# SHORT-TERM BANK CAPITAL AND BANK PERFORMANCE IN THE CRISIS

Alexandre Garel*

*ESCP Europe, Labex Refi*

Arthur Petit-Romec**

*ESCP Europe, Labex Refi*

December 2014

## Abstract

The reliance on short-term debt financing, which exposed banks to funding fragility, is viewed as having played a key role in the crisis. In this paper, we explore the possibility that the exposure of banks to short-term financing may extend to bank capital as well. We find that banks with more short-term investor ownership had worse stock returns during the recent financial crisis. Our results confirm the economic benefit of bank capital in helping banks to perform better during the crisis but they also indicate that, contrary to the general approach of capital regulation, the nature (in this case the horizon) of the providers of bank capital matters. Complementary tests reveal that banks with more short-term ownership did not perform worse during the crisis because they took more risks in the pre-crisis period but rather because the trading behavior of their short-term investors during the crisis exposed them to a higher selling pressure.

 *ESCP Europe, 79 avenue de la République 75543 Paris Cedex 11, France. Tel: +33 1 49 23 20 33; Fax: +33 1 49 23 20 80; E-mail: alexandre.garel@edu.escpeurope.eu

**Corresponding author : ESCP Europe, 79 avenue de la République 75543 Paris Cedex 11, France. Tel: +33 1 49 23 20 33; Fax: +33 1 49 23 20 80; E-mail: arthur.petit_romec@edu.escpeurope.eu

Many analyzes of the crisis emphasize the role of short-term finance in making banks vulnerable (Adrian and Shin 2010, Brunnermeier 2009, Gorton 2010, Roe 2011, Shleifer and Vishny 2011). The reliance on short-term debt reduces funding costs but exposes banks to funding fragility, i.e. the incapacity of rolling debt over. Consistently, banks that were financed with more short-term debt before the crisis performed worse during the crisis (Beltratti and Stulz 2012, Fahlenbrach, Prilmeier and Stulz 2012). By contrast, bank capital appears as a stable source of financing that makes banks more resilient to economic shocks (see Thakor 2014 for a comprehensive survey on bank capital and financial stability). Empirically, higher bank capital is associated with stronger performance during the 2007-2008 crisis (Beltratti and Stulz 2012, Demirguc-Kunt, Detragiache and Merrouche 2013) but also during previous crises (Berger and Bouwman 2013, Fahlenbrach, Prilmeier and Stulz 2012).

In this paper, we explore the possibility that the exposure of banks to funding fragility is not limited to debt financing but may extend to bank capital as well. Our main hypothesis is that depending on the nature and in particular the horizon of its providers, bank capital may not have the same impact on a bank's resilience during the crisis. Using the entire universe of 13F institutional investors, we start our analysis by examining whether the fraction of bank capital held by short-term investors has an impact on bank performance during the 2007-2008 crisis for a sample of 344 publicly listed U.S. banks. Our results indicate that banks with higher pre-crisis short-term investor ownership experience worse stock returns during the crisis. The economic significance of short-term ownership is strong and is almost of the same order of magnitude as the economic significance of pre-crisis bank capital. 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 ownership

and to the introduction of numerous control variables which include several measures of bank capital (equity ratio, market equity ratio, Tier 1 capital) that all have a positive impact on bank performance during the crisis. This confirms the economic benefits of capital on bank performance during the crisis but also indicates that the nature of the providers of bank capital matters.

The negative impact of short-term investor ownership on bank stock performance during the crisis that we document could be explained by two non-mutually exclusive channels. A first possibility is that banks with more short-term ownership took more risks in the pre-crisis period. Short-term investors may have pushed to boost shareholder returns through greater risk-taking prior to the crisis. We explore this possibility by regressing a variety of pre-crisis risk measures on our measure of short-term ownership and control variables. Our risk measures capture different dimensions of bank risk (total risk, systemic risk, tail risk). They include the stock volatility, the Z-score, the Marginal Expected Shortfall (MES) computed following Acharya et al. (2010) and an additional measure of tail risk. We find no evidence that the banks with more short-term investor ownership had higher risk prior to the crisis. This suggests that these banks did not enter the crisis being riskier and is thus inconsistent with the first explanation.

A second possibility is that banks with more short-term investor ownership did not take more risks prior to the crisis but still experienced worse performance because of the behavior of short-term investors during the crisis. During the crisis, facing weak expected demand from other market participants and possible price declines, short-term horizon investors may have responded by intensively selling their shares. Through these sales, they may have exacerbated the market reaction and contributed to higher bank share price drops during the crisis. Simply stated, the idea is that, similar to a run of short-term creditors on bank debt, short-term investors also withdrew their funds from the banks and contributed to amplify the impact of

the crisis. We explore this possibility through two different empirical tests. First, at the institutional investors' level, we assess whether short-term investors sold the stocks of our sample banks significantly more than long-term investors during the crisis. Our empirical results confirm that short-term horizon investors did sell significantly more the shares of our sample banks over the entire crisis period but also during each crisis quarter. The average quarterly selling pressure on our sample banks shares is about 7% higher for short-term investors compared to long-term investors. Second, at the level of our sample banks, we investigate whether banks with a higher short-term investor ownership experienced a larger selling pressure on their shares during the crisis. Our results indicate that banks with higher pre-crisis short-term ownership experience stronger selling pressure on their shares during the crisis. In complementary tests, we find that the shares of banks in the top quartile for short-term ownership were sold up to six times as more as banks in the bottom quartile. Overall, our results indicate that banks with more short-term investor ownership experienced worse performance during the crisis not because they took more risks in the pre-crisis period but rather because the short-term horizon of their capital providers exposed them to a higher selling pressure during the crisis.

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 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 bank during the crisis. Consistent with their results and with results from Berger and Bouwman (2013) and Demirguc-Kunt, Detragiache and Merrouche (2013), we find that book equity ratio, market equity ratio and regulatory Tier 1 ratio have all 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 and in particular that short-term investor ownership may extend the funding fragility to bank capital.

Other studies focus on the influence of bank governance notably Fahlenbrach and Stulz (2011) for CEO compensation, Minton, Taillard and Williamson (2012) for the independence and financial expertise of the board and Erkens, Hung and Matos (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 sample had also documented that a bank's ownership structure has an impact on their risk (e.g.: Barry, Lepetit and Tarazi 2011, Iannotta, Nocera and Sironi 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 since we show that only the fraction of ownership held by short-term institutional investors is associated with worse stock performance in the crisis. 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 captured during 'normal' market conditions but are revealed in an economic shock because of the stronger selling pressure imposed by short-term investors.

Second, our paper is related to the issue of the interaction of regulation and corporate governance and to the important question of whether bank regulation is a complement or a substitute for corporate governance (Becht, Bolton, Röell 2011, John and Qian 2003). In particular, John, Saunders and Senbet (2000) show that concentrating on bank capital regulation may be ineffective in controlling risk-taking and argue in favor of incorporating top management incentive features in the insurance premium scheme. Empirically, John, Mehran and Qian (2010) confirm that the pay-for-performance sensitivity of bank CEO compensation

increases with the degree of outside monitoring. Most relevant for our study, Laeven (2013) highlights that the general approach of capital regulation is that more capital is better, irrespective of who provides this capital. Our article offers empirical evidence that the nature of the providers of bank capital and in particular the investment horizon of bank shareholders does matter since banks with more short horizon ownership performed worse during the crisis and are more exposed to the risk of withdrawals and sales in economic shock.

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. Section III presents a series of robustness checks. Section IV concludes.

## I. Sample Selection and Main Variables

### A) 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 CRPS 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 exclude a list of banks that they identify as not belonging to the traditional banking industry, such as investment advisors (SIC 6282), online brokerage and payment processors. We also exclude banks that have institutional ownership inferior to 5% and for which we are not able to compute institutional investor horizon measures based on 13F Thomson Files. Finally, we winsorize our main dependent and independent variables at 1 and 99%. We obtain a final sample of 344 banks. For increased transparency purpose, 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 noninterest income from Compustat banking. Risk free rates are taken from the Fama-French website.

### B) Main Dependent and Independent Variables

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

Our main explanatory variable is the proportion of short-term institutional investor ownership (*OSHTINV*). Even though it is impossible to directly observe and measure the investment horizon of a given investor, it is revealed over time by its trading behaviour. Consequently, we follow Derrien et al. (2013)'s approach and capture an institutional investor's horizon based on 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:

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

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

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

We then classify institutional investors either as having short-term or long-term horizon depending on their *ATURNOVER*. We use the same threshold as in Derrien et al. (2013) and consider that an institutional investor has a short-term horizon (respectively long-term horizon) if its average portfolio turnover is superior to (respectively inferior to) 35%. Finally, for each bank we compute the proportion of short-term investor ownership expressed in percentage of the number of shares outstanding. Since banks' proportion of short-term institutional investors is measured quarterly, we match it with the final 2006 fiscal quarter of each bank. In some tests, we also add the proportion of long-term institutional investors as a control variable. In complementary tests, we use two alternative measures of short-term ownership, the value-weighted average turnover and the churn ratio based on Gaspar et al. (2005), which are both defined in Appendix B.

