1, 1998 continue to have economically and statistically significant explanatory power for returns during the recent financial crisis. Results using the November 1, 1998 cutoff lose about 25% of their economic significance relative to the results reported in Table 11, but continue to be statistically significant. They are omitted for brevity.

We have attempted to ensure that changing the way we control for systematic risk exposure does not affect our results. We have estimated beta over different time periods, using either weekly or daily data. In addition, we have calculated the marginal expected shortfall variable of Acharya et al. (2010) and have included it in the place of beta as a control variable in the regressions. Our main results are robust to these alternative specifications.

Finally, one might be concerned that our use of raw returns to calculate buy-and-hold crisis returns is problematic. We have re-estimated the main regressions of Table 2 using market-model adjusted buy-and-hold returns for our main dependent and independent variable. We calculate monthly market-model adjusted crisis returns as the difference between banks' crisis returns and banks' beta times the value-weighted CRSP return, where returns are measured in excess of the 3-month T-bill rate. Beta is estimated from 1995-1997 for the 1998 crisis returns and from 2004-2006 (or June 2006-June 2007) for financial crisis returns. For the 228 banks that have data going back to 1995, results using raw returns and excess returns are qualitatively and quantitatively similar.

Our second set of robustness tests deals with a different issue. In the interpretation of our results, we ascribe a special importance to the performance of banks during the events of 1998 and its ability to predict returns during the recent financial crisis. What if our proxies for systematic risk such as beta are mismeasured and any past return has predictive power for the performance during the recent crisis? Alternatively, what if the crisis return of 1998 also predicts returns during a calm period for banks? If any one of these two points is true, our interpretation of the crisis return 1998 might be questioned. We

attempt to address these concerns in Table 12. In columns 1 and 2, we reproduce our principal regressions of Tables 2 and 4 for comparison. In columns 3 and 4, we estimate the same regressions, but replace the crisis return 1998 with a "placebo crisis" return for 1997. We calculate the "placebo crisis" return with buy-and-hold returns from August 1, 1997 until 50 trading days later. We use fifty trading days because this is the average holding period from the first trading day in 1998 until the worst day of 1998. Columns 3 and 4 of Table 12 clearly show that the placebo crisis return 1997 does not have predictive power for the recent financial crisis. In columns 5 and 6 of Table 12 we replace the left-hand-side financial crisis return of 2007/2008 with a "placebo crisis return" by calculating annualized buy-and-hold returns for sample banks from July 2005 until December 2006. The results of columns 5 and 6 of Table 12 show that the crisis return of 1998 does not have predictive power for returns from July 2005 to December 2006. It follows from this experiment that the features of the business model that help predict crisis performance are not helpful to predict performance outside of crises. In unreported regressions, we predict 2005/2006 returns using returns of 1997, i.e. using two periods of good bank performance. We do not find evidence that a period of good performance predicts another period of good performance.

6. Conclusion

We find that the stock market performance of banks during the 1998 financial crisis predicts their stock market performance during the financial crisis of 2007/2008. Our key result is that for each percentage point of loss in the value of its equity in 1998, a bank lost an annualized 66 basis points during the recent financial crisis. This result holds whether we include investment banks in the sample or not. Our result cannot be explained by differences in the exposure of banks to the stock market or the same executives running the banks in 1998 and 2007. Our result is consistent with what we call the business model hypothesis and inconsistent with the learning hypothesis. Banks that are negatively affected in a crisis do not appear to subsequently alter the business model or to become more cautious regarding their risk culture. Consequently, the performance in one crisis has strong predictive power for a crisis which starts almost a decade later.

An important caveat applies to the interpretation of our results, however. By their very nature, crises are unexpected. We cannot exclude that banks learned from 1998 and chose to take less risk on the asset side, but as they invested in less risky assets, those assets turned out to perform unexpectedly poorly in the recent crisis. There is no good way to assess comprehensively the ex ante risk of the assets banks invest in, so that there is no good way to exclude the possibility that banks that suffered more from 1998 chose to invest more safely. However, our evidence shows that the banks that performed poorly in both crises had more risky funding, higher leverage, and greater growth than other banks before the crises. Hence, our evidence does suggest that banks did not change fundamental aspects of their business strategy as a result of their performance in the 1998 crisis.

Given our main result, some of the events subsequent to 1998 that have been argued to have played a key role in the performance of banks during the financial crisis have to be put in perspective. The Gramm-Leach-Bliley Act (GLBA) was signed into law in November 1999. GLBA repealed central provisions of the Glass-Steagall Act that restricted bank holding companies from affiliating with securities firms and insurance companies. Leading economists have suggested that the recent financial crisis can be, in part, blamed on GLBA.[21] The strong return predictability of 1998 crisis returns for the financial crisis of 2007/2008 shows that part of the performance of banks during the recent crisis can be attributed to factors that already existed before the enactment of GLBA or other regulatory decisions such as the Commodities Futures Modernization Act or the SEC's amendments to the broker-dealer net capital rule.

Though we provide evidence that the banks that perform poorly in both crises are more reliant on short-term market funding than other banks and grow more in the three years before the crisis, we do not find that reliance on short-term market funding and greater asset growth are sufficient to explain our result that returns during the recent crisis are predictable from returns of the 1998 crisis. Consequently,

[21] For example, Paul Krugman has argued that: "[…] aside from Alan Greenspan, nobody did as much as Mr. Gramm to make this crisis possible" (New York Times, Taming the beast, March 24, 2008). Joseph Stiglitz is quoted in an article on how GLBA helped to create the current economic crisis as saying: "As a result, the culture of investment banks was conveyed to commercial banks and everyone got involved in the high-risk gambling mentality. That mentality was core to the problem that we're facing now" (ABC news, Who's whining now? Gramm slammed by economists, Marcus Baram, Sep 19, 2008).

further research should attempt to isolate aspects of a firm's business model or culture that can explain this predictability. Cheng, Hong, and Scheinkman (2010) show that compensation practices in the late 1990s help explain the performance of banks during the recent crisis. Compensation practices can also be a manifestation of the deeper fundamentals that lead to persistence in crisis exposure.

In the absence of quantifiable information about a bank's business model or culture that could be used to measure its sensitivity to crises, our evidence shows that there is strong persistence in crisis exposure for crises that are ten years apart so that a bank's performance in one crisis is an important measure of its inherent riskiness and exposure to crises.

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Appendix 1

The appendix lists all sample firms. Shown is the name as it appears in the field "comnam" of the Compustat database at the end of fiscal year 2006.

