Institutional Investors and Financial Crisis*

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Abstract

We find that characteristics of stocks owned by institutional investors are changed after the 2007-2008 financial crisis, by analyzing institutional investors that have been reported on the filings of SEC's Form 13F from 2005 to 2011. We find that before the crisis institutional investors prefer stocks with low past volatility. However, we find no such patterns or even opposite patterns after the crisis. Consistent with previous literature, we confirm they consistently have a strong preference for large, liquid, and under-valued stocks before and after the crisis. However, we find that this preference is statistically weak in the middle of financial crisis.

[1] Introduction

During past decades, institutional investors such as banks, insurance companies, and asset management companies have been most successful in being rich. Starting with owning 7% of US equity by 1950s, institutional investors have held more than 50% of the market value of all tradable shares since 2009. However, they had not always been successful. The most recent and shocking failure of institutions happened during 2007-2008. The 2007-2008 fi-

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nancial crisis change the whole landscape of financial industry. For example, the crisis triggers the bankruptcy of Lehman Brothers, one of the biggest financial institutions in history.

In this paper, we examine changes in investment patterns of institutional investors around the crisis. The crisis weakens traditional belief on promised success of institutional investors, and therefore changes their strategy and portfolio compositions. What are the key changes? Are these changes, if any, temporary or persistent? We analyze institutional investors in the US equity market through SEC's 13F database to answer these. Specifically, we run cross-sectional regressions in each quarter using institutional ownerships as dependent variable and stock characteristics as independent variables. Additionally, we run Fama-Macbeth regressions for the robustness.

Our main findings are as follows. We find that institutional investors prefer stocks with low past volatility before the crisis. However, their preference on the low volatility is significantly weaken in the post-crisis periods. They even prefer relatively high-volatility stocks during some quarters after the crisis. This indicates two things. First, institutional investors manage the risk of their portfolio through the historical volatility before the crisis. Holding other stock characteristics constant, they prefer to hold stocks with low historical volatility on average. Second, after the crisis their preference on the volatility is insignificant. This indicates that institutions are relying on other tools instead of historical volatility in managing their risk. Large increases in the volatility during the crisis make the relationship between historical price fluctuation and fundamental changes in risk unclear and noisy. Also, many people become suspicious about the validity of traditional measurements of risk such as historical volatility, and thus they developmany other tools and less relying on the historical volatility to capture downside risk to avoid another crisis.

We also find that institutional investors tend to hold large, liquid, and under-valued stocks during our sample periods. This is consistent with previous literature, such as Gompers and Metrick (2001). Interestingly, we observe that these preferences become statistically weaker during the crisis. However, this effect is only temporary and restricted to few quarters during the crisis. We relate this finding to forced sale of institutions. During the crisis, there are huge redemption requests. The institutions have to sell their holdings to pay their customers. Thus they are forced to sell large liquid stocks because of high liquidity costs during the crisis. Furthermore, we find that estimated coefficients on momentum variables indicate positive relation between momentum and institutional ownership few quarters after the crisis. This indicates that investors try to capture the momentum returns in recovering from the crisis. This also indicates that positive relationship between institutional ownerships and historical volatility are partially due to institutions flights-to-returns.

This study contributes to the literature on institutional investors (Black 1991, Coffee Jr. 1991, Cooley 1977, Gompers and Metrick 2001, Hartzell and Starks 2003, Sias 1996, Song and Szewczyk 2003, and many others) Especially, Gompers and Metrick (2001) find the compositional shift in holdings of large institutional

investors which tend to increase demand for the stock of the large firms and decrease for the small firms from 1980 to 1996. While we confirm that institutional investors still demand for the stocks of large firms during 2005 to 2001, we highlight the new compositional shift in preference of institutional investors in stock volatility.

[2] Prior Literature

There are some incipient approaches about institutional investors that focus on the fundamental views. For example, Cooley (1977) claims the effects of firm specific characteristics such as price, P/E ratio, or returns and various macro-statistics on investors are end-results of a complex psycho-economic process. Thus, according to Cooley, many financial analysts and psychologists had started to move the research focus closer to the decision maker, the investor, to gain intuition to the valuation process. Specifically, Cooley cast light upon the relation between risk and institutional investors' perception. He provided some validating evidence for financial models based on investor variance-aversion.

On the other hands, Sias (1996) studies a different aspect of relation between risk and institutional investors, by considering the historical volatility as one of inputs for the investment judgment of investors. Inconsistent with the prediction by Cooley (1977) and other traditional academic theories, a positive contemporaneous connection is observed between the level of stocks held by institutions and historical stock return volatility. To explain their findings, Sias (1996) suggests two possible stories: either riskier securities attract institutional investors due to higher expected returns, or an increase in institutional holdings causes an increase in volatility. Latter interpretation had been more supported in his empirical results.