Since irrespective of who provides it, bank capital is supposed to help a bank to withstand financial shocks, we include a measure of bank capital in all our regressions. We focus on three measures of bank capital: 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 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. A detailed definition of all our variables is provided in Appendix B.

*C) Summary Statistics*

Table 1 provides summary statistics for our sample of banks. The median and mean annualized returns for our sample of banks are respectively minus 29% and minus 30.4%, 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. 2011), 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 12.2%. The average proportion of short-term institutional ownership is 4.1% but some heterogeneity exists across banks since it ranges from 0% to more than 25%. The average proportion of long-term institutional ownership is 24.6%. The median bank in our sample has $1.57 billion in assets at the end of 2006. The mean and median Tier 1 capital ratio 11.3% and 10.7% respectively, are both above regulatory minimum of 4%. In fact, the minimum Tier 1 capital ratio is 6.35%, which indicates that all banks in our sample comply with Basel requirement. The median and mean equity ratio, respectively 10% and 9%, are slightly lower than Tier 1 ratio. Both the median and mean market equity ratio are 16%, which is substantially higher than 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 0.6. The mean and median equity betas are 0.72 and 0.73 respectively. The average ratio of deposits to total assets is 74%. Finally, the average share of non-interest income is 78% for banks in our sample.

## II. Empirical Analysis

### A) *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 6 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 ownership is associated with a 6.32% (1.18*5.36%) lower return during the crisis. The effect of short-term ownership remains very strong even after taking into account our different control variables.

9

According to regression 5 where we control for the size, the beta, the stock return in 2006, the book-to-market ratio, the market equity ratio and the proportion of long-term ownership, a one standard deviation increase in the proportion of short-term ownership remains associated with a 5.1% lower return during the crisis. Compared to the sample mean crisis return of minus 30%, this corresponds to a drop of 17%. This effect cannot be attributed to a negative impact of institutional ownership as a whole since the fraction of ownership held by long-term institutional investors has no impact on bank performance during the crisis (regressions 5 and 6). Erkens, Hung and Matos (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 cannot distinguish the investment horizon of institutional investors.

Consistent with Beltratti and Stulz (2012), 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 5, a one standard deviation increase in the market equity ratio is associated with a 6.5% higher return during the crisis, which corresponds to a 21.7% increase compared to a mean return of minus 30% for our sample. This means that the economic effect of short-term ownership is about 0.78 times as large as the economic effect of bank capital. Consequently, if our results confirm that banks with more capital performed much better during the crisis, they also indicate that the horizon of the providers of bank capital does matter.

Consistent with Beltratti and Stulz (2012), Fahlenbrach et al. (2012) and Erkens et al. (2012), we find that banks that performed better in 2006 tend to have lower stock returns in the crisis. 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 returns[1]. Finally,

---

[1] 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 to estimate the beta and the sample composition. When they restrict their sample to the 100 largest banks and measure beta from July 2006 to June

results from regression 6, where we control for the deposit ratio and the share of non-interest income, indicate that banks that were more involved in non-traditional activities appear to have lower returns during the crisis.

In the next subsections, we seek to explore the relevance of two different explanations for the negative impact of short-term ownership on bank performance during the crisis.

*B) Short-term investor and  pre-crisis risk-taking*

One possible explanation for why banks with more short-term ownership performed worse during the crisis 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 the 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 kind of behavior and pushed for greater risk-taking prior to the crisis.

We explore this possibility by examining the impact of short-term ownership on a set of pre-crisis risk measures. Note that we already control for the equity beta in our regressions of crisis returns but we consider four additional risk measures. Our first risk measure is the stock return volatility. Our second risk measure is the Marginal Expected Shortfall (MES), a measure of systemic risk proposed by Acharya et al. (2010) and computed as the average stock return of a bank over the 5% worst days for the market (the value-weighted CRSP market return). Our third measure is a measure of tail risk computed as the average stock return of a bank over its 5% worst days. These three risk variables are measured over the period 2004-2006[2]. Finally, our last risk measure is the Z-score, which is inversely related to

---

2007 (and no longer from 2004 to 2006), Fahlenbrach et al. (2012) find a statistically significant negative coefficient on beta.

[2] Our results are unchanged if the risk variables are measured only in the year 2006.

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. Contrary to the first three variables which are stock-based risk measures, the Z-score is based on accounting data. Finally since the Z-score is highly skewed, we follow Laeven and Levine (2009) and use the natural logarithm of Z-score.

Table 3 provides no support for the risk-taking explanation. The proportion of short-term ownership does not have a significant impact on any of our four risk measures. Banks with more short-term do not seem to have taken more risks in the years preceding the crisis. This is true for different dimensions of bank risk: total risk, systemic risk, tail risk and insolvency risk. The results on our control variables indicate that large banks, banks with more capital and banks with higher book-to-market ratio have lower total risk in the pre-crisis period. On the contrary banks that did well in 2006 had also more total risk.

C) *Short-term investor and bank selling pressure*

If banks with more short-term ownership do not seem to have taken more risks prior the crisis, a second possibility is that they had worse stock returns because of the behavior of short-term investors during the crisis. In particular, through their trading behavior during the crisis, short-term investors may have amplified the effect of the crisis and contributed to higher bank shares price drops. We explore this possibility through two kinds of empirical tests. We first focus our analysis at the institutional investors' level and assess whether short-term investors sold the stocks of our sample banks significantly more than long-term investors during the crisis.

We start by computing a measure of selling pressure at the institutional investor level for both short-term and long-term investors. We follow Cella et al. (2013) and measure it quarterly as the sales of sample bank shares made by each 13F institution during quarter *t*

expressed as a percentage of its total holding of sample bank shares at the end of quarter *t-1*. As shown by Figure 1, investor selling pressure is higher for short-term investor relative to longer-term ones over the whole period 1984-2012. However, the discrepancy becomes higher and steeper for the crisis periods (1998-2000 and 2007-2008). In table 4, we compare by how much short-term and long-term investors reduced their holdings of our sample banks both for the entire crisis period (July, 2007 to end of December, 2008) and for each crisis quarter taken individually. Mean difference tests are highly significant and show that short-term investors sold twice as more their shares of the sample banks as long-term investors.

Second, at the bank level, we investigate whether banks with more short-term ownership were exposed to a stronger selling pressure on their shares during the crisis. We measure selling pressure at the bank level as the total number of a bank's shares sold by institutional investors expressed as a percentage of the bank total number of outstanding shares at the beginning of the crisis. We only report tests with a measure of selling pressure computed over the entire crisis period but results are unchanged if we compute it for any individual crisis quarter.

Table 5 indicates that banks with a higher proportion of short-term investors are exposed to a higher selling pressure on their shares during the whole crisis period. In all the specifications, short-term investor ownership has a strong statistically and economically significant 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 ownership is associated with a 7.2% (5.36%*1.35)  higher selling pressure on bank shares over the entire crisis period, which represents 41% of its standard deviation. We also look at the effect of short-term investor ownership on the selling pressure on bank shares by splitting our sample in quartiles based on the level of short-term investor ownership. Figure 2 displays the quarterly selling pressure on sample bank stocks for banks belonging respectively to the

top and bottom quartiles. Banks in the top quartile for short-term ownership record a selling pressure on their shares that is up to six times as important as banks in the bottom quartile over the crisis period.

Taken together, the results from this subsection are consistent with banks with higher short-term ownership performing worse during the crisis because of the trading behaviour of their short-term investors. Indeed, short-term institutional investors reduced significantly their holdings of our sample banks during the crisis and banks with more short-term ownership were exposed to a stronger selling pressure during the crisis.


### III. Robustness checks

We assess the possibility that our results may stem from the way we compute investor turnover and in particular from the threshold used to classify 13F institutions into short- and long-term investors. We address this concern by using two other proxies of banks' investor horizons. The first one is the raw mean investor turnover value (*MTURNOVER*). In this case, we do not distinguish short-term from long-term investors. We study the effect of pre-crisis value weighted turnover of the bank's investors on the bank performance during the crisis. As reported in Table 6, our results are unchanged with this alternative measure of short-term investor ownership. A higher *MTURNOVER* is associated with a lower bank performance during the crisis. This effect is statistically and economically significant.