1ST SOURCE CORP
ABIGAIL ADAMS NATL BANCORP INC
ALABAMA NATIONAL BANCORP DEL
AMCORE FINANCIAL INC
AMERIANA BANCORP
AMERICAN WEST BANCORPORATION
AMERIS BANCORP
AMERISERV FINANCIAL INC
AMERITRANS CAPITAL CORP
ANCHOR BANCORP WISCONSIN INC
ANNAPOLIS BANCORP INC
ARROW FINANCIAL CORP
ASTORIA FINANCIAL CORP
AUBURN NATIONAL BANCORP
B B & T CORP
B C S B BANKCORP INC
B O K FINANCIAL CORP
BANCFIRST CORP
BANCORP RHODE ISLAND INC
BANCORPSOUTH INC
BANCTRUST FINANCIAL GROUP INC
BANK GRANITE CORP
BANK NEW YORK INC
BANK OF AMERICA CORP
BANK OF HAWAII CORP
BANK OF THE OZARKS INC
BANK SOUTH CAROLINA CORP
BANKATLANTIC BANCORP INC
BANKUNITED FINANCIAL CORP
BANNER CORP
BAR HARBOR BANKSHARES
BEAR STEARNS COMPANIES INC
BEVERLY HILLS BANCORP INC
BLUE RIVER BANCSHARES INC
BNCCORP
BOE FINANCIAL SVCS OF VA INC
BOSTON PRIVATE FINL HLDS INC
BRITTON & KOONTZ CAPITAL CORP
BROADWAY FINANCIAL CORP DEL
BROOKLINE BANCORP INC
BRYN MAWR BANK CORP
C & F FINANCIAL CORP
C C F HOLDING COMPANY
C F S BANCORP INC
C V B FINANCIAL CORP
CAMCO FINANCIAL CORP
CAMDEN NATIONAL CORP
CAPITAL BANK CORP NEW
CAPITAL CITY BANK GROUP
CAPITAL CORP OF THE WEST
CAPITOL BANCORP LTD
CARDINAL FINANCIAL CORP
CARROLLTON BANCORP
CARVER BANCORP INC
CASCADE BANCORP
CASCADE FINANCIAL CORP
CATHAY GENERAL BANCORP
CENTER BANCORP INC
CENTRAL BANCORP INC
CENTRAL PACIFIC FINANCIAL CORP
CENTRAL VIRGINIA BANKSHARES INC
CENTRUE FINANCIAL CORP NEW
CENTURY BANCORP INC
CHARTERMAC
CHEMICAL FINANCIAL CORP
CHITTENDEN CORP
CITIGROUP INC
CITIZENS BANKING CORP MI
CITIZENS SOUTH BANKING CORP DEL
CITY HOLDING CO
CITY NATIONAL CORP
COBIZ INC
CODORUS VALLEY BANCORP INC
COLONIAL BANCGROUP INC
COLONY BANKCORP INC
COLUMBIA BANKING SYSTEM INC
COMERICA INC
COMM BANCORP INC
COMMERCE BANCORP INC NJ
COMMERCE BANCSHARES INC
COMMERCIAL NATIONAL FINL CORP
COMMUNITY BANK SHRS INDIANA INC
COMMUNITY BANK SYSTEM INC
COMMUNITY BANKS INC PA
COMMUNITY BANKSHARES INC S C
COMMUNITY CAPITAL CORP
COMMUNITY FINANCIAL CORP
COMMUNITY TRUST BANCORP INC
COMMUNITY WEST BANCSHARES
COMPASS BANCSHARES INC
COOPERATIVE BANCSHARES INC
CORUS BANKSHARES INC
COUNTRYWIDE FINANCIAL CORP
COWLITZ BANCORPORATION
CULLEN FROST BANKERS INC
DEARBORN BANCORP INC
DIME COMMUNITY BANCSHARES
DORAL FINANCIAL CORP
DOWNEY FINANCIAL CORP
E S B FINANCIAL CORP
EASTERN VIRGINIA BANKSHARES INC
ELMIRA SAVINGS BANK FSB NY
F F D FINANCIAL CORP
F M S FINANCIAL CORP
F N B CORP PA
F N B CORP VA
F N B FINANCIAL SERVICES CORP
F N B UNITED CORP
FARMERS CAPITAL BANK CORP
FEDERAL AGRICULTURAL MORT CORP
FEDERAL HOME LOAN MORTGAGE CORP
FEDERAL NATIONAL MORTGAGE ASSN
FEDERAL TRUST CORP
FIDELITY BANCORP INC
FIDELITY SOUTHERN CORP NEW
FIFTH THIRD BANCORP
FIRST ALBANY COS INC
FIRST BANCORP NC
FIRST BANCORP P R
FIRST BANCSHARES INC MO
FIRST CHARTER CORP
FIRST CITIZENS BANCSHARES INC NC
FIRST COMMONWEALTH FINANCIAL COR
FIRST DEFIANCE FINANCIAL CORP
FIRST FEDERAL BANCSHARES ARK INC
FIRST FEDERAL BANKSHARES INC DEL
FIRST FINANCIAL BANCORP OHIO
FIRST FINANCIAL BANKSHARES INC
FIRST FINANCIAL CORP IN
FIRST FINANCIAL HOLDINGS INC
FIRST FINANCIAL SERVICE CORP
FIRST HORIZON NATIONAL CORP
FIRST INDIANA CORP
FIRST KEYSTONE FINANCIAL INC
FIRST LONG ISLAND CORP
FIRST M & F CORP
FIRST MARINER BANCORP
FIRST MERCHANTS CORP
FIRST MIDWEST BANCORP DE
FIRST MUTUAL BANCSHARES INC
FIRST NIAGARA FINL GROUP INC NEW
FIRST REGIONAL BANCORP
FIRST REPUBLIC BANK S F
FIRST SOUTH BANCORP INC
FIRST STATE BANCORPORATION
FIRST UNITED CORP
FIRST WEST VIRGINIA BANCORP INC
FIRSTFED FINANCIAL CORP
FIRSTMERIT CORP
FLAGSTAR BANCORP INC
FLUSHING FINANCIAL CORP
FREMONT GENERAL CORP
FRONTIER FINANCIAL CORP
FULTON FINANCIAL CORP PA
G S FINANCIAL CORP
GERMAN AMERICAN BANCORP INC
GLACIER BANCORP INC NEW
GREAT PEE DEE BANCORP
GREAT SOUTHERN BANCORP INC
GREATER BAY BANCORP
GREATER COMMUNITY BANCORP
GUARANTY FEDERAL BANCSHARES INC
H F FINANCIAL CORP
H M N FINANCIAL INC
HABERSHAM BANCORP INC
HANCOCK HOLDING CO
HARLEYSVILLE NATIONAL CORP PA
HARLEYSVILLE SAVINGS FINAN CORP
HERITAGE COMMERCE CORP

HERITAGE FINANCIAL CORP WA
HINGHAM INSTITUTION FOR SVGS MA
HOME FEDERAL BANCORP
HOPFED BANCORP INC
HORIZON FINANCIAL CORP WASH
HUNTINGTON BANCSHARES INC
I T L A CAPITAL CORP
IBERIABANK CORP
INDEPENDENCE FEDERAL SAVINGS BK
INDEPENDENT BANK CORP MA
INDEPENDENT BANK CORP MICH
INDYMAC BANCORP INC
INTEGRA BANK CORP
INTERNATIONAL BANCSHARES CORP
INTERVEST BANCSHARES CORP
IRWIN FINANCIAL CORP
JACKSONVILLE BANCORP INC
JEFFERIES GROUP INC NEW
JEFFERSONVILLE BANCORP
JPMORGAN CHASE & CO
KEYCORP NEW
L S B BANCSHARES N C
L S B CORP
L S B FINANCIAL CORP
LAKELAND FINANCIAL CORP
LANDMARK BANCORP INC
LEESPORT FINANCIAL CORP
LEHMAN BROTHERS HOLDINGS INC
M & T BANK CORP
M A F BANCORP INC
M B FINANCIAL INC NEW
M F B CORP
MAINSOURCE FINANCIAL GROUP INC
MARSHALL & ILSLEY CORP
MASSBANK CORP
MAYFLOWER CO OPERATIVE BK MA
MEDALLION FINANCIAL CORP
MERCHANTS BANCSHARES INC
MERRILL LYNCH & CO INC
META FINANCIAL GROUP INC
MID PENN BANCORP INC
MIDSOUTH BANCORP INC
MIDWEST BANC HOLDINGS INC
MIDWESTONE FINANCIAL GROUP INC
MORGAN STANLEY DEAN WITTER & CO
MUNICIPAL MORTGAGE & EQUITY LLC
N B T BANCORP INC
NARA BANCORP INC
NATIONAL CITY CORP
NATIONAL PENN BANCSHARES INC
NEW HAMPSHIRE THRIFT BNCSHRS INC
NEW YORK COMMUNITY BANCORP INC
NORTH CENTRAL BANCSHARES INC
NORTH VALLEY BANCORP
NORTHEAST BANCORP
NORTHERN STATES FINANCIAL CORP
NORTHERN TRUST CORP
NORTHRIM BANCORP INC
NORTHWAY FINANCIAL INC
NORTHWEST BANCORP INC PA
NORWOOD FINANCIAL CORP
OAK HILL FINANCIAL INC
OCEANFIRST FINANCIAL CORP
OCWEN FINANCIAL CORP
OHIO VALLEY BANC CORP
OLD NATIONAL BANCORP
OLD SECOND BANCORP INC
OMEGA FINANCIAL CORP
OPPENHEIMER HOLDINGS INC
ORIENTAL FINANCIAL GROUP INC
P A B BANKSHARES INC
P F F BANCORP INC
P N C FINANCIAL SERVICES GRP INC
P V F CAPITAL CORP
PACIFIC CAPITAL BANCORP NEW
PACIFIC PREMIER BANCORP INC
PAMRAPO BANCORP INC
PARK BANCORP INC
PARK NATIONAL CORP
PARKVALE FINANCIAL CORP
PATHFINDER BANCORP INC
PATRIOT NATIONAL BANCORP INC
PENNSYLVANIA COMMERCE BANCORP IN
PEOPLES BANCORP
PEOPLES BANCORP INC
PEOPLES BANCORP NC INC
PEOPLES BANCTRUST CO INC
PEOPLES BANK BRIDGEPORT
PINNACLE BANCSHARES INC
POPULAR INC
PREMIER COMMUNITY BANKSHARES INC
PREMIER FINANCIAL BANCORP INC
PRINCETON NATIONAL BANCORP INC
PROVIDENT BANKSHARES CORP
PROVIDENT COMMUNITY BANCSHRS INC
PROVIDENT FINANCIAL HOLDINGS INC
PULASKI FINANCIAL CORP
Q C R HOLDINGS INC
REGIONS FINANCIAL CORP NEW
RENASANT CORP
REPUBLIC BANCORP INC KY
REPUBLIC FIRST BANCORP INC
RIVER VALLEY BANCORP
RIVERVIEW BANCORP INC
ROYAL BANCSHARES PA INC
S & T BANCORP INC
S C B T FINANCIAL CORP
S L M CORP
S V B FINANCIAL GROUP
S Y BANCORP INC
SANDY SPRING BANCORP INC
SAVANNAH BANCORP INC
SEACOAST BANKING CORP FLA
SECURITY BANK CORP
SHORE FINANCIAL CORP
SIMMONS 1ST NATIONAL CORP
SLADES FERRY BANCORP
SOUTH FINL GROUP INC
SOUTHSIDE BANCSHARES INC
SOUTHWEST BANCORP INC OKLA
SOUTHWEST GEORGIA FINANCIAL CORP
SOVEREIGN BANCORP INC
STATE BANCORP INC NY
STERLING BANCORP
STERLING BANCSHARES INC
STERLING FINANCIAL CORP
STERLING FINANCIAL CORP WASH
STUDENT LOAN CORP
SUFFOLK BANCORP
SUN BANCORP INC
SUNTRUST BANKS INC
SUSQUEHANNA BANCSHARES INC PA
SUSSEX BANCORP
SYNOVUS FINANCIAL CORP
T C F FINANCIAL CORP
T F FINANCIAL CORP
T I B FINANCIAL CORP
TECHE HOLDING CO
TIMBERLAND BANCORP INC
TOMPKINS TRUSTCO INC
TRICO BANCSHARES
TRUSTCO BANK CORP NY
TRUSTMARK CORP
U M B FINANCIAL CORP
U S B HOLDING CO INC
U S BANCORP DEL
UMPQUA HOLDINGS CORP
UNION BANKSHARES CORP
UNIONBANCAL CORP
UNITED BANCORP INC
UNITED BANKSHARES INC
UNITED COMMUNITY FINL CORP OHIO
UNITY BANCORP INC
UNIVERSITY BANCORP INC
VALLEY NATIONAL BANCORP
VIRGINIA COMMERCE BANCORP
W HOLDING CO INC
WACHOVIA CORP 2ND NEW
WAINWRIGHT BANK & TRUST CO BOSTN
WASHINGTON BANKING COMPANY
WASHINGTON FEDERAL INC
WASHINGTON MUTUAL INC
WASHINGTON SAVINGS BANK FSB
WASHINGTON TRUST BANCORP INC
WAYNE SAVINGS BANCSHARES INC NEW
WEBSTER FINL CORP WATERBURY CONN
WELLS FARGO & CO NEW
WESBANCO INC
WEST COAST BANCORP ORE NEW
WESTAMERICA BANCORPORATION
WHITNEY HOLDING CORP
WILMINGTON TRUST CORP
WINTRUST FINANCIAL CORPORATION
WORLD ACCEPTANCE CORP
WSFS FINANCIAL CORP
WVS FINANCIAL CORP
YARDVILLE NATIONAL BANCORP
ZIONS BANCORP

