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Bank capital in the crisis: It's not just how much you have but who provides it

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ABSTRACT

Bank capital is the cornerstone of bank regulation and is considered a key determinant of a bank's ability to withstand economic shocks. In the area of bank capital regulation, the general view is that more bank capital is better, irrespective of who provides it. In this paper, we investigate whether the investment horizon of bank capital providers matters for bank performance during the recent financial crisis. We observe that banks with more short-term investor ownership have worse stock returns during the crisis. Further exploration suggests that this is partially because banks with higher short-term investor ownership took more risk prior to the crisis but mainly because they experienced higher selling pressure during the crisis. Our results confirm the economic benefit of bank capital in helping banks to perform better during crises. However, when we decompose bank capital by the nature of its providers, we show that more capital is associated with worse performance when it is provided by short-term institutional investors.

1. Introduction

Bank capital is the cornerstone of bank regulation and is considered a stable source of financing that makes banks more resilient to economic shocks[1]. Existing empirical evidence emphasizes that more bank capital is associated with stronger performance during the 2007–2008 crisis (e.g., Beltratti and Stulz, 2012; Demirguc-Kunt et al., 2013) and also during previous crises (e.g., Berger and Bouwman, 2013; Fahlenbrach et al., 2012). In the area of capital regulation, the general view is that more capital is better, irrespective of who provides it (Laeven, 2013).

At odds with this approach, academic literature in corporate finance has outlined that investors are far from homogeneous and has sought to assess the implications of this heterogeneity. In particular, investors have different investment horizons and these differences have been found to influence corporate policies in non-financial firms (e.g., Bushee, 1998; Gaspar et al., 2005; Chen et al., 2007; Gaspar et al., 2012; Derrien et al., 2013). In this paper, we investigate whether the investment horizon of bank capital providers matters for bank performance during the recent financial crisis. In complementary tests, we also study the 1998 crisis. We focus on crisis periods because it is precisely during economic shocks that the stability of bank capital as a source of funding is much needed.

Using the entire universe of 13F institutional investors, we start our analysis by examining whether short-term investor ownership has an impact on bank performance during the 2007–2008 crisis for a sample of 419 publicly listed U.S. banks. We find that banks with higher pre-crisis short-term investor ownership experienced worse stock returns during the crisis. This effect cannot be attributed to a negative impact of institutional ownership as a whole. Indeed, the fraction of ownership held by long-term institutional investors has no impact on bank performance during the crisis. Our results are very robust to different measures of short-term investor ownership and to the introduction of numerous control variables, which include several measures of bank capital (equity ratio, market equity ratio, Tier 1 capital).

In additional tests, we address the concern that the negative association between short-term investor ownership and bank performance during the crisis could be driven by investors' stock-picking abilities. First, we include an active share measure computed following Cremers and Petajisto (2009) to control for investors' stock picking abilities. The negative effect of short-term investor owner-

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[1] See Thakor (2014) for a recent and comprehensive survey on bank capital and financial stability.

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ship on bank performance during the crisis is robust to the introduction of this variable. To further address potential endogeneity concerns due to the fact that investor horizon could capture other unobserved variables, we follow Cella et al. (2013) and use an instrumental variable approach to exploit exogenous variation in investor horizon. The instrumental variable approach confirms that investor horizon has a strong impact on bank performance during the crisis. Overall, these two results mitigate potential omitted variable concerns and in particular show that the effect of investor horizon on bank performance is not driven by investors' stock picking abilities.

In our complementary tests for the 1998 crisis, we document a similar relation between pre-crisis short-term ownership and bank performance during the crisis. The horizon of bank capital providers was thus a common and key determinant of bank performance during the two worst financial crises since the Great Depression. Whereas previous literature highlights the role of short-term debt and size growth in making banks vulnerable (e.g., Adrian and Shin, 2010; Brunnermeier, 2009; Fahlenbrach et al., 2012; Gorton, 2010), to the best of our knowledge, we are not aware of any work showing that banks with more short-term investors are also more vulnerable to crises. This result has strong implications for understanding the performance of financial institutions during crises and how it could be improved. The importance of this issue can hardly be overestimated. Both the 1998 and the 2007–2008 crises had important effects on the real economy and bank borrowers were significantly affected by the performance of their banks during these crises (e.g., Chava and Purnanandam, 2011; Chodorow-Reich, 2014).

Next, we assess the relevance of two non-mutually exclusive explanations for the negative impact of short-term investor ownership on bank stock performance during the recent financial crisis. A first possibility is that banks with more short-term investor ownership took more risks in the pre-crisis period. Short-term investors may have encouraged greater risk-taking prior to the crisis to boost shareholder returns. In this case, we would expect banks with more short-term ownership to be more risky before the crisis. We explore this possibility by regressing a variety of pre-crisis risk measures on short-term investor ownership and control variables. Our risk measures capture different dimensions of bank risk. They include two risk measures based on market data (stock volatility and tail risk) and several accounting-based risk measures (Z-score, the ratio of risk-weighted assets to total assets, real estate exposure, and loan loss provisions). We find some evidence that banks with more short-term investor ownership had higher risk prior to the crisis. In particular, short-term investor ownership is positively associated with pre-crisis stock volatility and the ratio of risk-weighted assets, and negatively associated with the Z-score. This suggests that the association between short-term investor ownership and bank performance during the crisis could be partially due to a higher exposure to risk in the pre-crisis period. However, the proportion of short-term investor ownership remains negatively associated with bank performance during the crisis when we control for these pre-crisis risk-measures. This indicates that while there is some evidence suggesting that banks with more short-term investors were more risky prior to the crisis, it is not sufficient to explain the negative association between short-term investor ownership and bank performance during the crisis.

A second possibility is that banks with more short-term investor ownership experienced worse performance because of the behavior of short-term investors during the crisis. Facing weak expected demand from other market participants and possible price declines, short-term investors may have intensively sold their shares during the crisis, which contributed to higher bank share price drops. To explore this possibility, we compute a measure of selling pressure based on the measure proposed by Cella et al. (2013) and show that banks with more short-term investor ownership experienced greater selling pressure during the crisis. This result is consistent with the idea that banks with more short-term investor ownership experienced worse performance during the crisis because the short-term horizon of their capital providers exposed them to greater selling pressure.

So far, our results show that, controlling for different bank capital measures, a higher proportion of short-term investors is associated with worse performance during the crisis. In complementary tests, we go one step further and assess whether more capital is always good for bank performance during crisis periods or whether this effect differs depending on who provides the capital. Consistent with previous studies, we confirm that more capital has a positive impact on bank performance during crises. However, we suspect that this well-established result may hide some heterogeneity depending on the nature of the providers of bank capital. To explore this issue, we decompose bank capital ratio into three components depending on the nature of the providers: short-term institutional investors, long-term institutional investors and non-13F investors. Our results reveal that more bank capital has a positive impact on bank performance during the crisis only when it is provided by non-13F investors or long-term investors. By contrast, more bank capital is associated with worse performance during the crisis when it is provided by short-term institutional investors. These findings further shed light on the necessity of taking into account the nature of bank capital providers.

Our paper is related to several streams of research in banking and corporate finance. First, it contributes to the literature investigating the determinants of bank performance during the recent financial crisis. Beltratti and Stulz (2012) provide a comprehensive study of the influence of both bank- and country-level characteristics on bank performance in the crisis. Most relevant for our study, they document a positive impact of bank capital and stable sources of financing on the performance of banks during the crisis. Consistent with their results and with Berger and Bouwman (2013) and Demirguc-Kunt et al. (2013), we find that book equity ratio, market equity ratio and regulatory Tier 1 ratio all have a positive impact on bank stock performance during the crisis. However, our results also indicate that the nature of the providers of bank capital matters for the economic benefit of bank capital and should be taken into account.

Other studies focus on the influence of bank governance, notably Fahlenbrach and Stulz (2011) for CEO compensation, Minton et al. (2014) for the independence and financial expertise of the board, and Erkens et al. (2012) for ownership and board composition. Based on an international sample, the latter study provides evidence that banks with higher institutional ownership took more risks and had worse stock returns during the crisis for an international sample of banks. For the pre-crisis period, previous studies based on international samples also documented that a bank's ownership structure has an impact on bank risk (e.g., Barry et al., 2011; Iannotta et al., 2007). To the best of our knowledge, our analysis is the first to consider investment horizons in the ownership structure of banks and extends previous results in two directions. First, our results suggest that some heterogeneity exists among institutional investors because we show that only the fraction of ownership held by short-term institutional investors is associated with worse stock performance in the crisis. Similarly, only the fraction of short-term institutional investors is associated with pre-crisis bank risk. Second, our results indicate that as far as the investment horizon of shareholders is concerned, the links between ownership structure and bank risk cannot be fully captured during 'normal' market conditions but materialize in economic shocks.

Our paper is also related to the issue of the interaction of regulation and corporate governance in banks. As emphasized by

existing literature, an important question is whether bank regulation is a complement or a substitute for corporate governance (Becht et al., 2011; John and Qian, 2003). In particular, John et al. (2000) show that concentrating on bank capital regulation may be ineffective in controlling risk-taking if top management incentives are not taken into account. Empirically, John et al. (2010) find that the pay-for-performance sensitivity of bank CEO compensation increases with the degree of outside monitoring by regulators. Our article indicates that the same regulation is likely to have different effects across banks depending on their ownership structure: a given capital requirement does not affect in the same way banks with different proportions of short-term investors in their ownership.

Furthermore, our paper is related to a recent contribution from Cella et al. (2013) who show that short-term investors amplify market shocks by selling their stockholdings to a larger extent than long-term investors. Contrary to Cella et al. (2013), our paper provides a specific analysis of banks. As argued by Stulz (2015), banks differ from other firms because their distress can have systemic effects. Moreover, existing literature has documented that bank performance during both the 1998 and 2007–08 crises had important effects on the real economy (e.g., Chava and Purnanandam, 2011; Chodorow-Reich, 2014). Focusing on banks and better understanding their performance during crises is therefore of special interest and has received a lot of attention over the past years (e.g., Beltratti and Stulz, 2012; Fahlenbrach et al., 2012). Our main contribution is to shed light on the fact that the investment horizon of a bank's shareholders is an important determinant of bank performance during both the 1998 and 2007–08 crises. Banks also differ from other firms because their level of equity is regulated. While banking regulation places a lot of emphasis on bank capital, our results indicate that, during crises, not only the amount of bank capital, but also the nature of its providers, matters. These results have potentially interesting implications concerning how bank performance during crises can be improved through regulation.