Other main streams in the literature focus on the role of institutional investors as a big shareholder with organized power. Representatively, Coffee Jr. (1991) and Black (1991) suggest and strengthened the famous framework that emphasizes the monitoring role of institutional investors through law review journals. Starting with them, many followers reveal the behavior patterns of institutional holdings and the effect of their monitoring role. Yet, Song and Szewczyk (2003) find very little evidence of the effectiveness of shareholder activism on the stock priceby examining the impact of Focus Listing by the Council of institutional investor on targeting poorly performing firms, Chen et. al. (2007) find opposite evidence. By examining acquisition decisions to reveal monitoring process, they conclude only concentrated holdings by independent long-term institutions are related to post-merger performance. Moreover they claimed these institutions tend to hold long-term portfolio rather than trading fre-

quently and only sell in advance of very poor outcomes.

Beyond the monitoring roles, other studies document various relationships between the corporate governance issues and institutional investors. Especially, Hartzell and Starks (2003) focus on the executive compensation. They find that the ownership concentration due to the institutional investors is positively related to the pay-for-performance sensitivity of executive compensation and negatively related to the level of compensation. Moreover they provide conditional evidences on the existence of clientele effects. Recently, Bushee et. al. (2011) also document interesting aspects about the institutional investor preferences for corporate governance mechanisms.

Furthermore, there are some studies with-distinctive approaches. Due to the information asymmetry approaches along with portion of institutional ownership, Potter (1992) reveals the relationship among accounting earnings announcements, institutional investor concentration, and common stock returns. Potter's result consists with the view that higher institutional ownership reduces the informativeness of prices prior to an earnings announcement. Further, Coxet. al. (2004) suggest interesting ideas about institutional investor preferences for corporate social performance. They had investigated UK firms and institutions and figured out that long-term institutional investment is positively related to corporate social performance, which is somewhat consistent with Chen et. al. (2007)'s founding.

Yet, many literature sreveal various phenomena, Gompers and Metrick (2001) document the relation with one of the most curious, which is the stock price. They analyze the demand of institutional investors conditional on various stock specific characteristics. They find that large institutional investors doubled their share of the US equity market during 1980 to 1996. They argue this compositional shift tends to increase demands for stocks of large firms and decrease for small firms. They elegantly point out that this shift, by itself, can justify some part of the disappearance of the historical small-firm stock premium, which is firstly documented on Banz (1981).

[3] Institutional Investors and Financial Crisis

We mainly follow approaches in Gompers and Metrick (2001). We examine various firm-specific characteristics to find the key determinants of institutional investors' ownership. Our main analysis shows the differences in coefficients (and their statistical importance) on those characteristics between pre- and post-crisis periods in determining institutional ownerships. In this paper, a term "financial crisis" refers the global financial crisis from late 2007 to 2008. Moreover, "after crisis" refers the quarters after the shock started, which means from the Dec. 2007.[1] Similarly "before crisis" refers the quarters from March

2005 to Sep. 2007.

Through our analyses, we especially focus on the impacts of liquidity and risk related variables on institutional holdings. We believe that roles of these variables are very important in the recession. By running the regressions in each quarterly cross-section, we will track the sign and significance of coefficients to capture any temporary or permanent changes in the sensitivity of variables in determining institutional ownerships.

3.1 Data

The Securities and Exchange Act of 1934 which are amended in 1978 requires all institutions with greater than $100 million of securities under discretionary management to report their holdings to the SEC. Holdings are reported quarterly through the SEC's 13F filings, which is available in online through Thomson Reuters database in Wharton Research Data Services (WRDS). In this paper, we use quarterly institutional holding data from the first quarter of 2005 to the last quarter of 2011 in 13F database. We assume that a firm has 0% of institutional ownerships if the firm is not reported in 13F database. Throughout this paper, the terms "institution" and" large institution" are used as synonyms for "an ininstitution that file a 13F".

We obtain firm-specific accounting characteristics from Standard & Poor's Coumpustat database.[2] We obtain the stock market information from Center for Research in Security Prices (CRSP) monthly database. We use all stocks listed on the New York Stock Exchange (NYSE) and American Stock Exchange (AMEX). We exclude financial firms. After merging CRSP, 13F, and Compustat data based on CRSP quarterly data, all data containing missing variables are all eliminated. The eliminated observations are less than 5% of total observations.

Finally, our dataset contains 40,564 stock-quarter observations during total 28 quarters-from the first quarter of 2005 to the last quarter of 2011. Detailed information is shown in 〈Table 1〉 below.

1) We divide our sample period into two subsamples and our "after crisis" period includes quarters both during and after crisis. We agree on referee's opinion that it might be helpful if we can divide our sample into three sub-periods; before, during and after crisis. Thus we provide the during-crisis results in Table A Appendix. Also, we try to document some interesting findings during-crisis periods. (See, for example, 4th paragraph in page 1 and the last paragraph in page 16) Ideally, we want to zoom-in the crisis periods. However, unfortunately, our institutional ownership data is only available on quarterly basis. Thus in our during-crisis sub-period we have only 5 quarters (i.e., 5 coefficients to analyze). Since our empirical approaches rely on comparing coefficients from regressions of quarterly cross-sections, it's hard to fairly compare a trend with few coefficients.