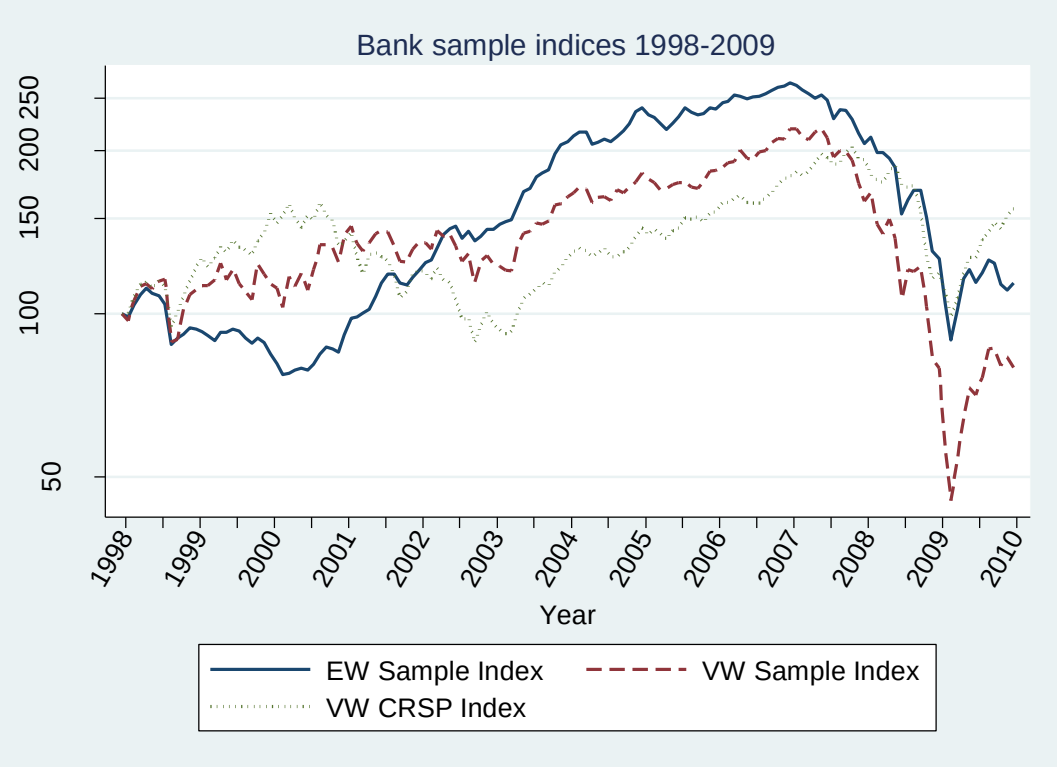

Figure 1: Equally-weighted and value-weighted indices of bank returns

The figure plots the value of two stock price indices constructed for sample banks from January 1998 through December 2009 as well as a value-weighted market index. "EW Sample Index" represents an equal-weighted index and "VW Sample Index" is the value-weighted index of the bank stocks in the sample. Both indices are rebalanced monthly. The sample consists of 347 banks that were in existence under the same or similar name in July 1998 and July 2007. Before and after these dates, the indices consist of fewer banks due to IPOs (before July 1998) and delistings (after July 2007). In January 1998, there are 309 bank stocks and in December 2009, there are 281 bank stocks remaining in the sample. "VW CRSP Index" is the index constructed using the value-weighted return for stocks listed on NYSE, AMEX and Nasdaq, as reported by CRSP.

Table 1: Sample summary statistics

The table presents summary statistics for the sample of 347 banks. "Financial crisis return" is the annualized stock return from July 2007 through December 2008. If a bank was delisted during the period from July 2007 to December 2008, the return (including delisting return) until the last day of listing was used, and proceeds were put into a cash index until December 2008. "Bank failed" is an indicator variable equal to one if the bank was closed by the FDIC/OTS, merged at a discount relative to the last close prior to the merger announcement, or was forced to delist by an exchange during the period from July 2007 to December 2009. "Crisis return 1998" is the bank's stock return from August 3, 1998 (the first trading day in August 1998) until the day in 1998 on which the bank's stock attains its lowest price. If the lowest price occurs more than once, the return is calculated using the first date on which it occurs. "Days in crisis 1998" reports the number of trading days from August 1, 1998 to the date of the lowest price. "Rebound return 1998" is the stock return over the six months following the date on which the lowest price first occurs. "Placebo return 1997" measures a hypothetical crisis return from August 1, 1997 (the first trading day in August 1997) over the following 50 trading days, i.e. the average of the "days in crisis 1998" variable. "Return 2005 – 2006" is the annualized stock return from July 2005 through December 2006. "Same CEO in 1998" is an indicator variable equal to one if the CEO at the end of fiscal year 2006 was already in office on August 1, 1998, and zero otherwise. Accounting data are measured at the end of fiscal year 2006 and include the book-to-market ratio (book value of common equity divided by market value of common equity), leverage (book value of assets minus book value of equity plus market value of equity, divided by market value of equity), the natural log of the market value of the bank's equity, and the Tier 1 capital ratio as reported in the Compustat Bank database. Other firm characteristics are the bank's stock return during calendar year 2006 and the bank's equity beta (obtained from a market model of weekly returns in excess of 3-month T-bills from January 2004 to December 2006, where the market is represented by the value-weighted CRSP index).