Finally, our paper provides some insights for the current debate on how banks should be financed. On the one hand, Admati et al. (2012) argue that banks should be financed with significantly more equity and that regulatory capital requirements should be set much higher than the levels proposed by the Basel Committee. On the other hand, DeAngelo and Stulz (2015) argue that high leverage is optimal for banks. While our results are mute concerning the optimal amount of bank capital, they highlight that the debate should not be uniquely centered on the issue of how much capital banks should have. The issue of the providers of bank capital should also be considered because more capital may be either beneficial or detrimental for bank stability depending on who provides it. In particular, more bank capital is likely to be detrimental for the resilience of a bank if it is provided by short-term investors.

The remainder of the paper is organized as follows. Section I describes our sample construction and our main dependent and independent variables. Section II contains our main empirical analysis and discusses the results. We conclude in Section III.

2. Sample selection and main variables

2.1. Sample selection

The starting point for the formation of our sample comprises all companies with SIC codes between 6000 and 6300 that are present on the Compustat and CRSP databases for the 2006 fiscal year. We exclude banks with foreign incorporation to keep our focus on U.S. firms. We then follow Fahlenbrach and Stulz (2011) and Fahlenbrach et al. (2012) and exclude a list of banks that do not belong to the traditional banking industry, such as investment advisors (SIC 6282), online brokerage and payment processors. Finally, we winsorize our dependent and independent variables at 1% and 99%. We obtain a final sample of 419 banks. For increased transparency, we provide the list of our sample firms in Appendix A.

We obtain stock and index returns from CRSP, accounting data from S&P Compustat, investor ownership information from 13F Thomson Files, and Tier 1 capital ratios, net interest income, deposits, and non-interest income from Compustat banking. Data on risk-weighted assets, real estate exposure, and loan loss provisions are from FR Y-9C filings. Risk free rates are from Kenneth French's website.

2.2. Main dependent and independent variables

We start our empirical analysis by investigating the determinants of individual banks' performance during the crisis by computing the annualized buy-and-hold stock returns from July 1, 2007 to December 31, 2008 (*BHR_CRISIS*). Consistent with previous studies (e.g., Beltratti and Stulz, 2012; Fahlenbrach and Stulz, 2011; Fahlenbrach et al., 2012), we stop the calculation of *BHR_CRISIS* at the end of 2008 to avoid bias in our dependent variable because stock performance thereafter was affected to some extent by government interventions and the uncertainty about possible nationalization[2].

Our main explanatory variable is the proportion of short-term institutional investor ownership (*SHORT_TERM_OWNERSHIP*). Although it is impossible to directly observe and measure the investment horizon of a given investor, it is revealed over time by its trading behavior (e.g., Gaspar et al., 2005; Chen et al., 2007; Cella et al., 2013; Derrien et al., 2013). To compute our primary measure of short-term investor ownership, we follow Derrien et al.'s (2013) approach and capture an institutional investor's investment horizon through its portfolio turnover. Based on quarterly data from 13F Thomson Files, we start by computing the portfolio turnover of each institutional investor as the price-weighted share of stocks that have been sold over the last 12 quarters (three-year period). Formally, the portfolio turnover at quarter t of an investor j with a portfolio composed of stocks from n different firms is given by the formula:

$$TURNOVER_{j,t} = \sum_{i=1}^{n} \frac{SoldShares_{i,t} \times SharePrice_{i,t-12}}{TotalPortfolioValue_{i,t-12}}$$

Derrien et al. (2013) suggest using a smoothed measure of investor portfolio turnover. They average it over four quarters. The final measure of investor j turnover for quarter t is defined as follows:

$$ATURNOVER_{j,t} = \frac{1}{4} \times \sum_{t=-3}^{0} Turnover_{j,t}$$

We then classify institutional investors either as having short-term or long-term horizon depending on their *ATURNOVER* as of the last quarter of 2006[3]. We consider that an institutional investor has a short-term horizon (long-term horizon) if its average portfolio turnover is above (below) the median. Finally, for each bank, we compute the proportion of short-term investor ownership expressed as a percentage of the number of shares outstanding. In some tests, we add the proportion of long-term institutional investors as a control variable. To assess the robustness of our findings, we also use two alternative measures of short-term investor ownership: the weighted average of the portfolio turnover ratios of a bank's investors (*MTURNOVER*) and the weighted average of the

[2] In unreported tests, we have also estimated regressions with buy-and-hold returns from July 2007 to December 2009 and from July 2007 to December 2010. The results on short-term investor ownership and on our control variables are unchanged.

[3] The turnover of the portfolio of each institutional investor is thus calculated over the period 2004–2006.

Table 1
Descriptive statistics.

Variables	N	Mean	S.D.	Min	0.25	Mdn	0.75	Max
BHR_CRISIS (%)	419	−29.94	31.41	−96.57	-51.69	−27.41	−4.72	34.45
SHORT_TERM_OWNERSHIP (%)	419	6.17	6.44	0.00	1.27	4.11	9.30	35.89
RETURN_2006 (%)	419	10.86	16.41	−32.02	0.58	8.38	19.15	81.58
TOTAL ASSETS	419	16.25	108.17	0.09	0.55	1.15	3.06	1459.74
SIZE	419	7.84	1.60	5.25	6.68	7.46	8.64	13.63
BETA	419	0.63	0.62	−0.15	0.08	0.35	1.16	2.04
BOOK_TO_MARKET	419	0.61	0.19	0.21	0.47	0.59	0.74	1.23
TIER_1_RATIO (%)	412	11.50	3.35	6.30	9.30	10.80	12.79	25.30
EQUITY_RATIO (%)	419	9.84	3.61	2.85	7.62	9.08	10.73	33.55
MARKET_EQUITY_RATIO (%)	419	15.87	5.48	4.93	12.28	15.53	18.79	45.89
LONG_TERM_OWNERSHIP (%)	419	20.74	17.22	0.10	6.16	16.51	32.27	71.92
DEPOSITS (%)	419	74.34	9.22	42.84	69.23	75.26	81.11	89.34
NON_INTEREST_INCOME (%)	419	78.55	12.33	26.19	72.50	80.98	87.20	97.15
SHORT_TERM_FUNDING (%)	419	7.05	5.98	0.00	2.43	5.81	9.83	28.39
LOAN_ RATIO (%)	418	69.43	12.24	30.67	63.26	70.92	78.13	90.93
Investor Horizon								
MCHURNRATIO	412	0.19	0.04	0.08	0.17	0.19	0.22	0.44
MTURNOVER	419	0.42	0.11	0.22	0.35	0.40	0.48	0.74
ACTIVE_SHARE_MEASURE	414	0.40	0.06	0.26	0.35	0.40	0.45	0.53
TRADING_PERF_SENS_1	412	0.07	0.16	−0.34	−0.01	0.07	0.15	0.84
TRADING_PERF_SENS_2	408	0.13	0.16	−0.35	0.03	0.15	0.23	0.53
Bank Risk								
TAIL RISK (%)	415	−3.53	0.99	−8.05	−4.15	−3.49	−2.90	−1.30
RETURN_VOL	419	0.57	0.25	0.22	0.41	0.51	0.68	419
Z-SCORE	397	3.91	0.79	1.14	3.49	3.99	4.42	0.79
RWA	269	0.77	0.11	0.45	0.71	0.78	0.84	1.00
REAL_ESTATE_EXPOSURE (%)	269	52.98	14.42	13.49	43.24	53.84	63.27	84.24
LOAN_LOSS_PROVISION (%)	269	0.22	0.25	−0.27	0.09	0.16	0.28	1.26
Selling Pressure								
SELLING_PRESSURE	359	0.42	0.28	0.00	0.21	0.40	0.57	2.44
BID_ASK_SPREAD (%)	415	0.83	0.92	0.04	0.17	0.45	1.12	4.41
ILLIQUIDITY	415	0.04	0.008	0.00	0.00	0.00	0.04	0.52

portfolio churn ratios of a bank's investors (*MCHURNRATIO*) computed following Cella et al. (2013). A detailed definition of these two variables is provided in Appendix B. We match our measures of investor horizon with Compustat data for the last fiscal quarter of 2006.

We include three different measures of bank capital in our regressions: a standard equity ratio, a market equity ratio computed following Acharya et al. (2010) as the market value of equity divided by the book value of assets minus the book value of equity plus the market value of equity, and a Tier 1 capital ratio. We also control for additional variables that may affect the stock performance of a bank during the crisis (e.g., Erkens et al., 2012; Fahlenbrach and Stulz, 2011; Fahlenbrach et al., 2012). A detailed definition of all our control variables is provided in Appendix B.

2.3. Summary statistics

Table 1 provides summary statistics for our sample of banks. The median and mean annualized returns for the sample banks are respectively minus 27.4% and minus 29.9%, from July 2007 to December 2008. In line with previous studies on bank performance during the crisis (e.g., Beltratti and Stulz, 2012; Fahlenbrach et al., 2012), the standard deviation of these returns, 31%, is rather high. By contrast, banks did well in the pre-crisis period with an average stock return of 10.9%. On average, the proportion of short-term institutional ownership is 6.2%, but it can reach more than 30%. The average proportion of long-term institutional ownership is 20.7%. The median bank in our sample had $1.15 billion in assets at the end of 2006. The mean and median Tier 1 capital ratio, 11.5% and 10.8%, respectively, are both above the regulatory minimum of 4%. In fact, the minimum Tier 1 capital ratio is 6.3%, which indicates that all banks in our sample comply with the Basel requirement. The median and mean equity ratio, respectively 9.1% and 9.8%, are slightly lower than the Tier 1 ratio. Both the median and the mean market equity ratio are close to 16%, which is substantially higher than the equity ratio. This is due to the fact that most banks in our sample have a book-to-market lower than 1, with an average of 0.61. The mean equity beta is 0.63. The average ratio of deposits to total assets is 74%. Finally, the average share of non-interest income and loan ratios are, respectively, 79% and 69% for banks in our sample.