2) To filter the Compustat, we declare data options such as indfmt ='INDL', datafmt = 'STD, popsrc = 'C', and consol = 'C'.

〈Table 1〉 Number of Sample Firms

This table shows the number of firms in our final dataset across quarters from 2005 1Q to 2011 4Q.

Quarter	Number of Firms	Quarter	Number of Firms
200503	1,557	200812	1,542
200506	1,583	200903	1,443
200509	1,606	200906	1,458
200512	1,645	200909	1,467
200603	1,529	200912	1,479
200606	1,548	201003	1,248
200609	1,576	201006	1,256
200612	1,609	201009	1,269
200703	1,482	201012	1,282
200706	1,515	201103	1,224
200709	1,537	201106	1,238
200712	1,564	201109	1,256
200803	1,419	201112	1,287
200806	1,455	Total	40,564
200809	1,490	Average	1,448.71

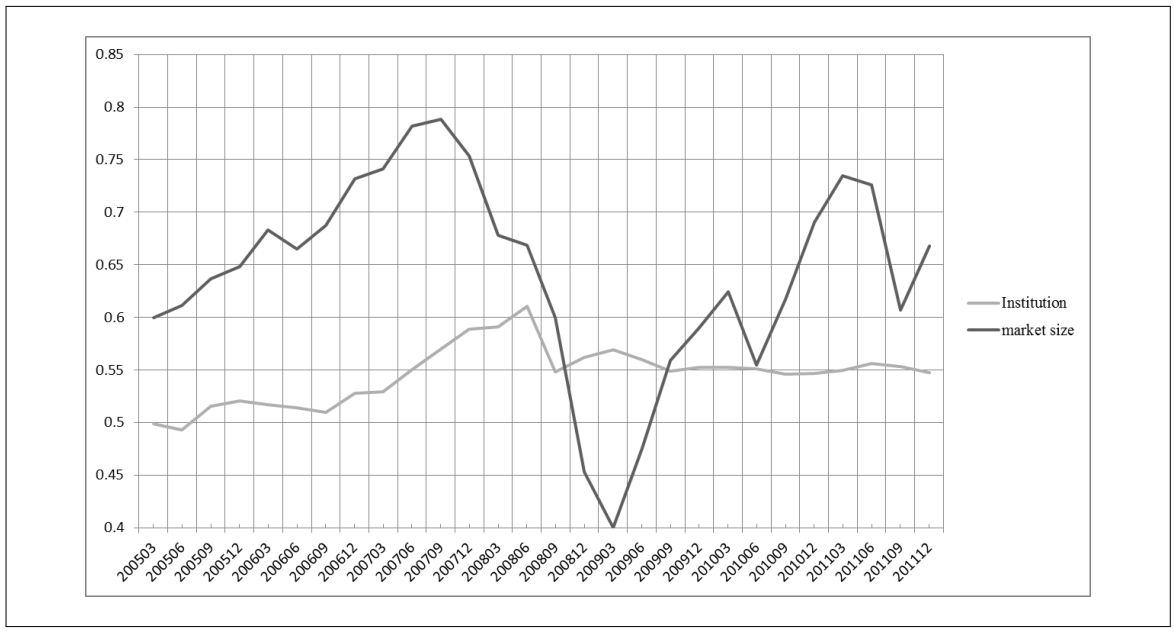
2.2 Institutional Investors' Ownership Trend

In our sample, institutional ownerships are consistently growing before the crisis, decreasing during the crisis and remaining constant after the crisis. The past growing trends of institutional investors are consistent with and well documented in previous papers such as Black (1991) and Gompers and Metrick (2001).

As shown in 〈Figure 1〉 the percentage ownership of institutions had been increasing from 2005 to the middle of 2008. We observe a sharp drop in institutional ownerships during the third quarter of 2008. This is consistent with the fact that financial firms experience large outflows during the financial crisis. After that, the institutional ownership remains stable at near 55%. Just like old times, in up-market, the size of institutional investors had been bigger as they make more money. Starting from the late 2007, the stock market shrinks, but institutional ownerships shrinks after few more quarters. This is consistent with the consensus that institutions have more power to resist bad market conditions. Thus individuals run out of the collapsing market first and this mechanically increases the portion of institutional investors in the market. After few quarters, in the middle of 2008, institutions finally lose their endurance. This results in 5% decrease in their portion. After the crisis, the institutional investors are no longer growing in the size. The government restricts them more to prevent the future crisis and people realize institutions are not a safe haven anymore.

〈Figure 1〉 Percentage of Equity Held by Institutional Investors

This figure represents time-series of the institutional ownerships and total market size. The gray solid line represents the percentage of market owned by all institutions, which is equal to sum of stocks owned by institutional investors divided by the total market size. The black solid line represents the market size normalized by the size at 2005.03.31 and we multiply 0.6 for the scaling purpose.