	Number	Min	Lower Quartile	Median	Upper Quartile	Max	Mean	Standard deviation
Financial crisis return	347	-1.00	-0.54	-0.30	-0.05	0.47	-0.31	0.33
Bank failed	347	0.00	0.00	0.00	0.00	1.00	0.07	0.26
Crisis return 1998	347	-0.97	-0.32	-0.24	-0.18	0.00	-0.26	0.12
Days in crisis 1998	347	0.00	44.00	47.00	53.00	105.00	50.39	23.90
Rebound return 1998	346	-0.21	0.04	0.12	0.24	1.84	0.18	0.26
Placebo return 1997	304	-0.19	0.07	0.13	0.21	0.80	0.15	0.12
Return 2005 – 2006	347	-0.68	0.01	0.08	0.17	0.77	0.10	0.15
Same CEO in 1998	347	0.00	0.00	0.00	1.00	1.00	0.43	0.50
Beta	347	-0.52	0.22	0.77	1.13	1.83	0.70	0.51
Return in 2006	347	-0.73	0.01	0.10	0.20	0.82	0.12	0.18
Total assets	347	56.02	794.54	2047.54	7371.13	1884318.00	40385.84	184549.47
Total liabilities	347	34.26	727.17	1813.96	6083.51	1764535.00	37474.62	172172.47
Book-to-market	346	0.19	0.45	0.57	0.73	1.35	0.60	0.19
Market capitalization	347	8.84	105.45	366.52	1258.24	273598.06	5439.75	24565.06
Leverage	346	1.28	5.61	6.71	8.71	38.20	7.57	3.39
Tier 1 capital ratio	319	5.73	8.93	10.53	12.23	21.94	10.86	2.65

Table 2: Buy-and-hold returns during the financial crisis and returns during the crisis of 1998

The table shows results from cross-sectional regressions of annualized buy-and-hold returns for banks from July 2007 to December 2008 on the banks' performance during the crisis of 1998 and firm characteristics. If a bank was delisted during the period from July 2007 to December 2008, the return (including delisting return) until the last day of listing was used, and proceeds were put into a cash index until December 2008. "Crisis return 1998" is the bank's stock return from the first trading date in August 1998 until the day in 1998 on which the bank's stock attains its lowest price. "Rebound return 1998" is the stock return over the six months after the date on which the lowest price occurs. Control variables include the bank's equity beta measured during 2004 – 2006 and the stock return in calendar year 2006. The additional control variables are measured at the end of fiscal year 2006 and include the book-to-market ratio, the natural log of the market value of the bank's equity, leverage, and the Tier 1 capital ratio. Numbers in parentheses are *t*-statistics, and ***, **, and * indicate statistical significance at the 1%, 5%, and 10% level, respectively.

	(1)	(2)	(3)	(4)	(5)
Crisis return 1998	0.6550***		0.5602***	0.4895***	0.4409***
	(4.73)		(3.45)	(3.11)	(2.59)
Rebound return 1998		-0.1966***	-0.0841	0.0535	-0.0122
		(-2.90)	(-1.13)	(0.66)	(-0.11)
Return in 2006				-0.2591**	-0.2023*
				(-2.55)	(-1.77)
Book-to-market				-0.1847	-0.3627***
				(-1.54)	(-3.25)
Log (market value)				-0.0488***	-0.0194
				(-4.11)	(-1.44)
Beta				0.1195***	0.0887**
				(3.10)	(2.16)
Leverage				-0.0206***	
				(-3.28)	
Tier 1 capital ratio					0.0192***
					(2.81)
Constant	-0.1365***	-0.2693***	-0.1455***	0.3243***	-0.0864
	(-3.43)	(-12.61)	(-3.50)	(2.85)	(-0.54)
Number of observations	347	346	346	345	318
R-squared	0.06	0.02	0.06	0.16	0.13

Table 3: Buy-and-hold returns during the financial crisis and returns during the crisis of 1998 – Return quintiles

The table shows cross-sectional regressions of annualized buy-and-hold returns for banks from July 2007 to December 2008 on the banks' performance during the crisis of 1998 and firm characteristics. If a bank was delisted during the period from July 2007 to December 2008, the return (including delisting return) until the last day of listing was used, and proceeds were put into a cash index until December 2008. Banks are sorted into return quintiles based on the crisis return 1998. "Crisis return 1998" is a bank's stock return from the first trading date in August 1998 until the day in 1998 on which the bank's stock attains its lowest price. "Crisis return 1998 Q1/Q2..." denotes banks whose stock returns during the crisis of 1998 were in the lowest/second lowest return quintile for that period, and so forth. "Rebound return 1998" is the stock return over the six months after the date on which the lowest price occurs. "Rebound return 1998 Q1/Q2..." indicates that the bank's return reversal was within the lowest/second lowest quintile, and so forth. Control variables include the bank's equity beta measured during 2004 – 2006 and the stock return in calendar year 2006. The additional control variables are measured at the end of fiscal year 2006 and include the book-to-market ratio, the natural log of the market value of the bank's equity, leverage, and the Tier 1 capital ratio. Numbers in parentheses are *t*-statistics, and ***, **, and * indicate statistical significance at the 1%, 5%, and 10% level, respectively.

	(1)	(2)	(3)	(4)	(5)
Crisis return 1998 Q1	-0.2296***	-0.1697***	-0.1560***	-0.1687***	-0.1437**
	(-4.21)	(-3.18)	(-2.75)	(-2.99)	(-2.42)
Crisis return 1998 Q2	-0.0393	-0.0308	-0.0642	-0.0303	-0.0618
	(-0.72)	(-0.59)	(-1.18)	(-0.57)	(-1.13)
Crisis return 1998 Q3	-0.0727	-0.0729	-0.0891*	-0.0743	-0.0882
	(-1.33)	(-1.39)	(-1.67)	(-1.41)	(-1.64)
Crisis return 1998 Q4	-0.0087	-0.0195	-0.0288	-0.0195	-0.0275
	(-0.16)	(-0.37)	(-0.54)	(-0.37)	(-0.51)
Rebound return 1998 Q1				0.0107	0.0623
				(0.18)	(1.01)
Rebound return 1998 Q2				-0.0153	0.0099
				(-0.25)	(0.16)
Rebound return 1998 Q3				0.0181	0.0488
				(0.31)	(0.82)
Rebound return 1998 Q4				0.0129	0.0463
				(0.23)	(0.81)
Return in 2006		-0.2696***	-0.1973*	-0.2650***	-0.1898
		(-2.66)	(-1.72)	(-2.59)	(-1.63)
Book-to-market		-0.2087*	-0.3818***	-0.2150*	-0.3934***
		(-1.75)	(-3.40)	(-1.77)	(-3.47)
Log (market value)		-0.0439***	-0.0181	-0.0442***	-0.0154
		(-4.05)	(-1.45)	(-3.70)	(-1.13)
Beta		0.1133***	0.0816**	0.1121***	0.0775*
		(2.92)	(1.98)	(2.85)	(1.85)
Leverage		-0.0195***		-0.0193***	
		(-3.15)		(-3.09)	
Tier 1 capital ratio			0.0191***		0.0195***
			(2.79)		(2.83)
Constant	-0.2358***	0.2468**	-0.1252	0.2461*	-0.1740
	(-6.09)	(2.19)	(-0.80)	(1.81)	(-1.01)
Number of observations	347	346	319	346	319
R-squared	0.06	0.17	0.14	0.17	0.14

Table 4: Differences between small banks and large banks

The table shows cross-sectional regressions of annualized buy-and-hold returns for banks from July 2007 to December 2008 on the banks' performance during the crisis of 1998 and firm characteristics If a bank was delisted during the period from July 2007 to December 2008, the return (including delisting return) until the last day of listing was used, and proceeds were put into a cash index until December 2008. The sample is split into small bank and large bank subsamples based on whether the bank's book value of assets at the end of fiscal year 2006 is below or above the sample median. "Crisis return 1998" is the bank's stock return from the first trading day in August 1998 until the day in 1998 on which the bank's stock attains its lowest price. "Rebound return 1998" is the stock return over the six months after the date on which the lowest price occurs. Control variables include the bank's equity beta measured during 2004 – 2006 and the stock return in calendar year 2006. The additional control variables are measured at the end of fiscal year 2006 and include the book-to-market ratio, the natural log of the market value of the bank's equity, leverage, and the Tier 1 capital ratio. Numbers in parentheses are *t*-statistics, and ***, **, and * indicate statistical significance at the 1%, 5%, and 10% level, respectively.