3. Empirical analysis

3.1. Short-term investor ownership and bank performance during the crisis

We start our empirical analysis by examining the determinants of bank stock performance during the crisis. Table 2 presents 8 regressions where the dependent variable is the buy-and-hold stock returns during the crisis. The results strongly indicate that banks with a higher proportion of short-term investors experienced worse performance during the crisis. The effect appears to be highly significant both statistically and economically. According to regression 1, a one standard deviation increase in the proportion of short-term investor ownership is associated with a 6.69% (1.04*6.44%) lower stock return during the crisis. The effect of short-term investor ownership remains very strong even after taking into account our different control variables. According to regression 6, where we control for the size, the beta, the stock return in 2006, the book-to-market ratio, the equity ratio, the proportion of long-term ownership, the deposits, the short-term funding and the loan ratio, a one standard deviation increase in the proportion of short-term investor ownership remains associated with a 6.07% lower return during the crisis. Compared to the sample mean crisis return of minus 30%, this corresponds to a drop of 20%. This effect cannot be attributed to a negative impact of institutional ownership as a whole because the fraction of ownership held by long-

Table 2
Buy-and-hold stock returns during the 2007–2008 financial crisis and short-term investor ownership.
The table shows results from cross-sectional regressions of annualized buy-and-hold returns for banks from July 2007 to December 2008 on short-term investor ownership and firm characteristics measured at the end of fiscal year 2006. Control variables include the stock return in 2006 (*RETURN_2006*), the natural log of the bank total assets (*SIZE*), the bank's equity beta (*BETA*), the book-to-market ratio (*BOOK_TO_MARKET*), three measures of bank capital (*EQUITY_RATIO, MARKET_EQUITY_RATIO, TIER_1_RATIO*), the long-term institutional investor ownership (*LONG_TERM_OWNERSHIP*), the deposit ratio (*DEPOSITS*), the non-interest income (*NON_INTEREST_INC*), the proportion of loans over total assets (*LOAN_RATIO*) and the short-term funding (*SHORT_TERM_FUNDING*). Alternative measures of short-term ownership include the weighted average of the portfolio turnover ratios of a bank's investors over the period 2004–2006 (*MTURNOVER*), the weighted average of the portfolio churn ratios of a bank's investors over the period 2002–2006 (*MCHURNRATIO*). Standard errors are reported in parentheses. Statistical significance at the 1%, 5%, and 10% level is indicated by ***, **, and *, respectively. All models are estimated by ordinary least squares and include the constant term, but the coefficient is not reported. Variable definitions are provided in Appendix B.

BHR_CRISIS	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
SHORT_TERM_OWNERSHIP	**−1.036*** (0.243)**	**−1.063*** (0.241)**	**−1.025*** (0.239)**	**−1.101*** (0.238)**	**−0.874*** (0.264)**	**−0.944*** (0.246)**		
MTURNOVER							**−0.578*** (0.161)**	
MCHURNRATIO								**−1.008*** (0.315)**
RETURN_2006	−0.088 (0.095)	−0.138 (0.095)	−0.150 (0.095)	−0.113 (0.096)	−0.176* (0.094)	−0.139 (0.087)	−0.113 (0.090)	−0.129 (0.088)
SIZE	−0.006 (0.013)	−0.011 (0.012)	−0.012 (0.012)	0.005 (0.012)	−0.026 (0.016)	−0.029** (0.015)	−0.048*** (0.0125)	−0.035*** (0.012)
BETA	0.141*** (0.032)	0.140*** (0.031)	0.139*** (0.031)	0.137*** (0.030)	0.140*** (0.034)	0.142*** (0.032)	0.098*** (0.032)	0.115*** (0.030)
BOOK_TO_MARKET	−0.096 (0.096)	−0.210** (0.099)	0.022 (0.097)	−0.100 (0.095)	−0.259** (0.109)	−0.274*** (0.104)	−0.297*** (0.100)	−0.261** (0.103)
EQUITY_RATIO		1.553*** (0.369)			1.963*** (0.435)	1.898*** (0.429)	2.087*** (0.422)	2.056*** (0.436)
MARKET_EQUITY_RATIO			1.112*** (0.283)					
TIER_1_RATIO				1.849*** (0.450)				
LONG_TERM_OWNERSHIP					−0.098 (0.136)	−0.034 (0.133)		
DEPOSITS					0.071 (0.247)	0.112 (0.226)	0.0718 (0.229)	0.130 (0.232)
SHORT_TERM_FUNDING					0.353 (0.348)	0.275 (0.336)	0.233 (0.343)	0.231 (0.359)
NON_INTEREST_INC					−0.407** (0.159)			
LOAN_RATIO						−0.742*** (0.116)	−0.297*** (0.100)	−0.788*** (0.120)
Observations	419	419	419	412	419	418	418	412
Adjusted R-squared	0.10	0.12	0.12	0.14	0.14	0.20	0.19	0.19

term institutional investors has no impact on bank performance during the crisis (regressions 5 and 6). Erkens et al. (2012) document a negative impact of institutional ownership as a whole on bank stock performance during the crisis, but they have an international sample of banks and do not distinguish between investment horizons of institutional investors.

Consistent with Beltratti and Stulz (2012) and Berger and Bouwman (2013), we find that our three measures of bank capital — equity ratio, market equity ratio, and Tier 1 ratio— are all associated with higher stock returns during the crisis. According to regression 6, a one standard deviation increase in the equity ratio is associated with a 6.85% higher return during the crisis, which corresponds to a 23% increase compared to the mean return of minus 30%.

Consistent with Beltratti and Stulz (2012); Fahlenbrach et al. (2012) and Erkens et al. (2012), we find that banks that performed better in 2006 tended to have lower stock returns in the crisis. Like Fahlenbrach and Stulz (2011) and Fahlenbrach et al. (2012), we find that banks with a higher book-to-market ratio had worse stock returns during the crisis. The results from regressions 5–6, where we control for the funding structure and the nature of bank activities, indicate that banks that were more involved in non-traditional activities appear to have had lower returns during the crisis. Unlike Beltratti and Stulz (2012) and Dermirguc-Kunt et al. (2013), our results indicate that the deposit ratio is not statistically related to bank performance during the crisis. However, these two studies focus on international samples whereas we have a sample of U.S. banks. For U.S. banks, Aebi et al. (2012) do not find any impact of the deposit ratio on bank performance. Consistent with Aebi et al. (2012); Beltratti and Stulz (2012), we also find that banks with more loans performed worse during the crisis[4].

Surprisingly, but in line with the results from Fahlenbrach et al. (2012), we find that banks with higher exposure to the market (i.e., higher beta) have better crisis returns. Comparing their result with the negative impact of beta reported by Acharya et al. (2010); Fahlenbrach et al. (2012) explain that the difference is due to the choice of the time period used to estimate the beta and the sample composition. In unreported tests, when we follow their steps and restrict our sample to the 100 largest banks and measure the beta from July 2006 to June 2007 (no longer from 2004 to 2006), we also find a statistically significant negative coefficient on the beta[5].

We assess the possibility that our results may stem from the way we compute investor turnover and in particular from the

[4] To avoid multicollinearity issues, we do not include the non-interest income and the loan ratio in the same regression. The effect of investor horizon on bank performance remains however unchanged if we do so.

[5] In these unreported tests limited to the 100 largest banks, the impact of short-term investor ownership on bank performance during the crisis remains significantly negative.

threshold used to classify 13F institutions into short- and long-term investors. We address this concern using other proxies for banks' investor horizons. Our first proxy is the weighted average of the portfolio turnover ratios of a bank's investors (*MTURNOVER*). Our second alternative measure is the weighted average of the portfolio churn ratios of a bank's investors (*MCHURNRATIO*). Unlike the turnover measure, which focuses only on sales, the churn ratio also takes into account the purchases of shares. As reported in Table 2, column 7 and 8, our results are unchanged with these two alternative measures of investor horizon.

3.2. Potential omitted factors

In this section, we start by addressing the important concern that the negative association between the proportion of short-term investors and bank performance during the crisis may be driven by investors' stock-picking abilities rather than by their horizon. One may argue that if investment horizons were related to investors' stock-picking abilities, short-term investors could have anticipated drops in stock prices. That is, in the run-up of the crisis, short-term investors may have stock-picked banks that would end up performing badly in the crisis to enjoy higher returns before the downturn. To capture investors' stock picking abilities, we first measure how much an investor's portfolio deviates from the Russell 1000 index using the active share measure computed following Cremers and Petajisto (2009), and then, at the bank level, we average this proxy across institutional investors. Results from Table 3 (Panel A) indicate that our different measures of investor horizon have still a negative and significant impact on bank performance during the crisis when we control for the active share measure. This suggests that our results are not driven by investors' stock picking abilities.

To further address potential endogeneity concerns due to the fact that our measures of investor horizon could also capture other unobserved variables, we follow Cella et al. (2013) and use an instrumental variable approach to exploit exogenous variation in investor horizon. We exploit that some institutional investors trade more not because of valuation beliefs, but to prevent or reduce withdrawals. To capture the variation in investor horizon aimed at preventing withdrawals, we start by computing a measure of Trading Performance Sensitivity calculated as the correlation between the portfolio performance in a quarter and net trading in the next quarter over the period spanning from 2002 to 2006[6]. Second, we compute another measure, Trading Performance Sensitivity 2, for which the correlation is computed from 1990 to 2006 and only using the quarters in which the performance of the S&P500 is classified in the bottom decile of the distribution of all quarterly S&P500 returns. This second measure allows us to take into account the existence of non-linearities in the flow-performance relation (e.g., Chevalier and Ellison, 1997) and to focus on periods of poor market performance.

Investors with lower correlation between funding and previous performance expect to have more stable funding and should have the possibility of taking a longer horizon on their investment. In line with Cella et al. (2013), we use these two measures of Trading Performance Sensitivity as an instrument for investor horizon. At the bank level, we average Trading Performance Sensitivity and Trading Performance Sensitivity 2, weighing each of them with the ownership stakes of the different investors and use them as an instrument for the average churn ratio. The first column of Table 3 (Panel B) presents the first stage. The positive and significant coefficient on both measures of Trading Performance Sensitivity indicates that they are a good predictor of investor horizon. In the second stage, the results of the instrumental variable regression confirm that investor horizon has a strong impact on bank performance during the crisis[7]. Overall, the results of this section mitigate potential omitted variable concerns and in particular show that the effect of investor horizon on bank performance is not driven by investors' stock picking abilities.

3.3. The 1998 crisis

In this subsection, we are interested in whether the impact on short-term ownership on bank performance during the recent financial crisis also holds for another crisis. We focus on the crisis of 1998 which was marked by Russia's default and the collapse of LTCM. The 1998 crisis was at the time considered as the worst financial crisis since the Great Depression. Like the recent financial crisis, the 1998 crisis also had important effects on the real economy (e.g., Chava and Purnanandam, 2011). Further, Fahlenbrach et al. (2012) show that the performance of a bank in the 1998 crisis has a strong explanatory power for its performance in the recent financial crisis.