2.3 Empirical Results

Our main variable of interests is the institutional ownership (*IO*). Following Gompers and Metrick (2001), we define *IO* as a fraction of firm's stock held by institutional investors. We calculate *IO* for a stock at the end of each quarter. We sum shares of all stocks held by any institutional investors in 13f and divide it by the total share outstanding for the firm at the end of the quarter. We assign 0% for *IO* if a stock is not held by any institution.

Following Gompers and Metrick (2001), we attempt to analyze the determinants of *IO*. We use 10 firm- and stock-level characteristics such as historical volatility, liquidity, and returns. All variables are measured at the contemporaneous quarter-end with *IO*, if available. If a variable is not available quarterly, we use closest available value before the quarter end. We omit the units, and we use natural logs for most variables. In the list below, we provide detailed definition for each variable. The sources of following 10 variables are specified in above. (See A. Data section)

X1) ***Siz :*** market capitalization
X2) ***Price :*** price per share
X3) ***The book-to-market ratio :*** book value after adjusting fiscal year which

ended before the most recent June 30, divided by Size as of December 31 during that fiscal year.

X4) *Yield :* amounts of cash dividends for the fiscal year ended before the most recent June 30, divided by size as of December 31 inthat fiscal year.

X5) *Volatility :* the variance of monthly returns over the previous two years.

X6) *Turnover :* volume divided by shares outstanding, measured for a month prior to the beginning of the quarter

X7) *Age :* number of months passed after first return appears in CRSP.

X8) $Momentum_{-3,0}$: percentage return earned in the current quarter, i.e. past three-month gross return

X9) $Momentum_{-12,-3}$: nine-month gross return preceding the quarter of filing

X10) *S&P 500 :* a dummy variable equal to one if the firm is included in the S&P 500 at the quarter of filing, zero other wise.

〈Table 2〉 shows the descriptive statistics for all variables except dummy variables.

〈Table 2〉 Variable Statistics

This table shows the mean and standard deviation of each variable during sample periods from 2005 to 2011.

	IO	Size($k)	Price	BtM	yield	Vol.	turnover	age	mom3	mom9
Mean	0.62	6834	106.61	0.000702	0.00002	0.022	1.93	294.65	0.025	0.0921
Std.	(0.36)	(22526)	(2862.08)	(0.003524)	(0.0001)	(0.038)	(2.07)	(242.46)	(0.301)	(0.586)

〈Table 3〉 shows the matrix of simple correlations among all variables. In 〈Table 3〉, we find correlations of *price, size*, and *turnover* with respect to *IO* is higher than other variables. Although it is too early to make any conclusion, we can presume that institutions prefer the liquidity which is related to *size* and *turnover*. Furthermore, we find a high correlation, above 0.6, between *size* and *price*, and between *size* and *S&P500*. It is not surprising though because our definition of size is the market value which is equal to *price* multiplied by number of outstanding shares. Also, *S&P500* is just a list of top 500 largest firms. One can worry about possible bias in OLS due to the high correlation among those variables. However, we decide include all these variables because of following reasons. First, the size and price of firm is a very traditional and very basic fundamental factor of investing. Second, it is well-known that being listed in *S&P500* itself can make stock price premium due to the additional demand. (e.g., Shleifer, 1986). Therefore excluding any one of three variables can cause the omitted variable problem.

Now we run a cross-sectional regression for each quarter, separately. In sum, we run 28 separate cross-sectional regressions. Specifically, we run the following regression (equation 1 below) for each quarter from Mar. 2005 to Dec. 2011.

$$IO_{i,t} = \alpha_t + \beta_t X_{i,t} + \varepsilon_{i,t} \quad (1)$$

Where *i* represents each individual firm and *t* represents each quarter, $IO_{i,t}$ is the portion of institutional ownership for firm *i* at the end of quarter *t*. Similarly, $X_{i,t}$ is the matrix of ten factors which introduced above (*size, price, book to market*, etc.) for firm *i* at the end of quarter *t*.[3] All dependent variables are logged, except for the dummy variable. The sample size is average 1,449 firms in each quarter from March 2005 to December 2011 and we require all 10 variables are observable to be included in the regression.