As a second alternative measure of a bank's short-term investor ownership, we also use the average churn ratio of the bank investors' portfolios (*MCHURNRATIO*) computed following Gaspar et al. (2005). Unlike turnover measures which focus on sales, the churn ratio also takes into account both the sales and purchases of shares. Details of the calculation of the variable are provided in the Appendix B. Table 7 confirms our previous results and shows that banks with a higher pre-crisis churn ratio had lower the bank performance during the crisis.

In Table 8 and 9, we assess the robustness of our results on selling pressure when our alternative measures of short-term ownership are used. In all specifications, our two alternative measures have a strong and positive impact on the selling pressure at the bank level.

Overall, our results are robust to the use of alternative measures of short-term ownership that are not based on the classification of investors in groups of short-term and long-term investors.


## IV. Conclusion

The reliance on short-term debt financing, which exposed banks to funding fragility, is viewed as having played a key role in the crisis. In this paper, we document that the exposure of banks to short-term financing may extend to bank capital as well. Banks with more short-term ownership record worse stock returns during the recent financial crisis. Our results confirm the economic benefit of bank capital in helping banks to perform better but they also indicate that the investment horizon of the providers of bank capital matters. The general approach of bank capital regulation is that more capital is better irrespective of who provides it. Our results reveal that the horizon of the providers of bank capital matters and significantly impact the resilience of banks during the recent financial crisis. Complementary tests indicate that banks with more short-term ownership did not perform worse during the crisis because they took more risks in the pre-crisis period but rather because the trading behavior of their short-term investors during the crisis exposed them to a higher selling pressure.

**References**

Acharya, V. V., Pedersen, L. H., Philippon, T., & Richardson, M. P. (2010). Measuring systemic risk. Working Paper New York University.

Adrian, T., & Shin, H. S. (2010). Liquidity and leverage. *Journal of financial intermediation*, *19*(3), 418-437.

Aebi, V., Sabato, G., & Schmid, M. (2012). Risk management, corporate governance, and bank performance in the financial crisis. *Journal of Banking & Finance*, *36*(12), 3213-3226.

Barry, T. A., Lepetit, L., & Tarazi, A. (2011). Ownership structure and risk in publicly held and privately owned banks. *Journal of Banking & Finance*, *35*(5), 1327-1340.

Becht, M., Bolton, P., & Röell, A. (2011). Why bank governance is different. *Oxford Review of Economic Policy*, *27*(3), 437-463.

Beltratti, A., & Stulz, R. M. (2012). The credit crisis around the globe: Why did some banks perform better?. *Journal of Financial Economics*, *105*(1), 1-17.

Berger, A. N., & Bouwman, C. H. (2013). How does capital affect bank performance during financial crises?. *Journal of Financial Economics*, *109*(1), 146-176.

Bhagat, S., & Bolton, B. (2014).Financial crisis and bank executive incentive compensation. *Journal of Corporate Finance*, 25, 313-341.

Bhattacharyya, S., & Purnanandam, A. (2010). *Risk-taking by banks: What did we know and when did we know it*. unpublished working paper, University of Michigan.

Brunnermeier, M. K. (2008). Deciphering the liquidity and credit crunch 2007-08. *Journal of Economic Perspectives*, 23, 77-100.

Cella, C., Ellul, A., & Giannetti, M. (2013). Investors' horizons and the amplification of market shocks. *Review of Financial Studies*, hht023.

Demirguc-Kunt, A., Detragiache, E., & Merrouche, O. (2013). Bank capital: Lessons from the financial crisis. *Journal of Money, Credit and Banking*, *45*(6), 1147-1164.

Derrien, F., Kecskés, A., & Thesmar, D. (2013). Investor horizons and corporate policies. *Journal of Financial and Quantitative Analysis*, *48*(06), 1755-1780.

Erkens, D. H., Hung, M., & Matos, P. (2012). Corporate governance in the 2007–2008 financial crisis: Evidence from financial institutions worldwide. *Journal of Corporate Finance*, *18*(2), 389-411.

Fahlenbrach, R., & Stulz, R. M. (2011). Bank CEO incentives and the credit crisis. *Journal of Financial Economics*, *99*(1), 11-26.

Fahlenbrach, R., Prilmeier, R., & Stulz, R. M. (2012). This time is the same: Using bank performance in 1998 to explain bank performance during the recent financial crisis. *The Journal of Finance*, *67*(6), 2139-2185.

Gaspar, J. M., Massa, M., & Matos, P. (2005). Shareholder investment horizons and the market for corporate control. *Journal of Financial Economics*, *76*(1), 135-165.

Gorton, G. B. (2010). *Slapped by the invisible hand: The panic of 2007*. Oxford University Press.

Iannotta, G., Nocera, G., & Sironi, A. (2007). Ownership structure, risk and performance in the European banking industry. *Journal of Banking & Finance*, *31*(7), 2127-2149.

John, K., & Qian, Y. (2003). Incentive features in CEO compensation in the banking industry. *Economic Policy Review*, *9*(1).

John, K., Saunders, A., & Senbet, L. W. (2000). A theory of bank regulation and management compensation. *Review of Financial Studies*, *13*(1), 95-125.

John, K., Mehran, H., & Qian, Y. (2010). Outside monitoring and CEO compensation in the banking industry. *Journal of Corporate Finance*, *16*(4), 383-399.

Laeven, L. (2013). Corporate governance: what's special about banks? *Annu. Rev. Financ. Econ.*, *5*(1), 63-92.

Laeven, L., & Levine, R. (2009). Bank governance, regulation and risk taking. *Journal of Financial Economics*, *93*(2), 259-275.

Minton, B. A., Taillard, J. P., & Williamson, R. (2012). Financial Expertise of the Board, Risk Taking and Performance: Evidence from Bank Holding Companies. *Journal of Financial and Quantitative Analysis (forthcoming)*.

Moussu, C., & Petit-Romec, A. (2014). RoE in Banks: Myth and Reality. Working Paper ESCP Europe.

Roe, M. J. (2010). Derivatives Market's Payment Priorities as Financial Crisis Accelerator, The. *Stan. L. Rev.*, *63*, 539.

Shleifer, A. & Vishny, R. (2011). Fire Sales in Finance and Macroeconomics. *Journal of Economic Perspectives*, 25(1): 29-48.

Thakor, A. V. (2014). Bank Capital and Financial Stability: An Economic Tradeoff or a Faustian Bargain? *Annu. Rev. Financ. Econ.*, 6*, 185-223.*

**Table 1: Descriptive Statistics**

| Variables | n | Mean | S.D. | Min | 0.25 | Mdn | 0.75 | Max |
|---|---|---|---|---|---|---|---|---|
| BHRCRISIS (%) | 344 | -30.42 | 31.38 | -97.48 | -53.52 | -28.87 | -5.28 | 31.10 |
| RETURN 2006 (%) | 344 | 12.17 | 15.74 | -24.42 | 1.58 | 9.60 | 20.25 | 78.07 |
| OSHTINV (%) | 344 | 4.09 | 5.36 | 0.00 | 0.16 | 2.00 | 6.35 | 26.65 |
| OLGTINV (%) | 344 | 24.47 | 14.77 | 4.58 | 12.67 | 20.93 | 34.42 | 72.91 |
| SIZE | 344 | 8.06 | 1.61 | 5.28 | 6.94 | 7.88 | 8.88 | 13.95 |
| TOTAL ASSETS | 344 | 19.20 | 119.07 | 0.11 | 0.73 | 1.57 | 3.44 | 1459.74 |
| TIER_1_RATIO (%) | 340 | 11.36 | 3.27 | 6.35 | 9.21 | 10.70 | 12.50 | 24.69 |
| EQUITY_RATIO (%) | 344 | 9.99 | 3.78 | 2.51 | 7.69 | 9.20 | 10.80 | 33.55 |
| MARKET_EQUITY_RATIO (%) | 344 | 16.10 | 5.61 | 3.92 | 12.64 | 15.80 | 19.02 | 45.89 |
| BOOK_TO_MARKET | 344 | 0.61 | 0.19 | 0.25 | 0.47 | 0.59 | 0.74 | 1.28 |
| BETA | 344 | 0.72 | 0.62 | -0.13 | 0.11 | 0.72 | 1.23 | 2.05 |
| DEPOSITS (%) | 344 | 73.77 | 8.90 | 44.30 | 68.63 | 74.32 | 80.34 | 88.57 |
| NON_INTEREST_INCOME (%) | 344 | 77.87 | 12.18 | 26.19 | 71.40 | 79.80 | 86.84 | 98.98 |