Table 4 reproduces the regressions of Table 2 for the 1998 crisis. The dependent variable is the buy-and-hold stock return of a bank during the 1998 crisis while the short-term ownership and control variables are computed for the year 1997. We follow Fahlenbrach et al. (2012) and use daily return to compute buy-and-hold returns from August 3, 1998 (the first trading day of August 1998) to the day on which the bank attains its lowest stock price for the rest of the year 1998. Table 4 indicates that our results on short-term investor ownership are unchanged for this specific crisis. As in 2007–2008, the effect of short-term investor ownership cannot be attributed to an effect of institutional ownership as a whole since long-term investor ownership has absolutely no impact on bank performance during the 1998 crisis. Results on control variables confirm once again the role played by bank capital during economic shock since our three measures of bank capital have a positive impact on bank performance during the 1998 crisis.

Overall, our results highlight that the horizon of bank capital providers was a common and key determinant of bank performance during the two worst financial crises since the Great Depression. Whereas previous literature highlights the role of short-term debt and size growth in making banks vulnerable (e.g., Adrian and Shin, 2010; Brunnermeier, 2009; Fahlenbrach et al., 2012; Gorton, 2010), we are not aware of any work showing that banks with more short-term investors are also more vulnerable to crises.

3.4. Short-term investor and pre-crisis risk-taking

In the next two sections, we are interested in what could explain why banks with more short-term investor ownership performed worse during the recent financial crisis. One possible explanation is that they took more risks in the pre-crisis period. Several studies indicate that in the years leading up to the crisis, banks took highly risky bets, producing short-term performance at the expenses of long-term sustainability (e.g., Bhagat and Bolton, 2014; Bhattacharyya and Purnanandam, 2012; Moussu and Petit-Romec, 2014). Short-term investors may have encouraged this type of risk-taking behavior prior to the crisis. Alternatively, the presence of short-term investors may simply reflect the willingness of a bank to take higher risks. In both cases, we would expect banks with more short-term investor ownership to be more risky before the crisis.

We explore this possibility by examining the impact of short-term investor ownership on a set of pre-crisis risk measures. Note

[6] As in Cella et al. (2013), we use net trading as a proxy for the change in assets under management.

[7] The coefficient on *MCHURNRATIO* is significantly higher than the coefficient of M*CHURNRATIO* in our baseline analysis in Table 2. However, the economic effect is similar in the two regressions because the instrumented *MCHURNRATIO* has a standard deviation that is much lower than *MCHURNRATIO*.

Table 3
Potential Omitted Factors.

Panel A: Controlling for investors' stock picking abilities
The table shows the results from cross-sectional regressions of annualized buy-and-hold returns for banks from July 2007 to December 2008 on short-term investor ownership as well as an additional measure (*ACTIVE_SHARE_MEASURE*) to control for institutional investors' stock picking abilities. *ACTIVE_SHARE_MEASURE* is the share-weighted average distance of a firm's institutional investors' portfolio weights to the RUSSEL 1000 index weights. Standard errors are reported in parentheses. Statistical significance at the 1%, 5%, and 10% level is indicated by ***, **, and *, respectively. All models are estimated by ordinary least squares and include the constant term, but the coefficient is not reported. Variable definitions are provided in Appendix B.

BHR_CRISIS	(1)	(2)	(3)
SHORT_TERM_OWNERSHIP	**−0.910*** **		
	(0.255)		
MTURNOVER		**−0.526*** **	
		(0.184)	
MCHURNRATIO			**−1.016*** **
			(0.340)
ACTIVE_SHARE_MEASURE	−0.221	−0.176	−0.700**
	(0.334)	(0.342)	(0.290)
RETURN_2006	−0.132	−0.109	−0.119
	(0.087)	(0.091)	(0.089)
SIZE	−0.036**	−0.051***	−0.044***
	(0.017)	(0.013)	(0.013)
BETA	0.132***	0.097***	0.085***
	(0.036)	(0.033)	(0.0325)
BOOK_TO_MARKET	−0.256**	−0.270***	−0.249**
	(0.103)	(0.100)	(0.102)
EQUITY_RATIO	1.967***	2.131***	2.076***
	(0.429)	(0.423)	(0.434)
DEPOSITS	0.117	0.093	0.0943
	(0.233)	(0.236)	(0.234)
SHORT_TERM_FUNDING	0.252	0.235	0.215
	(0.351)	(0.359)	(0.360)
LOAN_RATIO	−0.782***	−0.795***	−0.785***
	(0.117)	(0.119)	(0.120)
LONG_TERM_OWNERSHIP	0.002		
	(0.144)		
Observations	413	413	409
Adj. R^2	0.20	0.20	0.19

Panel B: Exploiting the Exogenous Variation in Investor Horizon
The table presents instrumental variable estimates. We use Average Trading Performance Sensitivity 1 (*TRADING_PERF_SENS_1*) and Average Trading Performance Sensitivity 2 (*TRADING_PERF_SENS_2*) as an instrument for investor horizon (*MCHURNRATIO*). Column 1 presents the results of the first stage regression and column 2 presents the results of the second stage regression. Standard errors are reported in parentheses. Statistical significance at the 1%, 5%, and 10% level is indicated by ***, **, and *, respectively. All models are estimated by ordinary least squares and include the constant term, but the coefficient is not reported. Variable definitions are provided in Appendix B.

	First Stage *MCHURNRATIO* (1)	**Second Stage** *BHR_CRISIS* (2)	
TRADING_PERF_SENS_1	**0.029** **		
	(0.014)		
TRADING_PERF_SENS_2	**0.032** **		
	(0.014)		
MCHURNRATIO		**−5.894** **	
		(3.015)	
RETURN 2006	−0.016	−0.192	
	(0.014)	(0.122)	
SIZE	0.003	−0.0295	
	(0.002)	(0.0188)	
BETA	−0.022***	−0.0179	
	(0.005)	(0.0753)	
BOOK_TO_MARKET	−0.001	−0.279**	
	(0.014)	(0.127)	
EQUITY_RATIO	0.149**	2.892***	
	(0.065)	(0.722)	
DEPOSITS	0.008	0.133	
	(0.035)	(0.292)	
SHORT_TERM_FUNDING	0.0143	0.293	
	(0.049)	(0.412)	
LOAN_RATIO	0.0174	−0.693***	
	(0.018)	(0.155)	
ACTIVE_SHARE_MEASURE	0.040	−0.679*	
	(0.049)	(0.369)	
Observations	405	Observations	405
Adj. R^2	0.08	Adj. R^2	0.22
Test of Excluded Instruments	8.34***(0.00)	Sargan's Over-identifying Restrictions Test	0.39(0.52)

Table 4
Buy-and-hold stock returns during the 1998 financial crisis and short-term investor ownership.
The table shows results from cross-sectional regressions of buy-and-hold returns for banks from August 3, 1998 to the day on which the bank attains its lowest stock price for the rest of the year 1998 on short-term investor ownership and firm characteristics measured at the end of fiscal year 1997. Control variables include the stock return in 1997 (*RETURN_1997*), the natural log of the bank total assets (*SIZE*), the bank's equity beta (*BETA*), the book-to-market ratio (*BOOK_TO_MARKET*), three measures of bank capital (*EQUITY_RATIO, MARKET_EQUITY_RATIO, TIER_1_RATIO*), the long-term institutional investor ownership (*OLGTINV*), the deposit ratio (*DEPOSITS*) and the non-interest income (*NON_INTEREST_INC*). Standard errors are reported in parentheses. Statistical significance at the 1%, 5%, and 10% level is indicated by ***, **, and *, respectively. All models are estimated by ordinary least squares and include the constant term, but the coefficient is not reported. Variable definitions are provided in Appendix B.

BHR_CRISIS_98	(1)	(2)	(3)
SHORT_TERM_OWNERSHIP	**−0.56*** **	**−0.56*** **	**−0.63*** **
	(0.182)	**(0.184)**	**(0.194)**
RETURN_1997	−0.03	−0.04	−0.02
	(0.029)	(0.027)	(0.029)
SIZE	0.01	0.00	0.01
	(0.011)	(0.011)	(0.010)
BETA	−0.11**	−0.11**	−0.09*
	(0.050)	(0.051)	(0.051)
BOOK_TO_MARKET	−0.09	−0.01	−0.03
	(0.059)	(0.054)	(0.051)
EQUITY_RATIO	0.57*		
	(0.321)		
MARKET_EQUITY_RATIO		0.43**	
		(0.194)	
TIER_1_RATIO			0.50*
			(0.276)
LONG_TERM_OWNERSHIP	0.09	0.11	0.08
	(0.106)	(0.106)	(0.101)
DEPOSITS	0.12	0.11	0.08
	(0.097)	(0.095)	(0.102)
Observations	184	184	181
Adj. R^2	0.14	0.15	0.13

that we already control for the equity beta in our regressions of crisis returns, but we consider additional risk measures including accounting-based risk measures. Our first risk measure is the stock return volatility. Our second risk measure is a measure of tail risk used by Ellul and Yerramilli (2013) and computed as the average stock return of a bank over its 5% worst days. These two variables are measured over the period 2004–2006[8]. We also consider several risk measures based on accounting data. Our first accounting-based risk measure is the Z-score, which is inversely related to the probability of bank insolvency. The Z-score is measured over the period 2001–2006 and equals the return on assets plus the capital asset ratio divided by the standard deviation of the return on assets. Because the Z-score is highly skewed, we follow Laeven and Levine (2009) and use the natural logarithm of the Z-score. As an additional risk measure, we focus on the ratio of risk-weighted assets to total assets. It mainly proxies for bank credit risk and is often used as a measure of bank risk taking (e.g., Logan, 2001; Berger et al., 2014; Berger and Bouwman, 2013). Because of the central role of real estate activity in the financial crisis, we also consider a bank's exposure to real estate as an additional risk measure. The exposure to real estate is measured as the ratio of real estate loans to total assets. This measure has been used previously by Minton et al. (2014). Finally, we consider the ratio of loan loss provisions to total loans that is often used as a measure of asset risk in existing literature (e.g., Barry et al., 2011; Iannotta et al., 2007). Data for these accounting based risk measures are from FR Y-9C filings.