〈Table 4〉 shows a trend in coefficient and significance for each variable obtained from the 28 OLS regressions. Since most of similar cross-sectional researches like Gompers and Metrick (2001) have found heteroskedastic errors, we compute statistical significance (t-statistics) based on White's (1980) heteroskedasticity-consistent standard errors. Since estimated coefficients are not independent across quarters, Gompers and Metric (2001) do not report any time-series statistics except simple mean. We agree with concerns in Gompers and Metric (2001), thus most of our analyses are based on 28 separate cross-sectional regressions. In addition to this, we examine Fama-Macbeth (1973) regressions with Newey-West (1987) heteroskedasticity and autocorrelation consistent covariance matrix for the robustness purposes. We report these results in *Appendix.*

〈Table 3〉 Pearson Correlation Coefficients

	IO	Price	Size	Age	Book to Market	Turnover	Yield	Volatility	Mom-3,0	Mom-12,-3	S&P500
IO	1										
Price	0.45997	1									
	[0.0000]										
Size	0.44592	0.74633	1								
	[0.0000]	[0.0000]									
Age	0.15033	0.27899	0.29317	1							
	[0.0000]	[0.0000]	[0.0000]								
Book to	0.09323	0.15338	0.05684	0.06938	1						
Market	[0.0000]	[0.0000]	[0.0000]	[0.0000]							
Turnover	0.44781	0.26445	0.44095	0.05608	-0.01745	1					
	[0.0000]	[0.0000]	[0.0000]	[0.0000]	[0.0004]						
Yield	-0.01407	-0.01689	-0.01382	0.03403	-0.03838	-0.03597	1				
	[0.0046]	[0.0007]	[0.0054]	[0.0000]	[0.0000]	[0.0000]					
Volatility	-0.17483	-0.55549	-0.47757	-0.26884	-0.14644	0.1194	-0.03514	1			
	[0.0000]	[0.0000]	[0.0000]	[0.0000]	[0.0000]	[0.0000]	[0.0000]				
Mom-3,0	0.00885	0.10322	0.05662	-0.00262	-0.02314	0.05099	-0.0399	0.11887	1		
	[0.0746]	[0.0000]	[0.0000]	[0.5975]	[0.0000]	[0.0000]	[0.0000]	[0.0000]			
Mom-12,-3	0.03679	0.14541	0.08245	-0.00542	-0.00926	0.06155	-0.04299	0.09471	-0.05711	1	
	[0.0000]	[0.0000]	[0.0000]	[0.2748]	[0.0623]	[0.0000]	[0.0000]	[0.0000]	[0.0000]		
S&P500	0.17504	0.3271	0.63825	0.31335	0.02254	0.21327	0.007	-0.30318	-0.02088	-0.01324	1
	[0.0000]	[0.0000]	[0.0000]	[0.0000]	[0.0000]	[0.0000]	[0.1588]	[0.0000]	[0.0000]	[0.0000]	

3) We do not include *S&P500* dummy for Dec. 2011, due to our limited availability for S&P constituent data.

〈Table 4〉 Determinants of Institutional Ownership

This table summarizes the results from 28 quarterly (cross-sectional) regressions for the sample period. The dependent variable is the institutional ownership as a percentage of the firm's market capitalization (*IO*). All variables except institutional ownership, *S&P 500* membership, and momentum are expressed in natural logarithms. More specific description is available above A. Data section. The table gives the number of positive coefficients, number of negative coefficients, the number of significantly positive coefficients (at the 95 percent confidence level and the number of significantly negative coefficients (at the 95 percent confidence level). Significance of the quarterly coefficients is computed using White-HC standard errors

Variables	Average Coefficients	Number Positive [significant]	Number Negative [significant]
Constant	0.0598	19 [4]	9 [1]
Price	0.0957	28 [28]	0 [0]
Size	0.0152	25 [15]	3 [0]
Book to Market	0.0038	26 [7]	2 [0]
Turnover	0.1093	28 [28]	0 [0]
Yield	21.081	16 [2]	12 [5]
Volatility	-0.0107	10 [4]	18 [12]
Age	0.0091	26 [5]	2 [0]
Mom-3,0	-0.0743	4 [0]	24 [15]
Mom-12,-3	-0.0487	2 [0]	26 [16]
S&P500	-0.0710	0 [0]	27 [24]

Our results in 〈Table 4〉 strongly suggest that *price* and *turnover* are two most important variables in determining institutional holdings. *price* and *turnover* are significantly positive through all quarters. Also, *size* is positively related, although there are few quarters that *size* is less significant. All these three variables are known as proxies for the liquidity and they are positive and significant in all or most of our sample periods. This suggests that, consistent with traditional belief, institutional investors strongly demand for the liquidity.

Among other variables, we find that *S&P500* are negatively correlated in all quarters and

significant in almost all quarters. However, we find mixed evidence from *volatility* and *yield*. We find that coefficients for *yield* are half positive and half negative through our sample periods, and insignificant in many quarters. Although *volatility* shows similar aspects, we believethat the negative correlation between *IO* and *volatility* is more convincible, because negative quartersare more statistically significant. In sum, results of *S&P500*, *volatility*, and *yield* are strongly against to the previous one from Gompers and Metrick (2001). In Gompers and Metrick's data from 1873 to 1996, *S&P500* and *volatility* shows both strongly positive correlations and coefficient for *yield* was significantly negative, while our evidence using recent data shows the opposites. Our finding is also against Cooley (1977)'s finding. We presume the reason behind is the financial crisis. (See Table 5 and Table 6)

As expected in Gompers and Metrick (2001), large institutions are not momentum investors. We find that the coefficients for two momentum variables are both negative and significant through many quarters. This is opposite of simple correlation results in 〈Table 3〉. The simple correlations, however, are not adjusted by other variables. The positive correlations are probably caused by positive correlations of momentum variables with respect to price and size, which are strongly positively related to *IO*. Here, OLS controls the size and price effect, thus we conclude that negative correlations are observed. Indeed, the negative relationship indicates the profit realizing needs of institutional investors. In other words, institutions may want to sell their shares when the past returns are good to realized profit. Therefore, high past return accelerate institution's selling and they are in general not the momentum traders.