**Table 2: Regressions of bank crisis (2007-2008) buy-and-hold stock returns on the pre-crisis fraction of short-term investor ownership**

This table reports the estimates of:

$$BHRCRISIS = \alpha + \beta OSHTINV + \gamma'X + \varepsilon$$

The dependent variable $BHRCRISIS$ is the bank crisis buy-and-hold stock returns from July 7, 2007 to 31 December, 2008. Our main independent variable, $OSHTINV$, is the fraction of short-term institutional investor ownership relative to the bank total market capitalization. $X$ is a vector of bank control variables. Control variables include the stock return in 2006, the natural log of the market value of the bank's equity, the bank's equity beta, the book-to-market ratio, the market equity ratio, the Tier 1 ratio, the long-term ownership, the deposit ratio and the non-interest income. All variables are defined in details in Appendix B.

| BHRCRISIS | (1) | (2) | (3) | (4) | (5) | (6) |
|---|---|---|---|---|---|---|
| OSHTINV | **-1.18*** | **-1.17*** | **-1.20*** | **-1.21*** | **-0.96*** | **-0.88** |
| | **(0.332)** | **(0.332)** | **(0.334)** | **(0.327)** | **(0.365)** | **(0.363)** |
| RETURN 2006 | -0.10 | -0.17 | -0.16 | -0.13 | -0.17 | -0.20* |
| | (0.111) | (0.110) | (0.110) | (0.112) | (0.108) | (0.106) |
| SIZE | 0.01 | 0.00 | 0.00 | 0.01 | 0.01 | -0.01 |
| | (0.014) | (0.013) | (0.014) | (0.014) | (0.014) | (0.017) |
| BETA | 0.16*** | 0.16*** | 0.16*** | 0.16*** | 0.16*** | 0.16*** |
| | (0.033) | (0.032) | (0.032) | (0.032) | (0.033) | (0.034) |
| BOOK_TO_MARKET | -0.13 | -0.02 | -0.24** | -0.13 | -0.00 | -0.03 |
| | (0.105) | (0.103) | (0.107) | (0.103) | (0.104) | (0.110) |
| MARKET_EQUITY_RATIO | | 1.09*** | | | 1.08*** | 1.26*** |
| | | (0.289) | | | (0.293) | (0.315) |
| EQUITY_RATIO | | | 1.51*** | | | |
| | | | (0.360) | | | |
| TIER_1_RATIO | | | | 1.64*** | | |
| | | | | (0.486) | | |
| OLGTINV | | | | | -0.19 | -0.19 |
| | | | | | (0.144) | (0.142) |
| DEPOSITS | | | | | | -0.06 |
| | | | | | | (0.222) |
| NON_INTEREST_INCOME | | | | | | -0.33* |
| | | | | | | (0.179) |
| Observations | 344 | 344 | 344 | 340 | 344 | 344 |
| Adj. R-squared | 0.12 | 0.15 | 0.15 | 0.15 | 0.15 | 0.16 |
| VIF | 1.15 | 1.19 | 1.19 | 1.19 | 1.20 | 1.22 |

*Standard errors are in parentheses. Constants are not reported. \*\*\* p<0.01, \*\* p<0.05, \* p<0.1*

**Table 3: Regressions of various measures of pre-crisis bank risk-taking on the bank pre-crisis percentage of short-term institutional investor ownership and usual control variables.**

This table reports the estimates of:

$$PRECRISIS\ BANK\ RISK = \alpha + \beta OSHTINV + \gamma'X + \varepsilon$$

The dependent variables are different measures of bank risk for the year 2006 (*the volatility, the Marginal Expected Shortfall, Tail-risk, and Z-score*). Our main independent variable is the fraction of short-term institutional investor ownership relative to the bank market capitalization. We also add our previous control variables. All variables are defined in the Appendix B.

| | VOL | MES | TAIL RISK | Z-SCORE |
|---|---|---|---|---|
| *OSHTINV* | **0.06** | **0.44** | **0.44** | **-1.39** |
| | **(0.048)** | **(0.329)** | **(0.329)** | **(0.963)** |
| *SIZE* | -0.03*** | -0.01 | -0.01 | 0.07 |
| | (0.003) | (0.011) | (0.011) | (0.045) |
| *RETURN 2006* | 0.06*** | 0.06 | 0.06 | 0.21 |
| | (0.018) | (0.090) | (0.090) | (0.315) |
| *BOOK_TO_MARKET* | -0.04** | -0.03 | -0.03 | 0.22 |
| | (0.017) | (0.083) | (0.083) | (0.297) |
| *BETA* | 0.06*** | 0.01 | 0.01 | 0.11 |
| | (0.005) | (0.025) | (0.025) | (0.075) |
| *DEPOSITS* | 0.04 | 0.01 | 0.01 | 0.84 |
| | (0.033) | (0.167) | (0.167) | (0.572) |
| *NON_INTEREST_SHARE* | -0.03 | -0.11 | -0.11 | 0.62 |
| | (0.030) | (0.128) | (0.128) | (0.537) |
| *MARKET_EQUITY_RATIO* | -0.24*** | -0.17 | -0.17 | 0.83 |
| | (0.065) | (0.282) | (0.282) | (1.483) |
| | | | | |
| Observations | 344 | 344 | 344 | 329 |
| R-squared | 0.49 | 0.01 | 0.01 | 0.04 |
| VIF | 1.94 | 1.01 | 1.01 | 1.05 |

*Standard errors are in parentheses. Constants are not reported. *** p<0.01, ** p<0.05, * p<0.1*

**Table 4: Selling pressure at the institutional investor level**

Two sample t-test with unequal variance on the mean value of the selling pressure on short-term and long-term institutional investor portfolio. The selling pressure at the institutional investor represent the amount of sample banks shares that has been sold over one quarter. Details of the variable calculation are in the Appendix B.

| | Q3-2007_Q4-2008 | | |
|---|---|---|---|
| | Short-Term | Long-Term | Diff |
| *Mean Selling Pressure* | 0.15 | 0.08 | 0.07*** |
| *Obs.* | 2788 | 5377 | |
| | **Q3-2007** | | |
| | Short-Term | Long-Term | Diff |
| *Mean Selling Pressure* | 0.14 | 0.08 | 0.06*** |
| *Obs.* | 441 | 894 | |
| | **Q4-2007** | | |
| | Short-Term | Long-Term | Diff |
| *Mean Selling Pressure* | 0.15 | 0.08 | 0.07*** |
| *Obs.* | 426 | 910 | |
| | **Q1-2008** | | |
| | Short-Term | Long-Term | Diff |
| *Mean Selling Pressure* | 0.15 | 0.08 | 0.07*** |
| *Obs.* | 448 | 904 | |
| | **Q2-2008** | | |
| | Short-Term | Long-Term | Diff |
| *Mean Selling Pressure* | 0.13 | 0.07 | 0.06*** |
| *Obs.* | 484 | 891 | |
| | **Q3-2008** | | |
| | Short-Term | Long-Term | Diff |
| *Mean Selling Pressure* | 0.18 | 0.1 | 0.08*** |
| *Obs.* | 492 | 900 | |
| | **Q4-2008** | | |
| | Short-Term | Long-Term | Diff |
| *Mean Selling Pressure* | 0.16 | 0.09 | 0.07*** |
| *Obs.* | 497 | 878 | |

*\*\*\* p<0.01, \*\* p<0.05, \* p<0.1*

## Table 5: Selling pressure at the bank level

This table reports the estimates of:

$$SPBANK = \alpha + \beta OSHTINV + \gamma' X + \varepsilon$$

The dependent is the amount of sample bank shares that has been sold over the 6 crisis quarters. Our main independent variable is the fraction of short-term institutional investor ownership relative to the bank market capitalization. We also add our previous control variables. All variables are defined in the Appendix B.