Panel A of Table 5 reports the results of the regressions of our different risk measures on short-term investor ownership plus the main control variables used in the regressions of Table 2. To avoid endogeneity issues, we do not include the beta since it already constitutes a risk measure. The results provide some support for a risk-taking explanation. First, the proportion of short-term investors is positively associated with pre-crisis stock volatility, although it is not highly statistically significant. Similarly, the results on the Z-score indicate that short-term investor ownership is associated with more insolvency risk. The proportion of short-term investors is also positively associated with credit risk as proxied by the ratio of risk-weighted assets to total assets. By contrast, the proportion of short-term investors is not associated with our other risk measures including the loan loss provision, tail risk and real estate exposure.

The results on our control variables indicate that banks with more capital have lower total risk and tail risk as well as lower loan loss provision and lower mortgage market exposure in the pre-crisis period. Results also indicate that larger banks had higher credit risk and lower exposure to real estate. In unreported tests, we find that our results are similar when we use our two other proxies of investor investment horizons.

The above results suggest that the association between short-term investor ownership and bank performance during the crisis is at least partly due to a higher exposure to risk in the pre-crisis period. In Panel B of Table 5, we add the pre-crisis risk measures to our regressions explaining bank performance during the crisis. Results show that the stock volatility and the ratio of risk-weighted assets have both a negative effect, respectively positive for the Z-score, on bank performance during the crisis. Consistent with Minton et al. (2014), we find that banks that were more exposed to real estate experienced lower performance during the crisis. Finally, the ratio of loan loss provisions is negatively associated to bank performance during the crisis. This indicates that these pre-crisis risk measures are relevant to explain bank performance during the crisis. However, in all regressions, the proportion of short-term investors has still a strong and negative impact on bank performance during the crisis. This indicates that while the risk-taking channel is relevant, it is not sufficient to explain the negative association between the proportion of short-term investors and bank performance during the crisis.

3.5. Short-term investor and bank selling pressure

A second explanation is that banks with more short-term investor ownership experienced worse stock returns because of the trading behavior of short-term investors during the crisis. Through their trading behavior during the crisis, short-term investors may indeed have contributed to higher bank share price drops. To explore this possibility, we follow Cella et al. (2013) and compute a measure of the selling pressure at the bank level as the total number of a bank's shares sold by institutional investors during the six crisis quarters expressed as a percentage of the bank's total number of outstanding shares held by institutional investors at the beginning of the crisis. We then regress the selling pressure measure on short-term investor ownership and our usual control variables. In some specifications, we also include additional variables to control for differences in the liquidity of bank stocks.

Table 6 indicates that banks with more short-term investors are exposed to greater selling pressure on their shares during the crisis period. In all the specifications, short-term investor ownership has a strong and positive impact on the selling pressure at the bank level during the crisis. According to regression 5, a one standard deviation increase in the proportion of short-term investor ownership is associated with a 3.24% higher selling pressure on bank

[8] Our results are unchanged if these two risk variables are measured only for the year 2006.

Table 5
Pre-crisis risk-taking and short-term investor ownership.

Panel A: Regressions of various pre-crisis bank risk measures on pre-crisis short-term investor ownership
Panel A shows results from cross-sectional regressions of pre-crisis risk measures on short-term investor ownership and bank characteristics measured at the end of fiscal year 2006. Pre-crisis risk measures are measured at the end of 2006 and include stock return volatility *(RETURN_VOL)*, a measure of tail risk (*TAIL RISK*), Z-score *(Z-SCORE)*, the ratio of Risk Weighted Assets to total Assets *(RWA)*, the ratio of real estate loans to total assets *(REAL_ESTATE_EXPOSURE)* and the ratio of loan loss provisions to total loans *(LLP)*. Control variables include the stock return in 2006 (*RETURN_2006*), the natural log of the bank total assets (*SIZE*), the book-to-market ratio (*BOOK_TO_MARKET*), the equity to assets ratio (*EQUITY_RATIO*), the long-term institutional investor ownership (*OLGTINV*), the deposit ratio (*DEPOSITS*), short-term funding (*SHORT_TERM_FUNDING*) and the loan ratio (*LOAN_RATIO*). Standard errors are reported in parentheses. Statistical significance at the 1%, 5%, and 10% level is indicated by ***, **, and *, respectively. Variable definitions are provided in Appendix B.

BANK RISK	Stock Return Volatility	Tail Risk	Z-SCORE	LLP	RWA	Real Estate Exposure
SHORT_TERM_OWNERSHIP	**0.443***	**0.680**	**−1.439***	**−0.017**	**0.239*****	**0.011**
	(0.227)	**(1.037)**	**(0.842)**	**(0.037)**	**(0.065)**	**(0.188)**
RETURN_2006	−0.020	−0.064	−0.009	0.004	−0.022	−0.044
	(0.078)	(0.313)	(0.272)	(0.012)	(0.025)	(0.056)
SIZE	0.006	0.300***	0.034	0.001	0.028***	−0.037***
	(0.011)	(0.037)	(0.042)	(0.002)	(0.005)	(0.011)
BOOK_TO_MARKET	0.184**	0.166	−0.450*	0.012	−0.018	0.037
	(0.087)	(0.308)	(0.268)	(0.010)	(0.034)	(0.067)
EQUITY_RATIO	−1.693***	6.300***	3.679**	−0.162**	−0.159	0.763**
	(0.346)	(1.519)	(1.43)	(0.072)	(0.218)	(0.370)
LONG_TERM_OWNERSHIP	−0.142	−0.227	−0.284	0.006	−0.084*	−0.037
	(0.094)	(0.362)	(0.366)	(0.017)	(0.044)	(0.109)
DEPOSITS	−0.032	−1.200*	0.659	−0.014	0.100	−0.390***
	(0.174)	(0.649)	(0.689)	(0.025)	(0.089)	(0.148)
SHORT_TERM_FUNDING	−0.439*	−0.450	1.299	−0.006	−0.049	−0.201
	(0.236)	(0.894)	(0.913)	(0.037)	(0.109)	(0.209)
LOAN_RATIO	0.409***	0.651*	0.345	0.045***	0.717***	0.277***
	(0.099)	(0.347)	(0.369)	(0.011)	(0.044)	(0.092)
Observations	418	414	396	269	269	269
Adj. R^2	0.10	0.27	0.03	0.02	0.65	0.26

Panel B: Bank performance in the crisis and short-term investor ownership controlling for various measures of the level of pre-crisis bank risk
Panel B shows results from cross-sectional regressions of annualized buy-and-hold returns for banks from July 2007 to December 2008 on short-term investor ownership and firm characteristics measured at the end of fiscal year 2006. Control variables include the stock return in 2006 (*RETURN_2006*), the natural log of the bank total assets (*SIZE*), the book-to-market ratio (*BOOK_TO_MARKET*), three measures of bank capital (*EQUITY_RATIO, MARKET_EQUITY_RATIO, TIER_1_RATIO*), the long-term institutional investor ownership (*LONG_TERM_OWNERSHIP*), the deposit ratio (*DEPOSITS*), the proportion of loans over total assets (*LOAN_RATIO*) and the short-term funding (*SHORT_TERM_FUNDING*). We add further pre-crisis bank risk control variables. Pre-crisis risk measures are measured at the end of 2006 and include return volatility *(RETURN_VOL)*, Tail risk *(TAIL RISK)*, Z-score *(Z-SCORE)*, the ratio of Risk Weighted Assets to total assets *(RWA)*, the ratio of real estate loans to total assets *(REAL_ESTATE_EXPOSURE)* and the ratio of loan loss provisions to total loans *(LLP)*. Standard errors are reported in parentheses. Statistical significance at the 1%, 5%, and 10% level is indicated by ***, **, and *, respectively. All models are estimated by ordinary least squares and include the constant term, but the coefficient is not reported. Variable definitions are provided in Appendix B.

BHR_CRISIS	(1)	(2)	(3)	(4)	(5)	(6)
SHORT_TERM_OWNERSHIP	**−0.739*****	**−1.116*****	**−1.223*****	**−1.435*****	**−1.004*****	**−1.401*****
	(0.200)	**(0.248)**	**(0.293)**	**(0.328)**	**(0.310)**	**(0.333)**
RETURN_2006	−0.158**	−0.141	−0.162*	−0.120	−0.163	−0.147
	(0.064)	(0.089)	(0.092)	(0.108)	(0.107)	(0.107)
SIZE	−0.009	−0.012	−0.018	−0.015	0.031*	−0.033*
	(0.010)	(0.017)	(0.015)	(0.018)	(0.018)	(0.019)
BOOK_TO_MARKET	−0.217***	−0.350***	−0.441***	−0.398***	−0.448***	−0.402***
	(0.072)	(0.105)	(0.108)	(0.139)	(0.133)	(0.141)
EQUITY_RATIO	0.602*	1.956***	2.085***	1.393	1.407*	2.019**
	(0.315)	(0.455)	(0.463)	(0.878)	(0.816)	(0.877)
LONG_TERM_OWNERSHIP	0.055	0.185	0.169	0.181	0.028	0.153
	(0.092)	(0.126)	(0.130)	(0.152)	(0.158)	(0.158)
DEPOSITS	0.186	0.222	0.142	0.644**	0.836***	0.492
	(0.165)	(0.228)	(0.229)	(0.300)	(0.247)	(0.303)
SHORT_TERM_FUNDING	0.071	0.441	0.283	1.031**	0.960**	0.951**
	(0.250)	(0.345)	(0.350)	(0.464)	(0.419)	(0.463)
LOAN_RATIO	−0.404***	−0.743***	−0.763***	−0.654***	0.472**	−0.607***
	(0.090)	(0.117)	(0.118)	(0.151)	(0.229)	(0.154)
RETURN_VOL	−0.834***					
	(0.047)					
TAIL RISK		0.003				
		(0.016)				
ZSCORE			0.035*			
			(0.019)			
LLP				−1.733**		
				(0.839)		
RWA					−1.679***	
					(0.241)	
REAL_ESTATE_EXPOSURE						−0.452***
						(0.129)
Observations	418	414	396	269	269	269
Adj. R^2	0.55	0.16	0.18	0.19	0.28	0.20

Table 6
Selling pressure on bank shares during the 2007–2008 crisis and short-term investor ownership
The table shows results from cross-sectional regressions of the selling pressure on bank shares from July 2007 to December 2008 on short-term investor ownership and firm characteristics measured at the end of fiscal year 2006. *SELLING_PRESSURE* is the total number of a bank's shares sold by institutional investors during the six crisis quarters expressed as a percentage of the bank's total number of outstanding shares held by institutional investors at the beginning of the crisis. *SHORT_TERM_OWNERSHIP* is the share of short-term institutional investors to total firm ownership. Control variables include the stock return in 2006 (*RETURN_2006*), the natural log of the bank total assets (*SIZE*), the bank's equity beta (*BETA*), the book-to-market ratio (*BOOK_TO_MARKET*), a measure of bank capital (*EQUITY_RATIO*), the long-term institutional investor ownership (*LONG_TERM_OWNERSHIP*), the deposit ratio (*DEPOSITS*), the non-interest income (*NON_INTEREST_INC*), and the stock liquidity measured either by the (*BID_ASK_SPREAD*) or by average daily ratio of absolute returns on share volume (*ILLIQUIDITY*). Standard errors are reported in parentheses. Statistical significance at the 1%, 5%, and 10% level is indicated by ***, **, and *, respectively. All models are estimated by ordinary least squares and include the constant term, but the coefficient is not reported. Variable definitions are provided in Appendix B.