Since Fama and French (1993), it is well known that *book-to-market* is one of the risk factors. 〈Table 4〉 shows that institutional investors weakly prefer high *book-to-market* stocks. We observe two negative coefficients for *book to market* in March and June 2008. These quarters are in the middle of crisis.

Overall, we find that institutional investors strongly demand for large, liquid stocks that have low past returns. While the preference on large liquid are not changed during our sample periods, the preference on characteristics related with the prudence like *volatility*, *S&P500* and *yield* have been dramatically changed. To figure out what causes this change and how the crisis matters, we separately report the results before and after the crisis quarters in 〈Table 5〉 and 〈Table 6〉 respectively.

〈Table 5〉 and 〈Table 6〉 show the interesting results that signs of coefficients for *volatility* and *yield* are significantly changed between before and after crisis, while signs and significances of other variables are not changed much.

Before the crisis, the coefficient for *yield* is on average negative, and significantly negative during many quarters. The pre-crisis period (not post-crisis period) results are consistent with prior studies like Gompers and Metrick (2001). Thus it shows that the financial crisis changes institutional investors' preference on *yield*. There are two possible stories; first, in the recession periods, everyone prefers cash, therefore cash dividends are more preferred. Indeed, the cash dividend during

crisis can be understood as a strong sign of the financial strength. Secondly, firms with less cash (here, no cash dividend firms) tend to have less resistance to the financial crisis probably due to the liquidity. Thus institutional investors sell those firms first, during the crisis.

The coefficient for *volatility* is negative during all quarters and statistically significant during most quarters before the crisis. This supports the traditional view that large institutions are risk averse and managing their risk measured by historical *volatility*. However, the sign of coefficients became mixed (both negative and positive) and insignificant for many quarters after the crisis. Actually there are equally 4 quarters of significantly positive and significantly negative coefficients for *volatility* after the crisis.

〈Table 5〉 Determinants of Institutional Ownership before the Crisis

The table shows the results from 11 quarterly (cross-sectional) regressions for the sample period from March 2005 to September 2007 which refers 'before crisis' area. All other descriptions for variables and table are same as those in 〈Table 4〉.

Variables	Average Coefficients	Number Positive [significant]	Number Negative [significant]
Constant	-0.0650	5 [0]	6 [1]
Price	0.0928	11 [11]	0 [0]
Size	0.0152	11 [6]	0 [0]
Book to Market	0.0042	11 [1]	0 [0]
Turnover	0.1185	11 [11]	0 [0]
Yield	-107.47	5 [0]	6 [4]
Volatility	-0.0288	0 [0]	11 [8]
Age	0.0139	11 [4]	0 [0]
Mom-3,0	-0.0921	0 [0]	11 [7]
Mom-12,-3	-0.0555	0 [0]	11 [9]
S&P500	-0.0680	0 [0]	11 [9]

〈Table 6〉 Determinants of Institutional Ownership after the Crisis

The table shows the results from 17 quarterly (cross-sectional) regressions for the sample period from December 2007 to December 2011 which refers 'after crisis' area. All other descriptions for variables and table are same as those in 〈Table 4〉.