| SPBANK | (1) | (2) | (3) | (4) | (5) |
|---|---|---|---|---|---|
| *OSHTINV* | **1.39\*\*\*** | **1.39\*\*\*** | **1.39\*\*\*** | **1.39\*\*\*** | **1.35\*\*\*** |
| | **(0.202)** | **(0.203)** | **(0.203)** | **(0.205)** | **(0.202)** |
| *RETURN 2006* | -0.09** | -0.09** | -0.10** | -0.09** | -0.08** |
| | (0.037) | (0.039) | (0.039) | (0.039) | (0.038) |
| *SIZE* | 0.05*** | 0.05*** | 0.05*** | 0.05*** | 0.05*** |
| | (0.007) | (0.007) | (0.007) | (0.007) | (0.007) |
| *BETA* | 0.02 | 0.02 | 0.02 | 0.02 | 0.02* |
| | (0.011) | (0.011) | (0.011) | (0.011) | (0.011) |
| *BOOK_TO_MARKET* | -0.00 | -0.00 | -0.01 | -0.01 | -0.02 |
| | (0.031) | (0.034) | (0.031) | (0.031) | (0.039) |
| *MARKET_EQUIY_RATIO* | | 0.00 | | | -0.10 |
| | | (0.102) | | | (0.111) |
| *EQUITY_RATIO* | | | 0.04 | | |
| | | | (0.140) | | |
| *TIER_1_RATIO* | | | | -0.22 | |
| | | | | (0.148) | |
| *DEPOSITS* | | | | | -0.10 |
| | | | | | (0.073) |
| *NON_INTEREST_INCOME* | | | | | 0.18*** |
| | | | | | (0.066) |
| | | | | | |
| Observations | 344 | 344 | 344 | 340 | 344 |
| Adj. R-squared | 0.14 | 0.16 | 0.16 | 0.15 | 0.16 |
| VIF | 1.17 | 1.21 | 1.21 | 1.20 | 1.22 |

*Standard errors are in parentheses. Constants are not reported. \*\*\* p<0.01, \*\* p<0.05, \* p<0.1*

**Table 6: Regression of bank crisis (2007-2008) buy-and-hold returns on the pre-crisis averaged turnover of bank institutional investor**

This table reports the estimates of:

$$BHRCRISIS = \alpha + \beta MTURNOVER + \gamma'X + \varepsilon$$

The dependent variable $BHRCRISIS$ is the bank crisis buy-and-hold returns compounded daily from July 7, 2007 to 31 December, 2008. Our main independent variable $MTURNOVER$ is an alternative measure of short-term ownership measured as the average turnover of bank investor portfolios relative to the bank total market capitalization. $X$ is a vector of control variables. We also add our previous control variables All the variables are defined in the Appendix B.

| BHRCRISIS | (1) | (2) | (3) | (4) | (5) |
|---|---|---|---|---|---|
| MTURNOVER | **-1.39\*\*\*** | **-1.40\*\*\*** | **-1.44\*\*\*** | **-1.48\*\*\*** | **-1.29\*\*\*** |
| | **(0.380)** | **(0.384)** | **(0.385)** | **(0.372)** | **(0.381)** |
| RETURN 2006 | -0.10 | -0.17 | -0.16 | -0.13 | -0.20* |
| | (0.109) | (0.108) | (0.108) | (0.110) | (0.106) |
| SIZE | 0.01 | 0.01 | 0.01 | 0.02 | -0.01 |
| | (0.014) | (0.014) | (0.014) | (0.014) | (0.017) |
| BETA | 0.16*** | 0.16*** | 0.16*** | 0.16*** | 0.15*** |
| | (0.034) | (0.033) | (0.033) | (0.032) | (0.033) |
| BOOK_TO_MARKET | -0.12 | -0.01 | -0.24** | -0.12 | -0.04 |
| | (0.106) | (0.105) | (0.108) | (0.104) | (0.111) |
| MARKET_EQUITY_RATIO | | 1.11*** | | | 1.28*** |
| | | (0.294) | | | (0.318) |
| EQUITY_RATIO | | | 1.53*** | | |
| | | | (0.367) | | |
| TIER_1_RATIO | | | | 1.66*** | |
| | | | | (0.475) | |
| DEPOSITS | | | | | -0.06 |
| | | | | | (0.223) |
| NON_INTEREST_INCOME | | | | | -0.32* |
| | | | | | (0.179) |
| | | | | | |
| Observations | 344 | 344 | 344 | 340 | 344 |
| Adj. R-squared | 0.12 | 0.15 | 0.15 | 0.15 | 0.16 |
| VIF | 1.16 | 1.20 | 1.20 | 1.20 | 1.21 |

**Table 7: Regression of bank crisis (2007-2008) buy-and-hold returns on the pre-crisis averaged churn ratio of bank institutional investor**

This table reports the estimates of:

$$BHRCRISIS = \alpha + \beta MCHURNRATIO + \gamma'X + \varepsilon$$

The dependent variable $BHRCRISIS$ is the bank crisis buy-and-hold returns compounded daily from July 7, 2007 to 31 December, 2008. Our main independent variable $MCHURNRATIO$ is an alternative measure of short-term ownership measured as the average churn ratio of bank investor portfolios relative to the bank total market capitalization. $X$ is a vector of control variables. All the variables are defined in the Appendix B.

| BHRCRISIS | (1) | (2) | (3) | (4) | (5) |
|---|---|---|---|---|---|
| MCHURNRATIO | -0.95*** | -0.90*** | -0.90*** | -0.92*** | -0.84*** |
| | (0.219) | (0.219) | (0.219) | (0.222) | (0.218) |
| RETURN 2006 | -0.08 | -0.14 | -0.13 | -0.10 | -0.17* |
| | (0.107) | (0.107) | (0.107) | (0.109) | (0.104) |
| SIZE | 0.02 | 0.01 | 0.01 | 0.02 | -0.01 |
| | (0.014) | (0.014) | (0.014) | (0.014) | (0.017) |
| BETA | 0.17*** | 0.16*** | 0.16*** | 0.16*** | 0.16*** |
| | (0.034) | (0.033) | (0.033) | (0.033) | (0.033) |
| BOOK_TO_MARKET | -0.06 | 0.04 | -0.16 | -0.06 | -0.00 |
| | (0.106) | (0.104) | (0.109) | (0.104) | (0.109) |
| MARKET_EQUITY_RATIO | | 0.99*** | | | 1.17*** |
| | | (0.291) | | | (0.313) |
| EQUITY_RATIO | | | 1.35*** | | |
| | | | (0.361) | | |
| TIER_1_RATIO | | | | 1.33*** | |
| | | | | (0.480) | |
| DEPOSITS | | | | | -0.10 |
| | | | | | (0.218) |
| NON_INTEREST_INCOME | | | | | -0.32* |
| | | | | | (0.178) |
| | | | | | |
| Observations | 344 | 344 | 344 | 340 | 344 |
| Adj. R-squared | 0.12 | 0.15 | 0.15 | 0.15 | 0.15 |
| VIF | 1.15 | 1.19 | 1.19 | 1.19 | 1.20 |

**Table 8: Regression of the selling pressure on bank shares during the crisis on the pre-crisis averaged turnover of bank institutional investor**

This table reports the estimates of:

$$SPBANK = \alpha + \beta MTURNOVER + \gamma'X + \varepsilon$$

The dependent is the amount of sample bank shares that has been sold over the 6 crisis quarters. Our main independent variable MTURNOVER an alternative measure of short-term ownership computed as the average turnover of bank investor portfolios relative to the bank total market capitalization. We also add our previous control variables. All variables are defined in the Appendix B.

| SPBANK | (1) | (2) | (3) | (4) | (5) |
|---|---|---|---|---|---|
| MTURNOVER | 2.15*** | 2.15*** | 2.15*** | 2.15*** | 2.11*** |
| | (0.144) | (0.143) | (0.143) | (0.144) | (0.142) |
| RETURN 2006 | -0.07*** | -0.07*** | -0.07*** | -0.07*** | -0.06** |
| | (0.026) | (0.028) | (0.027) | (0.027) | (0.028) |
| SIZE | 0.04*** | 0.04*** | 0.04*** | 0.03*** | 0.04*** |
| | (0.006) | (0.006) | (0.006) | (0.006) | (0.006) |
| BETA | 0.01 | 0.01 | 0.01 | 0.01 | 0.01* |
| | (0.009) | (0.009) | (0.009) | (0.009) | (0.009) |
| BOOK_TO_MARKET | -0.02 | -0.02 | -0.02 | -0.03 | -0.04 |
| | (0.026) | (0.027) | (0.026) | (0.026) | (0.030) |
| MARKET_EQUITY_RATIO | | -0.03 | | | -0.11 |
| | | (0.081) | | | (0.090) |
| EQUITY_RATIO | | | -0.01 | | |
| | | | (0.108) | | |
| TIER_1_RATIO | | | | -0.26** | |
| | | | | (0.117) | |
| DEPOSITS | | | | | -0.08 |
| | | | | | (0.057) |
| NON_INTEREST_INCOME | | | | | 0.15*** |
| | | | | | (0.051) |
| | | | | | |
| Observations | 304 | 304 | 304 | 300 | 304 |
| Adj. R-squared | 0.79 | 0.79 | 0.79 | 0.79 | 0.80 |
| VIF | 4.88 | 4.88 | 4.88 | 4.90 | 5.09 |