SELLING_PRESSURE	(1)	(2)	(3)
SHORT_TERM_OWNERSHIP	**0.671*** **	**0.701*** **	**0.672*** **
	(0.220)	**(0.217)**	**(0.224)**
RETURN_2006	−0.260**	−0.259**	−0.256**
	(0.118)	(0.119)	(0.116)
SIZE	0.054***	0.055***	0.052***
	(0.012)	(0.012)	(0.012)
BETA	0.040	0.046*	0.041
	(0.026)	(0.025)	(0.024)
BOOK_TO_MARKET	−0.132	−0.146	−0.141
	(0.112)	(0.114)	(0.110)
EQUITY_RATIO	0.015	0.046	0.011
	(0.374)	(0.391)	(0.373)
LONG_TERM_OWNERSHIP	0.135	0.139	0.142
	(0.115)	(0.115)	(0.115)
DEPOSITS	−0.083	−0.088	−0.092
	(0.194)	(0.195)	(0.194)
SHORT_TERM_FUNDING	0.100	0.068	0.061
	(0.327)	(0.327)	(0.329)
LOAN_RATIO	0.245*	0.241*	0.235*
	(0.134)	(0.132)	(0.136)
BID_ASK_SPREAD		0.007	
		(0.026)	
ILLIQUIDITY			−0.062
			(0.168)
Observations	358	355	355
Adjusted R-squared	0.26	0.26	0.26

Table 7
Buy-and-hold stock returns during the 2007–2008 financial crisis and the decomposition of bank capital depending on its providers (short-term institutional investors, long-term institutional investors and non-13F investors).
The table shows results from cross-sectional regressions of annualized buy-and-hold returns for banks from July 2007 to December 2008 on bank capital split according to the horizon of capital providers and firm characteristics measured at the end of fiscal year 2006. Our main independent variables are the equity provided by short-term investors scaled by total assets (*EQSHT*), the equity provided by long-term investors scaled by total assets (*EQLT*) and the equity provides by non-institutional investors (*EQREST*). Control variables include the stock return in 2006 (*RETURN_2006*), the natural log of the bank total assets (*SIZE*), the bank's equity beta (*BETA*), the book-to-market ratio (*BOOK_TO_MARKET*), the deposit ratio (*DEPOSITS*), the non-interest income (*NON_INTEREST_INC*), the proportion of loans over total assets (*LOAN_RATIO*) and the short-term funding (*SHORT_TERM_FUNDING*). Standard errors are reported in parentheses. Statistical significance at the 1%, 5%, and 10% level is indicated by ***, **, and *, respectively. All models are estimated by ordinary least squares and include the constant term, but the coefficient is not reported. Variable definitions are provided in Appendix B.

BHR_CRISIS	(1)	(2)	(3)
EQSHT	**−8.69*** **	**−6.73*** **	**−5.64** **
	(2.294)	**(2.233)**	**(2.321)**
EQLT	**3.77*** **	**2.26** **	**2.84** **
	(0.820)	**(1.135)**	**(1.133)**
EQREST	**1.62*** **	**2.32*** **	**2.47*** **
	(0.443)	**(0.469)**	**(0.515)**
RETURN_2006		−0.13	−0.14
		(0.096)	(0.087)
SIZE		−0.01	−0.04**
		(0.014)	(0.014)
BETA		0.14***	0.14***
		(0.033)	(0.031)
BOOK_TO_MARKET		−0.21**	−0.29***
		(0.103)	(0.105)
DEPOSITS			0.10
			(0.229)
SHORT_TERM_FUNDING			0.25
			(0.342)
LOAN_RATIO			−0.73***
			(0.118)
Observations	419	419	418
Adj. R^2	0.05	0.12	0.19

shares over the entire crisis period. In unreported tests, we find that our results are similar when we use our three other proxies for investor investment horizons. Overall, our results are consistent with the idea that banks with more short-term investors performed worse during the crisis because they were exposed to a higher selling pressure on their shares.

3.6. Bank capital and stock performance during the crisis: does the nature of the provider matter?

So far, our results indicate that, controlling for the level of bank capital, a higher proportion of short-term investors is associated with worse performance during the crisis. In this section, we assess whether more capital is always good for bank performance in the crisis or whether this effect differs depending on who provides this capital. Consistent with previous studies, we confirm that more capital has a positive impact on bank performance during the crisis (see Table 2). However, we suspect that this well-established result may hide some heterogeneity depending on the nature of the providers of bank capital. To explore this issue, we split the equity ratio (*EQUITY_RATIO*) in the share of equity scaled by total assets held respectively by short-term investors (*EQSHT*), by long-term investors (*EQLT*), and by non-13F investors (*EQREST*)[9]. Formally, the decomposition of the equity ratio is expressed as follows:

$$EQUITY\ RATIO = EQSHT + EQLT + EQREST$$

where

$$EQSHT = \frac{EQUITY}{TOTAL\ ASSETS} \times SHORT\_TERM\_OWNERSHIP$$

$$EQLT = \frac{EQUITY}{TOTAL\ ASSETS} \times LONG\_TERM\_OWNERSHIP$$

$$EQREST = \frac{EQUITY}{TOTAL\ ASSETS} \times (1 - INSTITUTIONAL\_OWNERSHIP)$$

In Table 7, we regress bank performance during the crisis on these three variables, controlling for the usual variables. Consistent with our conjecture, we find that the economic benefit of bank

[9] For the sake of place we only report the results for the decomposition of the equity ratio but the results are qualitatively similar if we decompose our alternative bank capital measures.

capital during the crisis crucially depends on who provides it. More bank capital is associated with higher performance only when it is provided by non-13F investors or long-term institutional investors. On the contrary, more capital has a negative impact on bank performance when it is provided by short-term institutional investors. This result has potentially important implications for bank regulation and suggests that higher capital requirements are likely to be counterproductive for bank resilience if they come from short-term investors.

4. Conclusion

Bank capital is the primary target of prudential regulation. This is easily explained by the fact that the amount of capital a bank has determines its ability to withstand economic shocks. In this paper, we have highlighted that on top of the amount of bank capital, the nature, and more precisely the investment horizon, of its providers also played an important role for bank performance during the recent financial crisis. These results also extend to the 1998 crisis, revealing that the horizon of bank capital providers was a common and key determinant of bank performance during the two worst financial crises since the Great Depression.

Our empirical evidence is at odds with the general approach in the area of bank capital regulation that more capital is better, irrespective of who provides it. It also contributes to our understanding of bank performance during crises. Our results provide some insights on the debate over how much capital banks should be required to have. Although it is well-established that more bank capital as a whole is associated with better performance during the crisis, we find that it is only true when it is provided by non-13F investors or long-term investors. By contrast, more bank capital loses its economic benefit and is associated with worse performance when it is provided by short-term institutional investors. This indicates that uniquely focusing on how much capital banks should be required to have to ensure financial stability may be misguided because the nature of the providers has an impact on how desirable more bank capital is for bank resistance in the crisis.

On top of financial stability and bank soundness, bank capital is also viewed as playing an important role in bank lending and monitoring intensity. Banks with more capital are more likely to engage in borrower monitoring (e.g., Holmstrom and Tirole, 1997; Mehran and Thakor, 2011; Allen, Carletti and Marquez, 2011) and in borrower screening (Coval and Thakor, 2005). Better capitalized banks are thus in a stronger position to lend, and as highlighted by Thakor (2014), more capital helps speed up the post-crisis recovery. In particular, Cornett et al. (2011) show that banks with more capital continued to lend relative to other banks during the recent financial crisis. Further research should assess whether the positive impact of bank capital on borrower monitoring and bank lending also depend on the nature of the bank capital providers and in particular their investment horizon.

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Appendix A. Sample banks (CRPS COMNAM)

ABIGAIL ADAMS NATL BANCORP
ALABAMA NATL BANCORPORATION
ALLIANCE BANKSHARES CORP
ALLIANCE FINANCIAL CORP/NY
AMERIANA BANCORP
AMCORE FINANCIAL INC
AMERICAN BANCORP NJ INC
AMERICAN BANK INC/PA
AMERICAN CMNTY BANCSHARES
AMERICAN NATL BANKSHARES
AMERICAN RIVER BANKSHARES
AMERICANWEST BANCORP
AMERICASBANK CORP
AMERISERV FINANCIAL INC/PA
AMERIS BANCORP
AMES NATIONAL CORP
ANNAPOLIS BANCORP INC
APPALACHIAN BANCSHARES INC
ARROW FINANCIAL CORP
ATLANTIC BANCGROUP INC
AUBURN NATIONAL BANCORP
BB&T CORP
BCB BANCORP INC
BFC FINANCIAL CORP -CL A
BOK FINANCIAL CORP
BOE FINANCIAL SERVICES VA
BNC BANCORP
BOFI HOLDING INC
BANCFIRST CORP/OK
BANCORP RHODE ISLAND INC
BANCORPSOUTH INC
BANCORP INC
BANCTRUST FINANCIAL GRP INC
BANK OF AMERICA CORP
BANK OF GRANITE CORP
BANK OF HAWAII CORP
BANK MUTUAL CORP
BANK OF THE OZARKS INC
BANK OF NEW YORK MELLON CORP
BANK OF COMMERCE HOLDINGS
BANK OF THE CAROLINAS
BANK SOUTH CAROLINA CORP
BANKFINANCIAL CORP
BANKUNITED FINANCIAL CORP
BAY NATIONAL CORP
BEACH FIRST NATL BANCSHRS/SC
BERKSHIRE BANCORP INC
BERKSHIRE HILLS BANCORP INC
BEVERLY HILLS BANCORP INC
BLUE RIVER BANCSHARES INC
BOARDWALK BANCORP INC
BOSTON PRIVATE FINL HOLDINGS
BRIDGE CAPITAL HOLDINGS
BRITTON & KOONTZ CAP CORP
BROADWAY FINANCIAL CORP/DE
BROOKLINE BANCORP INC
BRYN MAWR BANK CORP
C&F FINANCIAL CORP
CCF HOLDING CO
CFS BANCORP INC
CNB FINANCIAL CORP/PA
CVB FINANCIAL CORP
CADENCE FINANCIAL CORP
CAMCO FINANCIAL CORP
CAMDEN NATIONAL CORP
CAPE FEAR BANK CORP
CAPITAL CITY BK GROUP INC
CAPITAL BANK CORP/NC
CAPITAL CORP OF THE WEST
CAPITALSOUTH BANCORP
CAPITOL BANCORP LTD
CARDINAL FINANCIAL CORP
CARDINAL STATE BANK