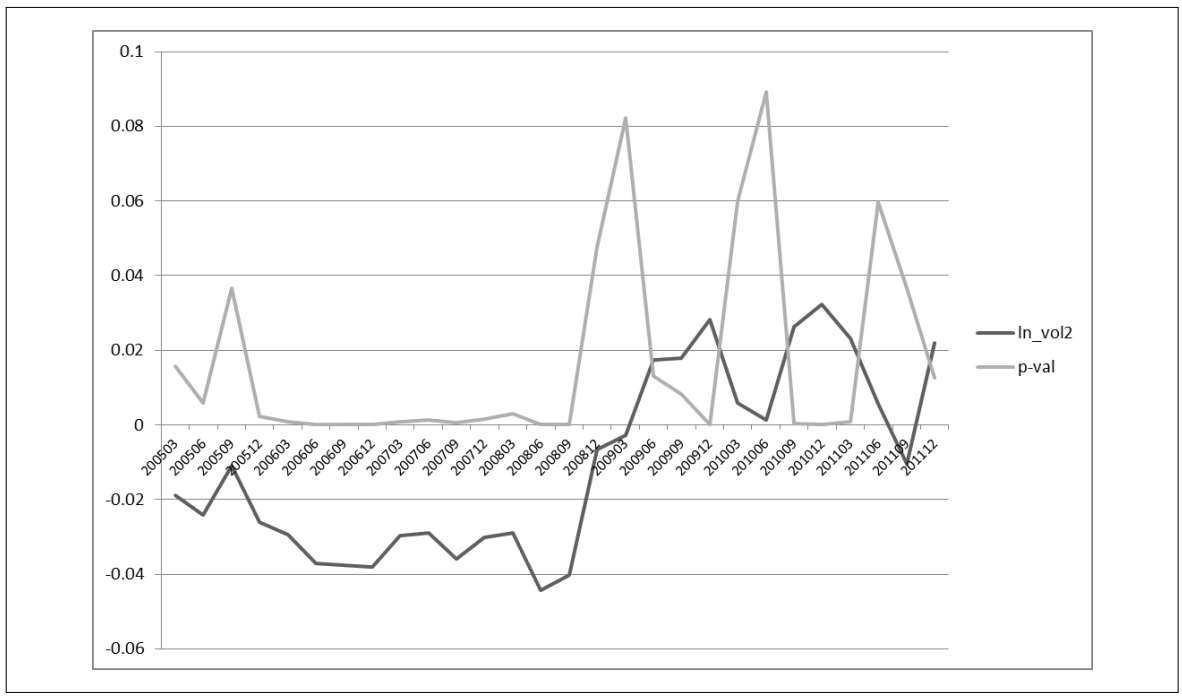
Variables	Average Coefficients	Number Positive [significant]	Number Negative [significant]
Constant	0.1405	14 [4]	3 [0]
Price	0.0976	17 [17]	0 [0]
Size	0.0152	14 [9]	3 [0]
Book to Market	0.0037	15 [6]	2 [0]
Turnover	0.1034	17 [17]	0 [0]
Yield	104.26	11 [2]	6 [1]
Volatility	0.0010	10 [4]	7 [4]
Age	0.0060	15 [1]	2 [0]
Mom-3,0	-0.0628	4 [0]	13 [8]
Mom-12,-3	-0.0443	2 [0]	15 [7]
S&P500	-0.0729	0 [0]	16 [15]

〈Figure 2〉 shows how institutional investors change their preference on the historical volatility after experiencing the crisis. Starting from the last quarter of 2008, the coefficients for volatility are very unstable as shown in the both graphs of coefficients and its p-values. This is contrasted with the constant significantly negative coefficients before the crisis quarters. Before the crisis, our results suggest that institutional investors maintain their own rule to control historical volatility of their portfolio to manage the risk. However, the investors are hurt from the crisis, regardless of low historical volatility of their portfolio. This means that the historical volatility, which is a simple but widely used measure of risks, is failed to predict the huge failure of market. Thus this breaks traditional beliefs on the historical volatility as a simple but widely used proxy for risks. Our results are consistent with Danielsson, Valenzuela, and Zer (2015) who document that the volatility has little or no effects on predict-

ing the financial crisis. Therefore our evidence suggests that institutional investors learned how they treat the historical volatility from the crisis. Indeed, many articles and papers point out the failure of risk management of institutional investors. (e.g., Ashby, 2010; Acharya et. al., 2011, and many others) Some of those studies focus on regulatory changes in the bank industry. We focus on the large institutional investors. After the crisis, they do not think historical volatility is a crucial in their portfolio management.

〈Figure 2〉 Trends of Coefficients for Volatility and Its P-values

This figure shows coefficients and p-values for volatility for each quarter from March 2005 to December 2011. The above black (darker) solid line shows the coefficient of volatility. The grey line shows the series of scaled p-value (i.e., p-value divided by 10). The p-value is calculated based on White's HC standard errors.



Although our stories are mainly based on behavioral explanations, we want to provide some theoretical explanations based on the low-volatility anomaly. There is a wide consensus that low historical volatility stocks earn high returns. (e.g., Anget al., 2006, 2009; Baker et. al., 2011; and many others) Dutt and Humphery-Jenner (2013) also point out the importance of low-volatility investing. There are several explanations such as the limits to arbitrage or asset volatility that explain this anomaly. One of which is the systemic risk. Lower historical volatility stocks may have higher systemic risks. (e.g., Acharya et. al.,

2011) Large parts of high historical volatility can be idiosyncratic risks. Low-volatility investing of institutions amplifies the systemic risks. Before the crisis, the systemic risk is not highlighted and not viewed as a problem. However, it is highlighted after the crisis. Many practitioners and academic researchers view the crisis as a failure of managing systemic risks. (e.g., Bullard et. al., 2009) Thus institutions start to manage the systemic part of their risks. Thus they less rely on the level of historical (raw) volatility and more achieve stocks with high historical volatility and high idiosyncratic but low systemic risks.