	Small banks		Large banks		Full sample		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Crisis return 1998	0.2051	0.1825	0.9240***	0.8897***	0.2051	0.0825	0.1208
	(1.05)	(0.93)	(3.47)	(3.62)	(0.95)	(0.40)	(0.55)
Crisis return 1998 x Large bank					0.7189**	0.9222***	0.7802**
					(2.20)	(2.96)	(2.36)
Rebound return 1998	0.1359	0.0776	-0.0896	0.1400	0.1359	0.0572	-0.1113
	(1.00)	(0.57)	(-0.86)	(1.19)	(0.90)	(0.40)	(-0.71)
Rebound return 1998 x Large bank					-0.2256	0.1274	0.2857
					(-1.26)	(0.71)	(1.29)
Large bank					0.2338***	0.3027***	0.2609***
					(2.81)	(3.29)	(2.70)
Return in 2006		-0.1606		-0.3187**		-0.2526**	-0.1779
		(-1.23)		(-2.04)		(-2.48)	(-1.56)
Book-to-market		-0.0894		-0.4984**		-0.1882	-0.3793***
		(-0.57)		(-2.60)		(-1.59)	(-3.40)
Log (market value)		-0.0807*		-0.0529**		-0.0658***	-0.0425**
		(-1.94)		(-2.53)		(-4.15)	(-2.37)
Beta		0.1692***		0.1400		0.0905**	0.0578
		(2.80)		(1.42)		(2.09)	(1.25)
Leverage		-0.0006		-0.0253***		-0.0209***	
		(-0.05)		(-3.02)		(-3.29)	
Tier 1 capital ratio							0.0205***
							(3.02)
Constant	-0.2729***	0.1205	-0.0391	0.6369***	-0.2729***	0.2984**	-0.0605
	(-5.08)	(0.47)	(-0.62)	(2.67)	(-4.59)	(2.30)	(-0.35)
Number of observations	173	173	173	172	346	345	318
R-squared	0.01	0.07	0.13	0.31	0.08	0.19	0.16

Table 5: CEOs and financial crisis returns

The table shows cross-sectional regressions of annualized buy-and-hold returns for banks from July 2007 to December 2008 on the banks' performance during the crisis of 1998 and firm characteristics. If a bank was delisted during the period from July 2007 to December 2008, the return (including delisting return) until the last day of listing was used, and proceeds were put into a cash index until December 2008. "Crisis return 1998" is the bank's stock return from the first trading date of August 1998 until the day in 1998 on which the bank's stock attains its lowest price. "Rebound return 1998" is the stock return over the six months after the date on which the lowest price occurs. "Same CEO in 1998" is an indicator variable equal to one if the bank's CEO at the end of 2006 held the position of CEO in 1998, and zero otherwise. Control variables include the bank's equity beta measured during 2004 – 2006 and the stock return in calendar year 2006. The additional control variables are measured at the end of fiscal year 2006 and include the book-to-market ratio, the natural log of the market value of the bank's equity, leverage, and the Tier 1 capital ratio. Numbers in parentheses are *t*-statistics, and ***, **, and * indicate statistical significance at the 1%, 5%, and 10% level, respectively.

	(1)	(2)	(3)	(4)	(5)
Crisis return 1998	0.5884***	0.4787***	0.5260***	0.4590**	0.4002**
	(2.95)	(2.93)	(2.73)	(2.59)	(1.97)
Rebound return 1998	-0.0287		0.1056		0.0052
	(-0.33)		(1.15)		(0.04)
Crisis return 1998	-0.2179	-0.0596	-0.2298	0.0077	0.0383
x Same CEO	(-0.62)	(-0.21)	(-0.68)	(0.02)	(0.11)
Rebound return 1998	-0.2295		-0.2139		-0.0488
x Same CEO	(-1.38)		(-1.35)		(-0.23)
Same CEO in 1998	-0.0659	-0.0621	-0.0700	-0.0552	-0.0422
	(-0.74)	(-0.74)	(-0.81)	(-0.61)	(-0.45)
Return in 2006		-0.2508**	-0.2626**	-0.2009*	-0.2068*
		(-2.46)	(-2.57)	(-1.77)	(-1.81)
Book-to-market		-0.1977*	-0.1822	-0.3764***	-0.3705***
		(-1.66)	(-1.52)	(-3.39)	(-3.31)
Log (market value)		-0.0456***	-0.0483***	-0.0203	-0.0198
		(-4.23)	(-4.05)	(-1.64)	(-1.46)
Beta		0.1137***	0.1150***	0.0832**	0.0845**
		(2.92)	(2.95)	(2.02)	(2.02)
Leverage		-0.0196***	-0.0207***		
		(-3.17)	(-3.27)		
Tier 1 capital ratio				0.0185***	0.0188***
				(2.73)	(2.74)
Constant	-0.1279**	0.3340***	0.3434***	-0.0341	-0.0581
	(-2.53)	(3.00)	(2.91)	(-0.22)	(-0.36)
Number of observations	346	346	345	319	318
R-squared	0.07	0.17	0.17	0.15	0.14

Table 6: Bank failures from July 2007 through December 2009

The table gives an overview of how many of the sample banks delisted and how many of them failed during the period from July 2007 through December 2009. Banks are considered to have survived if they are still listed at the end of 2009, if they merged at a premium during the period from July 2007 through December 2009, or if they delisted voluntarily. Banks are considered to have failed if they are on the list of failed banks maintained by the FDIC, if they are not on the FDIC list but have filed for Chapter 11, if they merged at a discount or if they were forced to delist by their stock exchange. A merger is judged to have occurred at a premium if the price per share paid is higher than the target's stock price at market close one trading day before the announcement date. Factiva news searches were performed to determine whether a delisting was voluntary or forced. Most voluntary delisters cited reporting obligations and other regulatory compliance cost as the main reason for delisting. Among the banks that were forced to delist, two failed to meet the market capitalization requirements of the NYSE and Nasdaq, respectively; one failed to submit an audited 2006 10-K by the final deadline set by the NYSE; and one saw its trading halted and was later delisted by NYSE Alternext after having failed to meet a deadline to raise capital or sell itself to an investor as required by the OTS in a cease-and-desist order.

	Number	Percent
Bank survived		
Listed at end of 2009	280	80.69
Merged at premium	34	9.80
Voluntary delisting	7	2.02
Total survivors	**321**	**92.51**
Bank failed		
Closed by FDIC/OTS	15	4.32
Merged at discount	5	1.44
Forced delisting by exchange	4	1.15
Chapter 11	2	0.58
Total failures	**26**	**7.49**
Total	**347**	**100.00**

Table 7: Bank failure during the financial crisis and performance during the 1998 crisis

The table presents marginal effects from probit regressions predicting bank failure during the period from July 2007 through December 2009. "Crisis return 1998" is the bank's stock return from the first trading day of August 1998 until the day in 1998 on which the bank's stock attains its lowest price. "Rebound return 1998" is the stock return over the six months after the date on which the lowest price occurs. Control variables include the bank's equity beta measured during 2004 – 2006 and the stock return in calendar year 2006. The additional control variables are measured at the end of fiscal year 2006 and include the book-to-market ratio, the natural log of the market value of the bank's equity, leverage, and the Tier 1 capital ratio. Numbers in parentheses are *z*-statistics, and ***, **, and * indicate statistical significance at the 1%, 5%, and 10% level, respectively.