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CAROLINA BANK HOLDINGS INC
CAROLINA NATIONAL CORP
CAROLINA TRUST BANK
CASCADE FINANCIAL CORP
CATHAY GENERAL BANCORP
CENTER FINANCIAL CORP/CA
CENTERSTATE BANKS INC
CENTRAL BANCORP INC/MA
CENTRAL JERSEY BANCORP
CENTRAL VALLEY CMNTY BANCORP
CENTRAL VIRGINIA BANKSHARES
CENTURY BANCORP INC/MA
CHEMICAL FINANCIAL CORP
CHICOPEE BANCORP INC
CHITTENDEN CORP
CITIZENS FIRST BANCORP INC
CITIZENS HOLDING CO
CITIZENS SOUTH BANKING CORP
CITYBANK
CITY HOLDING CO
COAST FINANCIAL HOLDINGS INC
COBIZ FINANCIAL INC
CODORUS VALLEY BANCORP
COLONIAL BANCGROUP
COLONY BANKCORP INC
COLUMBIA BANCORP/OR
COLUMBIA BANKING SYSTEM INC
COMERICA INC
COMM BANCORP INC
COMMERCE BANCORP INC/NJ
COMMERCEFIRST BANCORP INC
COMMERCIAL NATL FINL CP/PA
COMMONWEALTH BANKSHARES INC
COMMUNITY BANCORP/NV
COMMUNITY BK SHARES INC/IN
COMMUNITY BANK SYSTEM INC
COMMUNITY BANKS INC
COMMUNITY CAPITAL BANCSHARES
COMMUNITY CAPITAL CORP
COMMUNITY CENTRAL BK CORP
COMMUNITY FINANCIAL CORP/VA
COMMUNITY SHORES BANK CORP
COMMUNITY TRUST BANCORP INC
COMMUNITY WEST BANCSHARES
COMMUNITY VALLEY BANCORP/CA
CONNECTICUT BANK&TRUST CO/NE
COOPERATIVE BANKSHARES INC
CORUS BANKSHARES INC
CRESCENT BANKING CO
CULLEN/FROST BANKERS INC
DEARBORN BANCORP INC
DESERT COMMUNITY BANK
DIME COMMUNITY BANCSHARES
DOWNEY FINANCIAL CORP
ECB BANCORP INC
ESB FINANCIAL CORP
EAGLE BANCORP INC/MD
EAST PENN FINANCIAL CORP
EAST WEST BANCORP INC
EASTERN VA BANKSHARES INC
ELMIRA SVGS BANK ELMIRA/NY
EVANS BANCORP INC
FFD FINANCIAL CORP
FMS FINANCIAL CORP
F N B CORP/FL
FNB FINANCIAL SERVICES CORP
FPB BANCORP INC
F N B CORP/VA
FARMERS CAPITAL BANK CORP
FAUQUIER BANKSHARES INC
FIDELITY BANCORP INC/PA
FIDELITY SOUTHERN CORP
FINANCIAL INSTITUTIONS INC
FIRST BANCSHARES INC/MO

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FIRST BANCORP/NC
FIRST BANCSHARES INC/MS
FIRST BUSEY CORP
FIRST BUSINESS FINL SRV INC
FIRST CAPITAL INC
FIRST CHARTER CORP
FIRST CITIZENS BANCSH -CL A
FIRST COMMONWLTH FINL CP/PA
FIRST COMMUNITY CORP/SC
FIRST CMNTY BANCSHARES INC
FIRST CMNTY BK CORP AMER
1ST CONSTITUTION BANCORP
FIRST DEFIANCE FINANCIAL CP
FIRST FINL BANCORP INC/OH
FIRST FINL BANKSHARES INC
FIRST FED BANKSHARES INC
FIRST FINANCIAL CORP/IN
FIRST FED NOR MICH BANCORP
FIRST FINANCIAL SERVICE CORP
FIRST FINANCIAL HOLDINGS-OLD
FIRST FRANKLIN CORP
FIRST HORIZON NATIONAL CORP
1ST INDEPENDENCE FINL GROUP
FIRST INDIANA CORP
FIRST KEYSTONE FINANCIAL INC
FIRST LONG ISLAND CORP
FIRST M&F CORP
FIRST MARINER BANCORP
FIRST MERCHANTS CORP
FIRST MIDWEST BANCORP INC
FIRST NATL BANCSHARES INC/SC
FIRST MUTUAL BANCSHARES INC
FIRST NIAGARA FINANCIAL GRP
FIRST PLACE FINANCIAL CP/DE
FIRST REGIONAL BANCORP
FIRST STATE BANCORPORATION
FIRST SOUTH BANCORP INC/VA
1ST SOURCE CORP
FIRST UNITED CORP
FIRSTBANK CORP
FIRSTFED FINANCIAL CORP/CA
FIRSTMERIT CORP
FLUSHING FINANCIAL CORP
FULTON FINANCIAL CORP
G B & T BANCSHARES INC
GS FINANCIAL CORP
GATEWAY FINANCIAL HLDGS INC
GERMAN AMERICAN BANCORP INC
GLACIER BANCORP INC
GLEN BURNIE BANCORP
GREAT SOUTHERN BANCORP
GREAT LAKES BANCORP INC
GREAT PEE DEE BANCORP INC
GREATER BAY BANCORP
GREATER COMMUNITY BANCORP
GREEN BANKSHARES INC
GUARANTY FED BANCSHARES INC
HF FINANCIAL CORP
HMN FINANCIAL INC
HABERSHAM BANCORP INC
HANCOCK HOLDING CO
HARLEYSVILLE NATL CORP/PA
HARLEYSVILLE SVGS FINL CORP
HARRINGTON WEST FINL GROUP
HEARTLAND FINANCIAL USA INC
HERITAGE COMMERCE CORP
HERITAGE FINANCIAL CORP
HERITAGE OAKS BANCORP
HINGHAM INSTN FOR SAVINGS
HOME BANCSHARES INC
HOPFED BANCORP INC
HORIZON FINANCIAL CORP/WA
HUDSON CITY BANCORP INC
HUNTINGTON BANCSHARES

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IBERIABANK CORP
INDEPENDENT BANK CORP/MA
INTEGRA BANK CORP
INTEGRITY BANCSHARES INC
INTL BANCSHARES CORP
INTERVEST BANCSHARES CORP
INVESTORS FINANCIAL SVCS CP
IRWIN FINANCIAL CORP
JPMORGAN CHASE & CO
JEFFERSON BANCSHARES INC/TN
JEFFERSONVILLE BANCORP
KNBT BANCORP INC
KENTUCKY FIRST FEDERAL BNCRP
KEYCORP
LSB FINANCIAL CORP
LSB CORP
LAKE SHORE BANCORP INC
LAKELAND FINANCIAL CORP
LANDMARK BANCORP INC/KS
LEGACY BANCORP INC
LIBERTY BANCORP INC
LIBERTY BELL BANK
LINCOLN BANCORP/IN
M & T BANK CORP
MAF BANCORP INC
MB FINANCIAL INC/MD
MFB CORP
MACKINAC FINANCIAL CORP
MAINSOURCE FINL GROUP INC
MASSBANK CORP
MBT FINANCIAL CORP
MERCANTILE BANK CORP
MERCHANTS BANCSHARES INC/VT
META FINANCIAL GROUP INC
METROCORP BANCSHARES INC
MID PENN BANCORP INC
MIDDLEBURG FINANCIAL CORP
MIDWEST BANC HOLDINGS INC
MIDWESTONE FINANCIAL GP-OLD
MONARCH FINANCIAL HLDGS INC
MONROE BANCORP
MUTUALFIRST FINANCIAL INC
NB & T FINANCIAL GROUP INC
N B T BANCORP INC
NATIONAL BANKSHARES INC VA
NATIONAL CITY CORP
NATIONAL PENN BANCSHARES INC
NEW HAMPSHIRE THRIFT BNCSHRS
NEW YORK CMNTY BANCORP INC
NEWALLIANCE BANCSHARES INC
NEWPORT BANCORP INC
NEXITY FINANCIAL CORP
NORTH CENTRAL BANCSHARES INC
NORTHEAST COMMUNITY BANCORP
NORTHERN STATES FINANCIAL CP
NORTHERN TRUST CORP
NORTHRIM BANCORP INC
NORWOOD FINANCIAL CORP
OAK HILL FINANCIAL INC
OCEANFIRST FINANCIAL CORP
OCWEN FINANCIAL CORP
OHIO VALLEY BANC CORP
OLD LINE BANCSHARES INC
OLD NATIONAL BANCORP
OLD SECOND BANCORP INC/IL
OMEGA FINANCIAL CORP
OMNI FINANCIAL SERVICES
PAB BANKSHARES INC
PFF BANCORP INC
PNC FINANCIAL SVCS GROUP INC
PSB HOLDINGS INC
PVF CAPITAL CORP
PACIFIC CONTINENTAL CORP
PACIFIC STATE BANCORP/CA
PAMRAPO BANCORP INC
PARK BANCORP INC