**Table 9: Regression of the selling pressure on bank shares during the crisis on the pre-crisis averaged churn ratio of bank institutional investor**

This table reports the estimates of:

$$SPBANK = \alpha + \beta MCHURNRATIO + \gamma'X + \varepsilon$$

The dependent is the amount of sample bank shares that has been sold over the 6 crisis quarters. Our main independent variable MCHURNRATIO is an alternative measure of short-term ownership measured as the average churn ratio of bank investor portfolios relative to the bank total market capitalization. We also add our previous control variables. All variables are defined in the Appendix B.

| SPBANK | (1) | (2) | (3) | (4) | (5) |
|---|---|---|---|---|---|
| MCHURNRATIO | 1.17*** | 1.18*** | 1.18*** | 1.18*** | 1.16*** |
| | (0.098) | (0.099) | (0.098) | (0.103) | (0.098) |
| RETURN 2006 | -0.11*** | -0.12*** | -0.12*** | -0.12*** | -0.11*** |
| | (0.029) | (0.030) | (0.030) | (0.030) | (0.030) |
| SIZE | 0.04*** | 0.04*** | 0.04*** | 0.04*** | 0.04*** |
| | (0.006) | (0.006) | (0.006) | (0.006) | (0.007) |
| BETA | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 |
| | (0.010) | (0.010) | (0.010) | (0.010) | (0.010) |
| BOOK_TO_MARKET | -0.08*** | -0.07** | -0.10*** | -0.09*** | -0.07** |
| | (0.031) | (0.032) | (0.032) | (0.031) | (0.035) |
| MARKET_EQUITY_RATIO | | 0.13 | | | 0.03 |
| | | (0.081) | | | (0.094) |
| EQUITY_RATIO | | | 0.23** | | |
| | | | (0.110) | | |
| TIER_1_RATIO | | | | 0.16 | |
| | | | | (0.145) | |
| DEPOSITS | | | | | -0.04 |
| | | | | | (0.061) |
| NON_INTEREST_INCOME | | | | | 0.18*** |
| | | | | | (0.055) |
| | | | | | |
| Observations | 304 | 304 | 304 | 300 | 304 |
| Adj. R-squared | 0.74 | 0.74 | 0.74 | 0.74 | 0.75 |
| VIF | 3.94 | 3.96 | 3.98 | 3.92 | 4.14 |

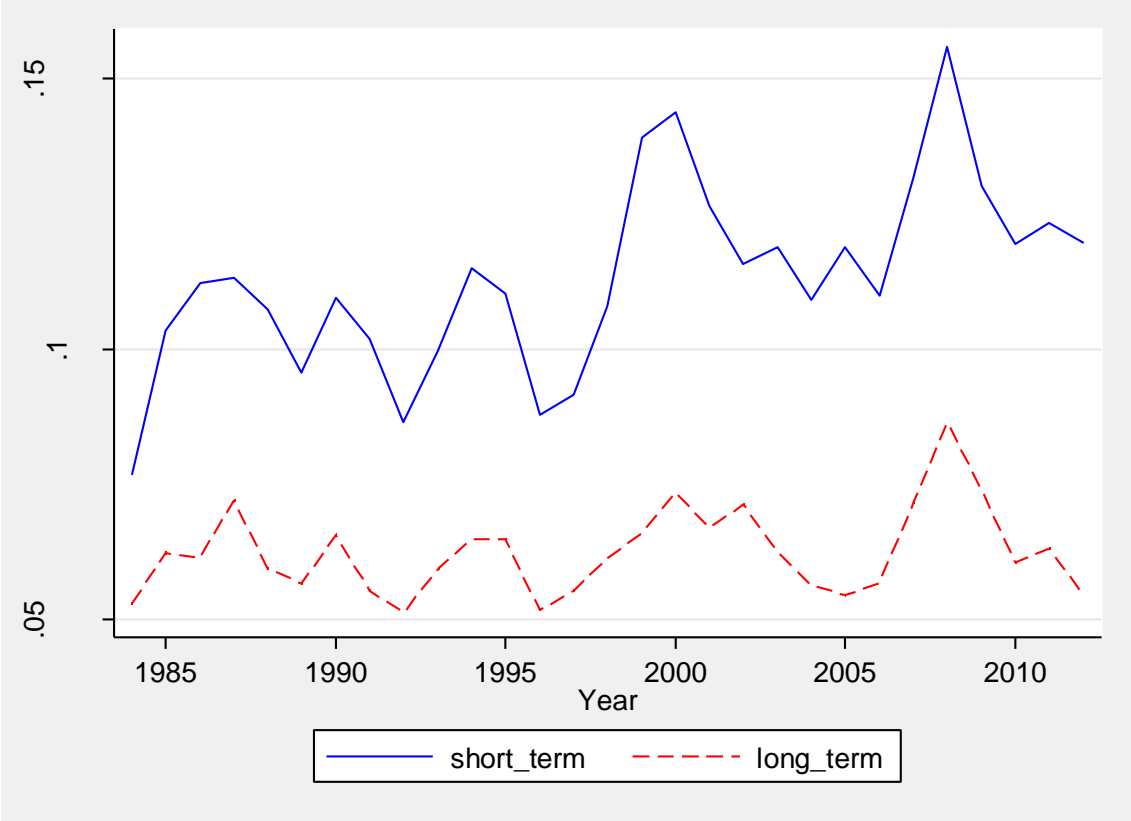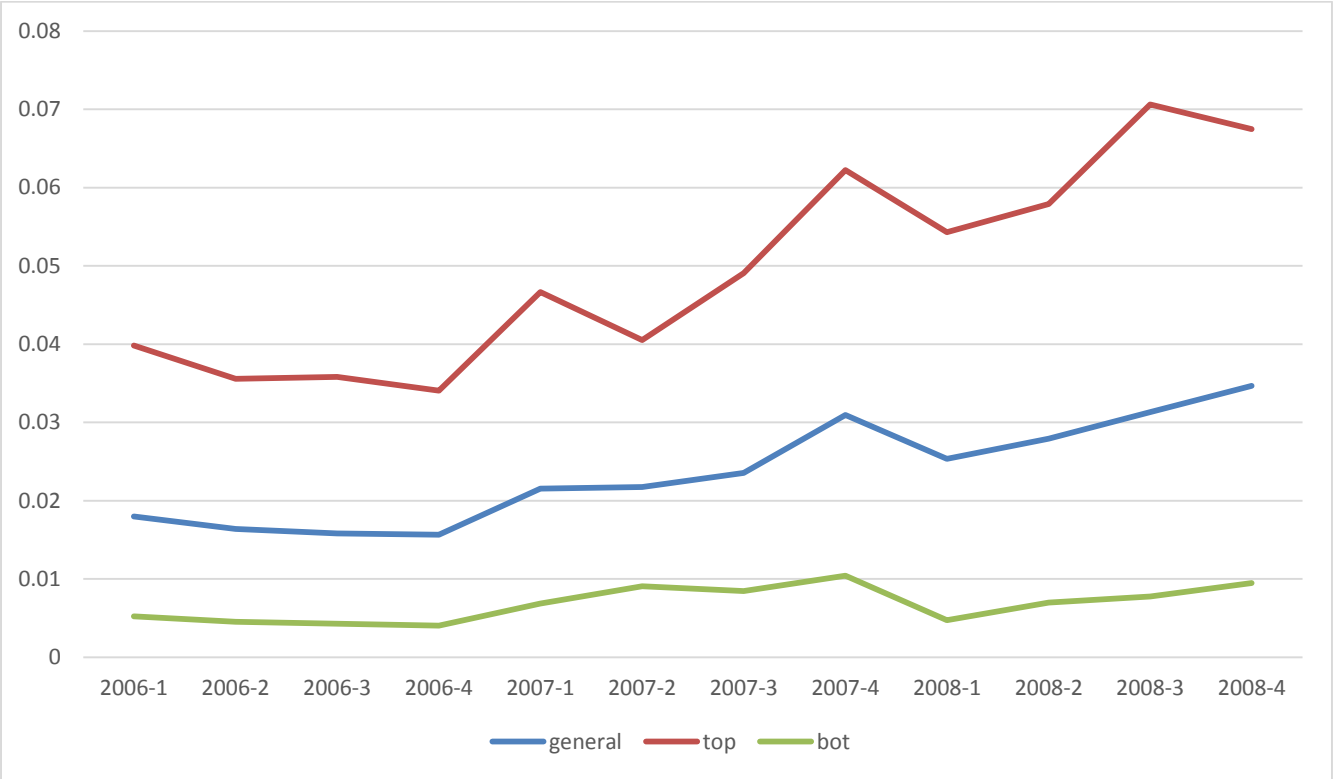**Figure 1: Short-term and long-term investor selling pressure over time**