	(1)	(2)	(3)	(4)	(5)
Crisis return 1998	-0.3803***		-0.4027***	-0.3994***	-0.3453***
	(-4.17)		(-3.78)	(-4.04)	(-3.47)
Rebound return 1998		0.0482	-0.0417	-0.1404***	-0.1369**
		(1.06)	(-0.89)	(-2.74)	(-2.15)
Return in 2006				0.0110	-0.0316
				(0.18)	(-0.45)
Book-to-market				0.0264	0.0455
				(0.35)	(0.73)
Log (market value)				0.0226***	0.0156**
				(3.37)	(2.24)
Beta				-0.0052	-0.0000
				(-0.22)	(-0.00)
Leverage				0.0047	
				(1.41)	
Tier 1 capital ratio					-0.0024
					(-0.53)
Number of observations	347	346	346	345	318

Table 8: Comparison of firm characteristics – bottom performers vs. other institutions

The table presents summary statistics comparing the characteristics of financial institutions whose stock return was in the bottom tercile for both the 1998 crisis and the financial crisis of 2007/2008 with financial institutions whose stock return was above the bottom tercile for at least one of these periods. Panel A (Panel B) examines characteristics measured at the end of 2006 (at the end of 1997) for all financial institutions. Panels C and D examine depository institutions only. The variables "return in 2006", "book-to-market", "log (market value)", "beta", "leverage", and "Tier 1 capital ratio" are defined in Table 1. "Asset growth" is the annualized growth rate of total assets from fiscal year end 2003-2006. "Short-term funding" is calculated as debt in current liabilities divided by total liabilities. "Commercial paper user" is an indicator variable equal to one if part of the institution's liabilities were financed with commercial paper, and zero otherwise. "Deposits" are measured as total customer deposits divided by total liabilities. "Rated" is an indicator variable equal to one if the institution possessed an S&P rating, and "rating" is an ordinal measure of the institution's rating which takes the value 1 for a rating of AAA, 2 for AA+, 3 for AA, 4 for AA-, and so forth. "Investment securities", "Assets held for sale", and "Trading securities" denote the fraction of total assets held in investment securities, held for sale, and held in trading securities, respectively. Assets held for sale are omitted from the panels that focus on non-depository institutions since there is only one non-missing observation among these firms. "Derivatives" denotes the log of the gross notional amount of derivatives held divided by total assets. "Non-interest income" is the ratio of non-interest income to the sum of non-interest income and net interest income. "Income variability" is the standard deviation of the institution's pre-tax return on assets over the 20 preceding quarters. "Non-depository" is an indicator variable equal to one if the institution is a non-depository institution, and zero otherwise. Institutions are defined as depository if the two-digit SIC code in Compustat equals 60 and the institution has deposits, and as non-depository if the two-digit SIC code in Compustat equals 61 or 62 and the institution does not have deposits. Tests of differences between the bottom performers and the other institutions are performed using *t*-tests that assume unequal variances across groups as well as Mann-Whitney U tests. Statistical significance at the 1%, 5%, and 10% level is indicated by ***, **, and *, respectively.

Panel A: Comparison of 2006 characteristics of all institutions

	Bottom obs	Bottom mean	Others obs	Others mean	Difference	*t*-statistic	Mann-Whitney *z*-statistic
Return in 2006	51	0.1240	296	0.1186	0.0054	0.1552	0.4443
Book-to-market	51	0.6554	295	0.5897	0.0657	1.9265*	1.9444*
Log (market value)	51	6.6793	296	5.9765	0.7028	2.0256**	1.7471*
Beta	51	0.7611	296	0.6909	0.0702	0.9343	0.9990
Leverage	51	9.8911	295	7.1710	2.7201	3.4533***	4.5627***
Asset growth	51	0.1675	296	0.0983	0.0692	4.8842***	5.2384***
Short-term funding	51	0.1795	296	0.0845	0.0950	3.9715***	4.7230***
Commercial paper user	29	0.3103	213	0.0986	0.2118	2.3582**	3.2397***
Deposits	51	0.6451	294	0.7910	-0.1460	-3.6453***	-4.0243***
Rated	51	0.3137	296	0.1824	0.1313	1.8928*	2.1549**
Rating	16	7.6250	54	7.2037	0.4213	0.4737	0.1201
Investment securities	51	0.1355	293	0.2002	-0.0647	-3.7072***	-4.4611***
Assets held for sale	39	0.0144	280	0.0086	0.0058	1.1914	1.7033*
Trading securities	49	0.0376	280	0.0063	0.0312	2.1245**	2.6611***
Income variability	49	0.0016	287	0.0014	0.0001	0.4808	1.6000
Non-depository	51	0.1176	296	0.0405	0.0771	1.6409	2.2899**

Panel B: Comparison of 1997 characteristics of all institutions

	Bottom obs	Bottom mean	Others obs	Others mean	Difference	*t*-statistic	Mann-Whitney *z*-statistic
Return in 1997	44	0.6593	236	0.6418	0.0175	0.3075	0.3285
Book-to-market 1997	40	0.5407	232	0.4635	0.0772	2.1000**	2.2069**
Log (market value) 1997	40	6.2036	233	5.6075	0.5961	1.6448	1.6041
Beta 1995-1997	34	0.7357	194	0.3835	0.3523	3.0512***	3.1061***
Leverage 1997	40	8.8120	232	5.5875	3.2245	3.5834***	4.4159***
Asset growth 1997	38	0.2146	209	0.1476	0.0671	2.6570**	3.0582***
Short-term funding 1997	41	0.2707	238	0.0900	0.1807	4.3357***	3.9309***
Commercial paper user 1997	24	0.4583	192	0.0990	0.3594	3.3866***	4.7886***
Deposits 1997	39	0.5861	234	0.8354	-0.2493	-4.4578***	-4.6027***
Rated 1997	41	0.3659	239	0.1213	0.2445	3.0934***	3.9675***
Rating 1997	15	7.4000	29	6.6552	0.7448	0.7492	0.6249
Investment securities 1997	34	0.1794	234	0.2387	-0.0593	-3.0094***	-2.5810***
Assets held for sale 1997	29	0.0307	221	0.0097	0.0211	1.5121	3.3736***
Trading securities 1997	38	0.0536	221	0.0028	0.0507	2.4399**	3.8830***
Income variability 1997	10	0.0020	51	0.0017	0.0003	0.4421	0.9546

Panel C: Comparison of 2006 characteristics of depository institutions

	Bottom obs	Bottom mean	Others obs	Others mean	Difference	*t*-statistic	Mann-Whitney *z*-statistic
Return in 2006	45	0.1112	284	0.1144	-0.0032	-0.0867	0.1990
Book-to-market	45	0.6779	284	0.5867	0.0912	2.5592**	2.5302**
Log (market value)	45	6.2694	284	5.9347	0.3347	1.0177	0.8923
Beta	45	0.7134	284	0.6808	0.0327	0.4056	0.4301
Leverage	45	9.3665	284	7.1763	2.1901	2.6542**	3.7262***
Tier 1 capital ratio	40	9.4580	279	11.0646	-1.6066	-5.1015***	-3.8184***
Asset growth	45	0.1667	284	0.0965	0.0702	4.5784***	4.8951***
Short-term funding	45	0.1424	284	0.0747	0.0677	3.8519***	4.3672***
Commercial paper user	23	0.2174	204	0.1029	0.1145	1.2648	1.6303
Deposits	45	0.7272	284	0.8189	-0.0917	-3.5872***	-3.4310***
Rated	45	0.2444	284	0.1761	0.0684	0.9965	1.0951
Rating	11	8.8182	50	7.2600	1.5582	1.5005	1.7750*
Investment securities	45	0.1367	284	0.2037	-0.0671	-4.5776***	-4.2221***
Assets held for sale	39	0.0144	279	0.0085	0.0059	1.2216	1.7410*
Trading securities	43	0.0109	270	0.0022	0.0087	1.4653	1.5222
Ln(1+Derivatives)	22	0.3752	205	0.1118	0.2634	1.4484	1.2804
Non-interest income	40	0.1927	284	0.2530	-0.0602	-3.2280***	-3.2614***
Income variability	43	0.0016	278	0.0012	0.0004	1.3472	2.0058**