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PARKE BANCORP INC
PARKVALE FINANCIAL CORP
PARTNERS TRUST FINL GRP INC
PENNS WOODS BANCORP INC
PEOPLES BANCORP INC/OH
PEOPLES BANCTRUST INC
PEOPLES BANCORP NC INC
PEOPLES CMNTY BANCORP INC
PEOPLES FINANCIAL CORP/MS
PEOPLE'S UNITED FINL INC
PINNACLE FINL PARTNERS INC
PLUMAS BANCORP
PREMIER CMNTY BANKSHARES INC
PREMIER FINANCIAL BANCORP
PRINCETON NATL BANCORP INC
PRIVATEBANCORP INC
PROSPERITY BANCSHARES INC
PROVIDENT BANKSHARES CORP
PROVIDENT FINANCIAL HOLDINGS
PROVIDENT COMMUN BANCSHS INC
PROVIDENT FINANCIAL SVCS INC
PULASKI FINANCIAL CORP
QCR HOLDINGS INC
RAINIER PACIFIC FINL GRP INC
REGIONS FINANCIAL CORP
RENASANT CORP
REPUBLIC BANCORP INC/KY
REPUBLIC FIRST BANCORP INC
RIVER CITY BANK
RIVER VALLEY BANCORP
RIVERVIEW BANCORP INC
ROMA FINANCIAL CORP
ROME BANCORP INC
ROYAL BANCSHARES/PA -CL A
S & T BANCORP INC
SVB FINANCIAL GROUP
SANDY SPRING BANCORP INC
SANTANDER BANCORP
SAVANNAH BANCORP INC
SECURITY BANK CORP
SEVERN BANCORP INC
SHORE FINANCIAL CORP
SIERRA BANCORP/CA
SIGNATURE BANK/NY
SIMMONS FIRST NATL CP -CL A
SLADE'S FERRY BANCORP
SMITHTOWN BANCORP INC
SOMERSET HILLS BANCORP
SOUTH FINANCIAL GROUP INC
SOUTHCOAST FINANCIAL CORP
SOUTHERN CMNTY FINL CORP
SOUTHERN CONN BANCORP INC
SOUTHERN MISSOURI BANCP INC
SOUTHSIDE BANCSHARES INC
SOUTHWEST BANCORP INC
STATE BANCORP/NY
STERLING BANCSHARES INC/TX
STERLING BANCORP/NY -OLD
STERLING FINANCIAL CORP
SUFFOLK BANCORP
SUMMIT FINANCIAL GROUP INC
SUN AMERICAN BANCORP
SUNTRUST BANKS INC
SUSQUEHANNA BANCSHARES INC
SUSSEX BANCORP
SYNERGY FINANCIAL GROUP INC
TCF FINANCIAL CORP
TF FINANCIAL CORP
TAYLOR CAPITAL GROUP INC
TEAM FINANCIAL INC
TEMECULA VALLEY BANCORP INC
TENNESSEE COMMERCE BANCORP
TEXAS CAPITAL BANCSHARES INC
BANK HOLDINGS INC
TIDELANDS BANCSHARES INC

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TIERONE CORP
TIMBERLAND BANCORP INC
TOWER FINANCIAL CORP
TRICO BANCSHARES
TRUSTCO BANK CORP/NY
UCBH HOLDINGS INC
UMB FINANCIAL CORP
U S B HOLDING CO INC
U S BANCORP
UMPQUA HOLDINGS CORP
UNION BANKSHARES INC
UNITED BANCSHARES INC/OH
UNITED COMMUNITY FINL CORP
UNITED BANKSHARES INC/WV
UNITED BANCORP INC/OH
UNITED SECURITY BANCSHARS CA
UNITED WESTERN BANCORP INC
UNITY BANCORP INC
UNIVERSITY BANCORP INC
UNIVEST CORP OF PENNSYLVANIA
VALLEY FINANCIAL CORP
VALLEY NATIONAL BANCORP
VINEYARD NATIONAL BANCORP
VIRGINIA COMM BANCORP INC
WGNB CORP
WSFS FINANCIAL CORP
WVS FINANCIAL CORP
WACCAMAW BANKSHARES INC
WACHOVIA CORP
WAINWRIGHT BANK & TRUST CO
WASHINGTON BANKING CO
WASHINGTON FEDERAL INC
WASHINGTON MUTUAL INC
WASHINGTON TR BANCORP INC
WAYNE SAVINGS BANCSHARES INC
WEBSTER FINANCIAL CORP
WELLS FARGO & CO
WESBANCO INC
WEST BANCORPORATION INC
WESTAMERICA BANCORPORATION
WESTERN ALLIANCE BANCORP
WHITNEY HOLDING CORP
WILLOW FINL BANCORP INC
WILSHIRE BANCORP INC
WINTRUST FINANCIAL CORP
YARDVILLE NATIONAL BANCORP
ZIONS BANCORPORATION

Appendix B. Variable definition

Bank Variables	
BETA	Bank's equity beta calculated from a market model of daily stock returns over the period 2004–2006. Risk-free rates are from Kenneth French's website, and the market is represented by the value-weighted CRSP index.
BHRCRISIS	Annualized buy-and-hold stock return from July 2007 to December 2008.
BHRCRISIS98	Buy-and-hold stock return from August, 3, 1998 to the day on which the bank attains its lowest stock price for the rest of the year 1998.
BOOK TO MARKET	Book value of common equity divided by market value of common equity.
DEPOSITS	Total customer deposits divided by total assets.
EQUITY RATIO	Book value of common equity divided by book value of total assets.
MARKET EQUITY RATIO	Market value of equity divided by book value of assets plus market value of equity minus book value of equity.

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NON-INTEREST INCOME	Non-interest income divided by the sum of non-interest income and net interest income.
RETURN 2006	Bank's stock return during calendar year 2006.
SIZE	Natural logarithm of the market value of the bank's equity.
TIER 1 RATIO	Tier 1 capital ratio as reported in the Compustat Bank database.
TOTAL ASSETS	Total assets at fiscal year-end.
Investor Horizon Measures	
ACTIVE_SHARE_ MEASURE	The weighted average of the proportion of the portfolios of institutional investors in firm *j* that deviates from the benchmark index. We use the Russell 1000 for the year 2006 as the benchmark index. The Russell 1000 is usually rebalanced the last Friday in June; therefore, our active share measure is computed over the period from the third quarter of 2006 until the first quarter of 2007. We use as weights the number of shares held by each investor *i* in firm *j* as a proportion of the shares held by 13F investors in firm *j*.
ATURNOVER	$ATURNOVER_{j,t} = \frac{1}{4}\sum_{T=t-3}^{T=t}\sum_{i=1}^{i=n}\frac{SoldShares_{i,T}\times SharePrice_{i,T-12}}{TotalPortfolioValue_{i,T-12}}$ At quarter *t*, the over-four-quarter averaged share price weighted fraction of *i* shares sold relative to the portfolio composition for the institutional investor *j* 12 quarters ago. It lies between 0 and 1.
LONG_TERM_ OWNERSHIP	Fraction of short-term institutional investor ownership on bank total market capitalization, where a long-term institutional investor is identified as having a portfolio ATURNOVER inferior or equal to the median.
MCHURNRATIO	Averaged *j* investor portfolios churn ratio of a given bank *i*. It measures how frequently institutional investors rotate the stocks in their portfolio and is constructed as in Gaspar et al. (2005). We compute it over a three-year period. Churn ratio is defined as follows: $CHURNRATIO_{j.t} = 2 * \sum_{i=1}^{n} \lvert Shares_{i.t} \times Price_{i.t} - Shares_{i.t-12} \times Price_{i.t-12} - Shares_{i.t} \times (Price_{i.t} - Price_{i.t-12})\rvert / (\sum_{i=1}^{n} Shares_{i.t} \times Price_{i.t} + Shares_{i.t-12} \times Price_{i.t-12})$ $MCHURNRATIO_{i.t} = \sum_{j=1}^{j=n}\frac{CHURNRATIO_{j.t}\times SHARESHELD_{j.t-1}}{SHROUT_{i.t-1}}$
MTURNOVER	Averaged investor portfolios turnover (*TURNOVER*) of a given bank. $MTURNOVER_{i.t} = \sum_{j=1}^{j=n}\frac{ATURNOVER_{j.t}\times SHARESHELD_{j.t-1}}{SHROUT_{i.t-1}}$
SHORT_TERM_ OWNERSHIP	Fraction of short-term institutional investor ownership on bank total market capitalization, where a short-term institutional investor is identified as having a portfolio ATURNOVER superior to the median.
TRADING_PERF_ SENS_1	The average of the investor level Trading Performance Sensitivity for all the investors holding stocks in firm *j* using as weights the number of shares held by each investor *i* in firm *j* as a proportion of the shares held by 13F investors in firm *j* in the last quarter of 2006. Where Trading Performance Sensitivity is defined as the correlation between the portfolio performance in quarter *t* and net trading in quarter t+1 of each institutional investor *i* over a rolling window of 20 quarters (2002–2006). For more details about the computation of the variable see Cella et al. (2013).
TRADING_PERF_ SENS_2	The average of the investor level Trading Performance Sensitivity where the latter is computed only over quarters from 1990 to 2006 during which the S&P500 Index return is in the bottom decile. We average the investor level correlations for all the investors holding stocks in firm *j* using as weights the number of shares held by each investor *i* in firm *j* as a proportion of the shares held by 13F investors in firm *j* in the last quarter of 2006. For more details about the computation of the variable see Cella et al. (2013).
Pre-crisis Bank Risk Measures	
LLP	Loan loss provisions for the last quarter of 2006 scaled by total loans (*bhck4230*/*bhck2122*).

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REAL_ESTATE_ EXPOSURE	Real estate loans over total assets measured the last quarter of 2006 (*bhck1410/ bhck2170*).
RWA	Risk-weighted assets over total assets measured the last quarter of 2006 (*bhcka223/bhck2170*).
TAIL RISK	Average stock return of a bank over its 5% worst days during 2004–2006.
VOL	Annualized standard deviation of bank daily stock returns standard deviation computed over the 2004–2006 period.
Z-SCORE	Sum of average return on assets plus average equity ratio divided by the standard deviation of return on assets during the period 2001–2006. We take the natural logarithm of the Z-score.
Selling Pressure	
SELLING_ PRESSURE	Total number of a bank's shares sold by institutional investors during the six crisis quarters expressed as a percentage of the bank's total number of outstanding shares held by institutional investors at the beginning of the crisis.
BID_ASK_ SPREAD	The average difference between bid and ask quotes divided by the daily price. This variable is calculated as the average bid-ask spread over the month of December 2006.
ILLIQUIDITY	Daily absolute returns scaled by daily volume averaged over the last 250 days (see Amihud, 2002). We multiply it by 1000.
Equity Ratio Decomposition	
EQSHT	$EQSHT = \frac{EQUITY}{TOTAL\ ASSETS} \times SHORT\_TERM\_OWNERSHIP$
EQLT	$EQLT = \frac{EQUITY}{TOTAL\ ASSETS} \times LONG\_TERM\_OWNERSHIP$
EQREST	$EQREST = \frac{EQUITY}{TOTAL\ ASSETS} \times (1 - INSTITUTIONAL\_OWNERSHIP)$

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