**Figure 2: Selling pressure on sample banks' shares in the bottom and top quartile in terms of short-term investor ownership during the financial crisis.**

**Appendix A: Sample Banks** *(CRPS COMNAM)*

ABIGAIL ADAMS NATL BANCORP INC
ALABAMA NATIONAL BANCORP DEL
ALLIANCE BANKSHARES CORP
ALLIANCE FINANCIAL CORP NY
AMERIANA BANCORP
AMCORE FINANCIAL INC
AMERICAN BANCORP OF NJ INC
AMERICAN COMMUNITY BNCSHRS INC
AMERICAN NATIONAL BANKSHARES INC
AMERICAN RIVER BANKSHARES
AMERICANWEST BANCORPORATION
AMERICASBANK CORP
AMERISERV FINANCIAL INC
AMERIS BANCORP
APPALACHIAN BANCSHARES INC
ARROW FINANCIAL CORP
B B & T CORP
B C B BANCORP INC
B F C FINANCIAL CORP
B O K FINANCIAL CORP
BOE FINANCIAL SVCS OF VA INC
BANCFIRST CORP
BANCORP RHODE ISLAND INC
BANCORPSOUTH INC
BANCORP INC
BANCTRUST FINANCIAL GROUP INC
BANK OF AMERICA CORP
BANK GRANITE CORP
BANK OF HAWAII CORP
BANK MUTUAL CORP NEW
BANK OF THE OZARKS INC
BANK OF THE CAROLINAS CORP
BANK SOUTH CAROLINA CORP
BANKFINACIAL CORP
BEACH FIRST NATL BANCSHARES INC
BERKSHIRE HILLS BANCORP INC
BEVERLY HILLS BANCORP INC
BOARDWALK BANCORP INC
BOSTON PRIVATE FINL HLDGS INC
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
N B C CAPITAL CORP
CAMCO FINANCIAL CORP
CAMDEN NATIONAL CORP
CAPE FEAR BANK CORP
CAPITAL CITY BANK GROUP
CAPITAL BANK CORP NEW
CAPITAL CORP OF THE WEST
CAPITOL BANCORP LTD
CARDINAL FINANCIAL CORP
CARDINAL STATE BANK DURHAM N C
CAROLINA BANK HOLDINGS INC
CAROLINA TRUST BANK
CASCADE FINANCIAL CORP
CATHAY GENERAL BANCORP
CENTER FINANCIAL CORP
CENTERSTATE BANKS OF FLORIDA INC
CENTRAL BANCORP INC
CENTRAL VIRGINIA BANKSHARES INC
CENTURY BANCORP INC
CENTRUE FINANCIAL CORP NEW
CHEMICAL FINANCIAL CORP
CHICOPEE BANCORP INC
CHITTENDEN CORP
CITIZENS FIRST BANCORP INC
CITIZENS SOUTH BANKING CORP DEL
CITY BANK LYNNWOOD WASHINGTON
CITY HOLDING CO
COAST FINANCIAL HLDGS INC
COBIZ INC
COLONIAL BANCGROUP INC
COLUMBIA BANCORP ORE
COLUMBIA BANKING SYSTEM INC
COMERICA INC
COMMERCE BANCORP INC NJ
COMMERCEFIRST BANCORP INC
COMMONWEALTH BANKSHARES INC
COMMUNITY BANCORP
COMMUNITY BANK SYSTEM INC
COMMUNITY BANKS INC PA
COMMUNITY CAPITAL BANCSHARES INC
COMMUNITY CAPITAL CORP
COMMUNITY CENTRAL BANK CORP

| | |
|---|---|
| COMMUNITY FINANCIAL CORP | FIRST MERCHANTS CORP |
| COMMUNITY SHORES BANK CORP | FIRST MIDWEST BANCORP DE |
| COMMUNITY TRUST BANCORP INC | FIRST MUTUAL BANCSHARES INC |
| CONNECTICUT BANK & TRUST CO | FIRST NIAGARA FINL GROUP INC NEW |
| COOPERATIVE BANCSHARES INC | FIRST PLACE FINANCIAL CORP NM |
| CORUS BANKSHARES INC | FIRST REGIONAL BANCORP |
| CULLEN FROST BANKERS INC | FIRST STATE BANCORPORATION |
| DEARBORN BANCORP INC | FIRST SOUTH BANCORP INC |
| DIME COMMUNITY BANCSHARES | 1ST SOURCE CORP |
| DOWNEY FINANCIAL CORP | FIRST UNITED CORP |
| E C B BANCORP INC | FIRSTBANK CORP |
| E S B FINANCIAL CORP | FIRSTMERIT CORP |
| EAST WEST BANCORP INC | FLUSHING FINANCIAL CORP |
| EASTERN VIRGINIA BANKSHARES INC | FULTON FINANCIAL CORP PA |
| ELMIRA SAVINGS BANK FSB NY | G B & T BANCSHARES INC |
| F N B CORP PA | G S FINANCIAL CORP |
| F N B CORP VA | GATEWAY FINANCIAL HLDGS INC |
| FARMERS CAPITAL BANK CORP | GERMAN AMERICAN BANCORP |
| FAUQUIER BANKSHARES INC | GLACIER BANCORP INC NEW |
| FIDELITY BANCORP INC | GREAT SOUTHERN BANCORP INC |
| FIDELITY SOUTHERN CORP NEW | BAY VIEW CAPITAL CORP |
| FINANCIAL INSTITUTIONS INC | GREATER BAY BANCORP |
| FIRST BANCSHARES INC MO | GREATER COMMUNITY BANCORP |
| FIRST BANCORP NC | GREENE COUNTY BANCSHARES INC |
| FIRST BUSEY CORP | GUARANTY FEDERAL BANCSHARES INC |
| FIRST CHARTER CORP | H F FINANCIAL CORP |
| FIRST CITIZENS BANCSHARES INC NC | H M N FINANCIAL INC |
| FIRST COMMONWEALTH FINANCIAL COR | HABERSHAM BANCORP INC |
| FIRST COMMUNITY CORP SC | HANCOCK HOLDING CO |
| FIRST COMMUNITY BANCSHARES INC | HARLEYSVILLE NATIONAL CORP PA |
| FIRST DEFIANCE FINANCIAL CORP | HARLEYSVILLE SAVINGS FINAN CORP |
| FIRST FINANCIAL BANCORP OHIO | HARRINGTON WEST FINANCIAL GRP IN |
| FIRST FINANCIAL BANKSHARES INC | HEARTLAND FINANCIAL USA INC |
| FIRST FEDERAL BANKSHARES INC DEL | HERITAGE COMMERCE CORP |
| FIRST FINANCIAL CORP IN | HERITAGE FINANCIAL CORP WA |
| FIRST FED NORTHN MI BANCORP INC | HERITAGE OAKS BANCORP |
| FIRST FINANCIAL SERVICE CORP | HINGHAM INSTITUTION FOR SVGS MA |
| FIRST FINANCIAL HOLDINGS INC | HOME BANCSHARES INC |
| FIRST FRANKLIN CORP | HOPFED BANCORP INC |
| FIRST HORIZON NATIONAL CORP | HORIZON FINANCIAL CORP WASH |
| 1ST INDEPENDENCE FNL GROUP INC | HUDSON CITY BANCORP INC |
| FIRST INDIANA CORP | HUNTINGTON BANCSHARES INC |
| FIRST KEYSTONE FINANCIAL INC | IBERIABANK CORP |
| FIRST LONG ISLAND CORP | INDEPENDENT BANK CORP MA |
| FIRST M & F CORP | INTEGRA BANK CORP |
| FIRST MARINER BANCORP | INTERNATIONAL BANCSHARES CORP |