Panel D: Comparison of 1997 characteristics of depository institutions

	Bottom obs	Bottom mean	Others obs	Others mean	Difference	*t*-statistic	Mann-Whitney *z*-statistic
Return in 1997	38	0.6451	227	0.6504	-0.0053	-0.0827	-0.2630
Book-to-market 1997	34	0.5442	222	0.4606	0.0836	2.2188**	2.1912**
Log (market value) 1997	34	5.8066	222	5.5544	0.2522	0.7127	0.7984
Beta 1995-1997	28	0.5528	188	0.3673	0.1855	1.8479*	1.9642**
Leverage 1997	34	7.3583	222	5.6245	1.7338	3.1622***	3.2955***
Tier 1 capital ratio 1997	29	9.6931	228	11.8026	-2.1095	-3.2279***	-3.1642***
Asset growth 1997	32	0.2161	202	0.1473	0.0688	2.5829**	2.8275***
Short-term funding 1997	35	0.2024	228	0.0814	0.1210	3.2197***	2.8698***
Commercial paper user 1997	19	0.3684	188	0.1011	0.2674	2.3085**	3.3431***
Deposits 1997	34	0.6702	229	0.8503	-0.1801	-3.6983***	-3.8466***
Rated 1997	35	0.2857	229	0.1135	0.1722	2.1449**	2.7592***
Rating 1997	10	8.9000	26	6.4615	2.4385	2.4288**	2.3920**
Investment securities 1997	32	0.1863	229	0.2427	-0.0564	-2.8272***	-2.3825**
Assets held for sale 1997	29	0.0307	220	0.0097	0.0210	1.5087	3.3536***
Trading securities 1997	33	0.0169	216	0.0019	0.0150	1.3369	2.9472***
Ln(1+Derivatives 1997)	14	0.0574	170	0.0398	0.0176	0.3090	-0.4348
Non-interest income 1997	28	0.1964	187	0.1836	0.0128	0.3883	-0.8469
Income variability 1997	6	0.0028	45	0.0013	0.0015	1.8078	1.5787

Table 9: Probit regressions predicting membership in the bottom performer group

The table shows marginal effects from probit regressions predicting whether a financial institution's stock return is in the bottom tercile both in the 1998 crisis and the financial crisis of 2007/2008. Panel A uses firm characteristics in 2006 to predict membership in the bottom performer group, and panel B uses firm characteristics in 1997. Models (1) through (3) include commercial banks, savings institutions, and non-depository institutions. Model (4) excludes non-depository institutions, and models (5) and (6) contain variables that are available for commercial banks regulated by the FDIC only. All variables are defined in the caption of Table 8. Numbers in parentheses are z-statistics, and ***, **, and * indicate statistical significance at the 1%, 5%, and 10% level, respectively.

Panel A: 2006 firm characteristics

	(1)	(2)	(3)	(4)	(5)	(6)
Short-term funding	0.6214***		0.6524***	0.6033***	0.1841	0.2856*
	(2.84)		(2.75)	(2.63)	(1.13)	(1.75)
Deposits		-0.2740*				
		(-1.74)				
Non-depository	-0.1225	-0.1378				
	(-1.35)	(-1.05)				
Asset growth	0.7835***	0.8659***	0.3452**	0.2922**	0.2052*	0.1706*
	(4.68)	(4.91)	(2.44)	(2.15)	(1.83)	(1.78)
Commercial paper user					0.0475	0.0409
					(1.27)	(1.32)
Rated			-0.1854	-0.1567	-0.2775	-0.2100
			(-1.07)	(-0.85)	(-1.51)	(-1.36)
Rating			0.0180	0.0171	0.0270	0.0224
			(1.02)	(0.92)	(1.41)	(1.37)
Investment securities			-0.6184***	-0.5437***		
			(-3.95)	(-3.55)		
Assets held for sale			-0.4039	-0.1760		
			(-0.83)	(-0.38)		
Trading securities			-1.2327	-0.2369		
			(-1.06)	(-0.31)		
Income variability			-7.6055	1.7938	-5.8043	-4.1478
			(-0.53)	(0.15)	(-0.46)	(-0.54)
Non-interest income				-0.3801***	-0.3491**	-0.2622*
				(-2.71)	(-2.36)	(-1.88)
Ln(1+Derivatives)					0.0113	0.0262
					(0.37)	(1.05)
Return in 2006	0.1830*	0.1679	0.1731**	0.1841**	0.0613	0.0344
	(1.75)	(1.64)	(2.07)	(2.28)	(0.94)	(0.67)
Book-to-market	0.0716	0.0617	0.0622	0.0595	-0.0404	0.0429
	(0.58)	(0.50)	(0.59)	(0.61)	(-0.48)	(0.78)
Log (market value)	0.0124	0.0118	0.0240	0.0263	0.0346*	0.0076
	(1.13)	(1.03)	(1.33)	(1.48)	(1.89)	(0.65)
Beta	-0.0389	-0.0240	-0.0573	-0.0471	-0.0394	-0.0111
	(-0.94)	(-0.60)	(-1.57)	(-1.33)	(-1.40)	(-0.52)
Leverage	0.0180**	0.0214***	0.0156*	0.0157**	0.0134*	
	(2.54)	(3.02)	(1.88)	(2.01)	(1.69)	
Tier 1 capital ratio						-0.0101*
						(-1.92)
Number of observations	346	344	297	297	219	219

Panel B: 1997 firm characteristics

	(1)	(2)	(3)	(4)	(5)	(6)
Short-term funding 1997	0.5995***		0.4268	0.3971	-0.4318	-0.4698
	(2.98)		(1.61)	(1.52)	(-0.72)	(-0.77)
Deposits 1997		-0.5427***				
		(-3.43)				
Non-depository	-0.1737	-0.2457*				
	(-1.26)	(-1.68)				
Asset growth 1997	0.2843	0.2101	0.1344	0.1765	0.0540	0.0613
	(1.63)	(1.25)	(0.82)	(1.01)	(0.34)	(0.36)
Commercial paper user 1997					0.1321	0.1250
					(1.08)	(0.90)
Rated 1997			-0.6171*			
			(-1.85)			
Rating 1997			0.0812**			
			(2.16)			
Investment securities 1997			-0.3208	-0.3596*		
			(-1.63)	(-1.88)		
Assets held for sale 1997			0.4255	1.1616*		
			(0.94)	(1.81)		
Trading securities 1997			1.2841	3.8173		
			(1.17)	(0.57)		
Non-interest income 1997				-0.5870**	-0.1002	-0.1340
				(-2.00)	(-0.32)	(-0.39)
Ln(1+Derivatives 1997)					-1.3113	-1.0702
					(-0.70)	(-0.66)
Return in 1997	0.0928	0.0703	0.1163*	0.1128*	0.0472	0.0238
	(1.32)	(1.06)	(1.94)	(1.89)	(0.52)	(0.24)
Book-to-market 1997	0.0700	-0.0513	0.1638	-0.0179	0.0332	0.2524
	(0.32)	(-0.26)	(0.89)	(-0.10)	(0.10)	(0.77)
Log (market value) 1997	-0.0048	-0.0037	0.0296	0.0276	0.0040	-0.0078
	(-0.20)	(-0.16)	(1.11)	(0.93)	(0.13)	(-0.23)
Beta 1995-1997	0.0717	-0.0114	-0.1101	-0.0470	0.0592	0.0816
	(0.76)	(-0.12)	(-1.24)	(-0.45)	(0.48)	(0.60)
Leverage 1997	0.0253*	0.0312**	0.0177	0.0259*	0.0276	
	(1.79)	(2.37)	(1.38)	(1.90)	(1.11)	
Tier 1 capital ratio 1997						-0.0072
						(-0.90)
Number of observations	225	221	189	163	83	82

Table 10: Firm characteristics in 2006 and performance during the 1998 crisis

The table shows results from cross-sectional regressions of various firm characteristics of the sample banks in 2006 on the banks' performance during the crisis of 1998 and control variables. The dependent variables are: leverage, the Tier 1 capital ratio, distance to default (DTD), short-term funding, and asset growth. "Leverage" is defined as book value of assets minus book value of equity plus market value of equity divided by market value of equity, and "Tier 1 capital ratio" is obtained from the Compustat Bank database. "Distance to default" is estimated as the natural logarithm of (CAR+ROA)/volatility(ROA), where CAR is the capital to assets ratio, ROA is the return on assets, and the volatility of ROA is measured on a quarterly basis from 2003-2006. "Short-term funding" is calculated as debt in current liabilities divided by total liabilities, and "asset growth" is the annualized growth rate of total assets from fiscal year end 2003 through 2006. We report results both for the full sample and for the sample of depository institutions only, except for the Tier 1 capital ratio and the distance to default, which are available for depository institutions only. "Crisis return 1998" is the bank's stock return from the first trading date in August 1998 until the day in 1998 on which the bank's stock attains its lowest price. "Rebound return 1998" is the stock return over the six months after the date on which the lowest price occurs. Control variables are measured at the end of 2005 for the leverage, Tier 1 capital, distance to default, and short-term funding regressions. For the asset growth regressions, they are measured at the end of 2003 since asset growth itself is measured during 2004-2006. Control variables include the bank's equity beta measured during the previous three years, the stock return in the previous calendar year, the book-to-market ratio, the natural log of the market value of the bank's equity, and, for the asset growth regressions only, leverage, and the Tier 1 capital ratio. Numbers in parentheses are *t*-statistics, and ***, **, and * indicate statistical significance at the 1%, 5%, and 10% level, respectively.

Dependent variable:	Leverage		Tier 1	DTD	Short-term funding		Asset growth	
Institutions in sample:	All	Depository	Depository	Depository	All	Depository	All	Depository
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Crisis return 1998	-3.7974***	-3.8898***	5.4236***	0.5327	-0.0428	-0.0837**	-0.1505***	-0.1245**
	(-2.61)	(-2.89)	(3.96)	(1.24)	(-0.91)	(-2.32)	(-2.89)	(-2.02)
Rebound return 1998	3.0070***	1.9567**	0.4865	-0.5139*	0.1593***	0.0260	0.0308	0.0099
	(4.03)	(2.27)	(0.54)	(-1.82)	(6.62)	(1.12)	(1.21)	(0.28)
Previous year return	-7.0665***	-7.6500***	0.1474	0.3686	-0.0816**	-0.1412***	0.0364**	0.0406*
	(-6.79)	(-7.95)	(0.14)	(1.16)	(-2.43)	(-5.47)	(2.16)	(1.76)
Book-to-market	4.7956***	4.7076***	-0.6914	-0.5710*	0.0849***	0.0248	-0.0525	-0.1187***
	(4.74)	(4.96)	(-0.71)	(-1.87)	(2.60)	(0.97)	(-1.32)	(-2.93)
Log (market value)	-0.0821	-0.2724**	-0.6646***	0.0687*	0.0096***	0.0145***	0.0055	0.0009
	(-0.72)	(-2.49)	(-5.96)	(1.97)	(2.61)	(4.94)	(1.15)	(0.16)
Beta	-1.5515***	-1.1566***	1.6118***	-0.3031**	0.0159	-0.0130	-0.0416	-0.0229
	(-3.31)	(-2.63)	(3.60)	(-2.16)	(1.05)	(-1.10)	(-1.64)	(-0.79)
Leverage							-0.0047**	
							(-2.08)	
Tier 1 capital ratio								0.0007
								(0.37)
Constant	4.6113***	5.6428***	15.4833***	5.8804***	-0.0601*	-0.0348	0.0931**	0.1175**
	(4.46)	(5.90)	(15.65)	(18.97)	(-1.80)	(-1.36)	(2.45)	(2.12)
Number of observations	345	328	318	318	345	328	345	287
R-squared	0.33	0.40	0.15	0.07	0.29	0.22	0.11	0.08

Table 11: Robustness tests

The table shows robustness tests for the cross-sectional regressions of annualized buy-and-hold returns for banks from July 2007 to December 2008 on the banks' performance during the crisis of 1998 and firm characteristics. Models (1) and (2) estimate median regressions instead of ordinary least squares. Models (3) and (4) use an alternative definition of 1998 crisis and rebound returns and estimate OLS regressions. For columns 1 and 2, "Crisis return 1998" is the bank's stock return from the first trading day in August 1998 until the day in 1998 on which the bank's stock attains its lowest price. "Crisis return 1998 (Alternative)" is the bank's stock return from August 3, 1998 to October 1, 1998, and "Rebound return 1998 (Alternative)" uses returns from October 2, 1998 to April 1, 1999. Control variables include the bank's equity beta measured during 2004 – 2006 and the stock return in calendar year 2006. The additional control variables are measured at the end of fiscal year 2006 and include the book-to-market ratio, the natural log of the market value of the bank's equity, leverage, and the Tier 1 capital ratio. Numbers in parentheses are *t*-statistics, and ***, **, and * indicate statistical significance at the 1%, 5%, and 10% level, respectively.

	(1)	(2)	(3)	(4)
Crisis return 1998	0.4324	0.5995**		
	(1.60)	(2.16)		
Rebound return 1998	-0.0009	-0.0062		
	(-0.01)	(-0.03)		
Crisis return 1998 (Alternative)			0.4124***	0.4162**
			(2.61)	(2.38)
Rebound return 1998 (Alternative)			0.1356	0.1125
			(1.38)	(0.92)
Return in 2006	-0.3595**	-0.2548	-0.2756***	-0.2094*
	(-2.09)	(-1.35)	(-2.70)	(-1.83)
Book-to-market	-0.3412*	-0.3903**	-0.1841	-0.3698***
	(-1.70)	(-2.13)	(-1.53)	(-3.31)
Log (market value)	-0.0526***	-0.0175	-0.0521***	-0.0228*
	(-2.61)	(-0.81)	(-4.29)	(-1.66)
Beta	0.1541**	0.1523**	0.1187***	0.0901**
	(2.37)	(2.28)	(3.05)	(2.16)
Leverage	-0.0153		-0.0229***	
	(-1.64)		(-3.65)	
Tier 1 capital ratio		0.0242**		0.0203***
		(2.17)		(2.99)
Constant	0.4013**	-0.1178	0.3084***	-0.1252
	(2.08)	(-0.46)	(2.69)	(-0.80)
Number of observations	345	318	345	318
R-squared			0.15	0.13

Table 12: Placebo regressions

The table shows placebo regressions predicting buy-and-hold returns for banks during various time periods using the return during the 1998 crisis and placebo returns during a hypothetical 1997 "crisis". Models (1) through (4) predict stock returns during the recent financial crisis from July 2007 through December 2008. Models (5) and (6) use the crisis return in 1998 to predict the return from July 2005 through December 2006. "Crisis return 1998" is the bank's stock return from the first trading day in August 1998 until the day in 1998 on which the bank's stock attains its lowest price. "Placebo return 1997" measures a hypothetical crisis return as the return from the first trading day in August 1997 over the following 50 trading days, i.e. the average number of days over which the 1998 crisis return is measured. "Large bank" is an indicator variable equal to one if the bank's book value of assets at the end of 2006 (end of 2004 for model (6)) was above the sample median, and zero otherwise. Firm characteristics are measured at the end of the fiscal year preceding the year for which returns are predicted, that is they are measured in 2006 for models (1) through (4), and 2004 for models (5) and (6). Firm characteristics include the bank's stock return during the previous year, the book-to-market ratio, the natural log of the market value of the bank's equity, and leverage. The firm's beta is measured over the previous three years, i.e. from 2004 through 2006 for models (1) through (4), and 2002 through 2004 for models (5) and (6). Numbers in parentheses are *t*-statistics, and ***, **, and * indicate statistical significance at the 1%, 5%, and 10% level, respectively.

	(1) Financial crisis return	(2) Financial crisis return	(3) Financial crisis return	(4) Financial crisis return	(5) Return 2005 - 2006	(6) Return 2005 - 2006
Crisis return 1998	0.4756***	0.1846			-0.0197	0.0290
	(3.49)	(1.01)			(-0.28)	(0.33)
Crisis return 1998 x Large bank		0.5949**				-0.0630
		(2.24)				(-0.48)
Placebo return 1997			0.0498	0.0239		
			(0.33)	(0.13)		
Placebo return 1997 x Large bank				0.0716		
				(0.23)		
Large bank		0.2256***		0.0719		-0.0736*
		(2.64)		(0.93)		(-1.81)
Previous year return	-0.2521**	-0.2318**	-0.3591***	-0.3367***	0.0183	0.0249
	(-2.49)	(-2.29)	(-3.36)	(-3.11)	(0.38)	(0.52)
Book-to-market	-0.1937	-0.2087*	-0.2634**	-0.2600**	0.0782	0.0759
	(-1.63)	(-1.77)	(-2.05)	(-2.02)	(1.20)	(1.17)
Log (market value)	-0.0454***	-0.0539***	-0.0518***	-0.0636***	-0.0002	0.0076
	(-4.22)	(-3.82)	(-4.69)	(-4.42)	(-0.03)	(1.00)
Beta	0.1185***	0.0885**	0.1167***	0.0869*	0.0552	0.0779**
	(3.08)	(2.06)	(2.89)	(1.90)	(1.59)	(2.12)
Leverage	-0.0195***	-0.0178***	-0.0255***	-0.0254***	0.0020	0.0012
	(-3.17)	(-2.89)	(-3.98)	(-3.96)	(0.52)	(0.32)
Constant	0.3055***	0.2606**	0.3215***	0.3717***	0.0087	-0.0028
	(2.86)	(2.16)	(2.72)	(3.00)	(0.16)	(-0.05)
Number of observations	346	346	303	303	346	346
R-squared	0.16	0.18	0.17	0.18	0.02	0.04