INTERVEST BANCSHARES CORP

IRWIN FINANCIAL CORP

JPMORGAN CHASE & CO

JEFFERSON BANCSHARES INC TENN

K N B T BANCORP INC

KEARNY FINANCIAL CORP

KEYCORP NEW

L S B CORP

LAKELAND FINANCIAL CORP

LANDMARK BANCORP INC

LEGACY BANCORP INC

LIBERTY BANCORP INC MO

LINCOLN BANCORP IND

M & T BANK CORP

M B FINANCIAL INC NEW

M F B CORP

MACKINAC FINANCIAL CORP

MAINSOURCE FINANCIAL GROUP INC

MASSBANK CORP

M B T FINANCIAL CORP

MERCANTILE BANK CORP

MERCHANTS BANCSHARES INC

META FINANCIAL GROUP INC

METROCORP BANCSHARES INC

MIDDLEBURG FINANCIAL CORP

MIDWEST BANC HOLDINGS INC

MIDWESTONE FINANCIAL GROUP INC

MONARCH FINANCIAL HOLDINGS INC

MUTUALFIRST FINL INC

N B T BANCORP INC

NATIONAL BANKSHARES INC

NATIONAL CITY CORP

NATIONAL PENN BANCSHARES INC

NEW HAMPSHIRE THRIFT BNCSHRS INC

NEW YORK COMMUNITY BANCORP INC

NEWALLIANCE BANCSHARES INC

NEWPORT BANCORP INC

NEXITY FINANCIAL CORP

NORTH CENTRAL BANCSHARES INC

NORTHEAST COMMUNITY BANCORP INC

NORTHERN TRUST CORP

NORTHRIM BANCORP INC

OAK HILL FINANCIAL INC

OCEANFIRST FINANCIAL CORP

OCWEN FINANCIAL CORP

OLD LINE BANCSHARES

OLD NATIONAL BANCORP

OLD SECOND BANCORP INC

OMEGA FINANCIAL CORP

OMNI FINANCIAL SERVICES INC

P A B BANKSHARES INC

P F F BANCORP INC

P N C FINANCIAL SERVICES GRP INC

PSB HOLDINGS INC

P V F CAPITAL CORP

PACIFIC CONTINENTAL CORP

PACIFIC STATE BANCORP

PAMRAPO BANCORP INC

PARK BANCORP INC

PARKE BANCORP INC

PARKVALE FINANCIAL CORP

PARTNERS TRUST FINL GRP INC NEW

PATRIOT NATIONAL BANCORP INC

PENNS WOODS BANCORP INC

PEOPLES BANCORP INC

PEOPLES BANCORP NC INC NEW

PEOPLES COMMUNITY BANCORP INC

PEOPLES FINANCIAL CORP MS

PINNACLE FINANCIAL PARTNERS INC

PREMIER FINANCIAL BANCORP INC

PRINCETON NATIONAL BANCORP INC

PRIVATEBANCORP INC

PROSPERITY BANCSHARES INC

PROVIDENT BANKSHARES CORP

PROVIDENT FINANCIAL HOLDINGS INC

UNION FINANCIAL BANCSHARES INC

PROVIDENT FINANCIAL SVCS INC

PULASKI FINANCIAL CORP

Q C R HOLDINGS INC

RAINIER PACIFIC FINL GROUP INC

REGIONS FINANCIAL CORP NEW

RENASANT CORP

REPUBLIC BANCORP INC KY

REPUBLIC FIRST BANCORP INC

RIVER VALLEY BANCORP

RIVERVIEW BANCORP INC

ROMA FINANCIAL CORP

ROME BANCORP INC

ROYAL BANCSHARES PA INC

S & T BANCORP INC

S V B FINANCIAL GROUP

SANDY SPRING BANCORP INC

SAVANNAH BANCORP INC

SECURITY BANK CORP NEW

SEVERN BANCORP INC MD

SIERRA BANCORP

SIGNATURE BANK NEW YORK N Y

SIMMONS 1ST NATIONAL CORP

SMITHTOWN BANCORP INC

SOMERSET HILLS BANCORP

SOUTH FINL GROUP INC

SOUTHCOAST FINANCIAL CORP

SOUTHERN COMMUNITY FINCL CORP

SOUTHERN CONNECTICUT BANCORP INC

SOUTHERN MISSOURI BANCORP INC

SOUTHSIDE BANCSHARES INC

SOUTHWEST BANCORP INC OKLA

STATE BANCORP INC NY

STERLING BANCSHARES INC

STERLING BANCORP

STERLING FINANCIAL CORP

SUFFOLK BANCORP

SUNTRUST BANKS INC

SUSQUEHANNA BANCSHARES INC PA

SUSSEX BANCORP

SYNERGY FINANCIAL GROUP INC

T C F FINANCIAL CORP

T F FINANCIAL CORP

TAYLOR CAPITAL GROUP INC

TEMECULA VALLEY BANCORP INC

TENNESSEE COMMERCE BANCORP INC

TEXAS CAPITAL BANCSHARES INC

THE BANK HOLDINGS

TIDELANDS BANCSHARES INC

TIERONE CORP

TIMBERLAND BANCORP INC

TOWER FINANCIAL CORP

TRICO BANCSHARES

TRUSTCO BANK CORP NY

U C B H HOLDINGS INC

U M B FINANCIAL CORP

U S B HOLDING CO INC

U S BANCORP DEL

UMPQUA HOLDINGS CORP

UNITED BANCSHARES INC

UNITED COMMUNITY FINL CORP OHIO

UNITED BANKSHARES INC

UNITED WESTERN BANCORP INC

UNITY BANCORP INC

UNIVEST CORP OF PENNSYLVANIA

VALLEY FINANCIAL CORP VA

VALLEY NATIONAL BANCORP

VINEYARD NATIONAL BANCORP

VIRGINIA COMMERCE BANCORP

WSFS FINANCIAL CORP

WACHOVIA CORP 2ND NEW

WAINWRIGHT BANK & TRUST CO BOSTN

WASHINGTON BANKING COMPANY

WASHINGTON FEDERAL INC

WASHINGTON MUTUAL INC

WASHINGTON TRUST BANCORP INC

WAYNE SAVINGS BANCSHARES INC NEW

WEBSTER FINL CORP WATERBURY CONN

WELLS FARGO & CO NEW

WESBANCO INC

WEST BANCORPORATION INC

WESTAMERICA BANCORPORATION

WESTERN ALLIANCE BANCORPORATION

WHITNEY HOLDING CORP

WILLOW FINANCIAL BANCORP INC

WILSHIRE BANCORP INC

WINTRUST FINANCIAL CORPORATION

YARDVILLE NATIONAL BANCORP

ZIONS BANCORP

## 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. |
| *BOOK TO MARKET* | Book value of common equity divided by the market value of common equity |
| *DEPOSITS* | Total customer deposits divided by total assets |
| *EQUITY RATIO* | Book value of common equity divided by the 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 |
| *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**

*ATURNOVER*

$$ATURNOVER_{j,t} = \frac{1}{4} \sum_{T=t-3}^{T=t} \sum_{i=1}^{i=n} \frac{\Delta SoldShares_{i,T} * SharePrice_{i,T-12}}{TotalPortfolioValue_{i,T-12}}$$

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.

*OSHTINV*

Fraction of short-term institutional investor ownership on bank total market capitalization, where a short-term institutional investors is identified as having a portfolio turnover superior than 35%.

*OLGTINV*

Fraction of short-term institutional investor ownership on bank total market capitalization, where a short-term institutional investors is identified as having a portfolio turnover inferior or equal to 35%.

**Pre-crisis Bank Risk Measures**

| | |
|---|---|
| *MES* | Marginal expected shortfall computed as the average stock return of a bank over the 5% worst days for the value-weighted CRSP market return during 2004–2006. |
| *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 variables**

| | |
|---|---|
| *SPINV* | Selling pressure at the investor level. Share of the stock of our sample banks that have been sold over one quarter by an institutional investor. |

$$SPINV_{j,t} = \sum_{i=1}^{i=n} \frac{\Delta SoldShares_{i,t} * SharePrice_{i,t-1}}{TotalPortfolioValue_{i,t-1}}$$

| | |
|---|---|
| *SPBANK* | Selling pressure at the firm level. Share of the stock of the bank *i* that have been sold over one quarter *t* by *j* institutional investors expressed in % of its number of shares outstanding. |

$$SPBANK_{t,i} = \sum_{j=1}^{j=n} \frac{\Delta SoldShares_{j,t}}{SRHOUT_{j,t-1}}$$

**Alternative measures of short-term ownership**

| | |
|---|---|
| *MTURNOVER* | Averaged investor portfolios turnover (*TURNOVER*) of a given bank. |
| *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: |

$$CHURNRATIO_{j,t} = 2 * \sum_{i=1}^{n} |Shares_{i,t} * Price_{i,t} - Shares_{i,t-12} * Price_{i,t-12} - Shares_{i,t}$$
$$* (Price_{i,t} - Price_{i,t-12})| / (\sum_{i=1}^{n} Shares_{i,t} * Price_{i,t} + Shares_{i,t-12} * Price_{i,t-12})$$

$$MCHURNRATIO_{i,t} = \sum_{j=1}^{j=n} \frac{CHURNRATIO_{j,t} * SHARESHELD_{j,t-1}}{SRHOUT_{i,t-1}}$$