Furthermore, 〈Table 6〉 shows there are few quarters of negative coefficients for size, book to market, and age. It is interesting because those three variables tend to have significantly positive coefficients during other quarters. 〈Table A〉 in *Appendix* shows these unusual quarters (except for negative *age* quarters) are mostly observed during the crisis (i.e.,between 2007: Q4 and 2008: Q4). Although they are not statistically significant at the conventional level, it is worthwhile to notice those abnormal quarters to understand the effect of crisis. This indicates that the crisis even change the traditional characteristics of stock holdings, such as size, book to market, although the effects are only temporarily. This is consistent with the forced-sale story in which institutional investors have to sell their large and liquid holdings to pay large redemption requests triggered by the crisis.

In addition, institutions are less behaved as contrarian investors during and after the crisis, compare to pre-crisis quarters. Positive coefficients of momentum variables are all appeared in the post-crisis periods. This indicates that even institutional investors, who are considered to be very rational and resourceful investors, chase the momentums after the crisis, rather than investing contrarily to the past returns.

[4] Conclusion

In this paper, we document changes in institutional investors' preferences around the financial crisis of 2007-2008. We examine all institutions reported on the filings of the SEC's Form 13F from 2005 to 2011. Based on quarterly data obtained from 13F, Compustat, and CRSP, the fraction of institutional ownership has been analyzed as main variable. We focus on the effect of financial crisis on the relationship between institutional ownership and stock characteristics.

We find that institutional investors have strongly demanded for large, liquid stocks have low past returns, consistent with previous literatures on similar studies. However, inconsistent with previous studies, in our samples, preference on characteristics related with the prudence like volatility and yieldare dramatically changed. We also find that preferences on the traditional risk factors, like size and book to

market are temporarily distorted during the crisis. While institutional investors in pre-crisis quarters prefer stocks with low historical volatility and yield, we find no such relationships or even opposite relationships during the post-crisis quarters. Furthermore, we find weak evidence that institutional investors tend to behave as momentum investors during and after the crisis, contrast to other periods.

We attribute our findings to the lessons from the crisis. Institutional learn from the crisis that historical volatility is not useful in accessing actual risks of their portfolio. We also provide some theoretical backgrounds to support our results that low (high) historical volatility may have high (lower) systemic risks. The crisis enlightens the importance of managing systemic risks. To enhance this idea, further researches are needed. For example, one can separate the volatility into two parts (i.e., systemic and idiosyncratic parts) and examine changes in institutional holdings separately. Furthermore, one can use more sophisticated model, such as regime switching model, to confirm a structural breaks in the relationship between institutional holdings stock characteristics.

[5] Appendix

〈Table A〉 Determinants of Institutional Ownership during the Crisis

The table shows the results from 5 quarterly (cross-sectional) regressions for the sample period from December 2007 to December 2008 which refers 'after crisis' area. All other descriptions for variables and table are same as those in 〈Table 4〉.

Variables	Average Coefficients	Number Positive [significant]	Number Negative [significant]
Constant	0.1634	4 [2]	1 [0]
Price	0.0883	5 [5]	0 [0]
Size	0.0023	3 [1]	2 [0]
Book to Market	0.0012	3 [0]	2 [0]
Turnover	0.1306	5 [5]	0 [0]
Yield	26.677	3 [0]	2 [0]
Volatility	-0.0300	0 [0]	5 [4]
Age	0.0070	5 [0]	0 [0]
Mom-3,0	-0.0497	2 [0]	3 [2]
Mom-12,-3	-0.0471	0 [0]	5 [2]
S&P500	-0.0670	0 [0]	5 [5]

〈Table B〉 Determinants of Institutional Ownership with Fama-Macbeth regression

The table provides results of Fama-Macbeth (1973) regression using Newey-West (1987) heteroskedasticity and autocorrelation consistent covariance matrix for our data from March 2005 to December 2011.

Variables	Coefficients	StdErr	Prob-t
Constant	0.0598	0.0441	0.1868
Price	0.0957	0.0028	<.0001
Size	0.0152	0.0035	0.0001
Book to Market	0.0038	0.0005	<.0001
Turnover	0.1093	0.0071	<.0001
Yield	21.081	57.6567	0.7175
Volatility	-0.0107	0.0083	0.2067
Age	0.0091	0.0017	<.0001
Mom-3,0	-0.0743	0.0115	<.0001
Mom-12,-3	-0.0487	0.0059	<.0001
S&P500	-0.0710	0.0066	<.0001

〈Table C〉 Determinants of Institutional Ownership with Fama-Macbeth regression after the crisis

The table provides results of Fama-Macbeth (1973) regression using Newey-West (1987) heteroskedasticity and autocorrelation consistent covariance matrix for our data from December 2007 to December 2011.

Variables	Coefficients	StdErr	Prob-t
Constant	0.1405	0.0384	0.0021
Price	0.0976	0.0976	<.0001
Size	0.0152	0.0152	0.0107
Book to Market	0.0037	0.0008	0.0004
Turnover	0.1034	0.1034	<.0001
Yield	104.26	53.1681	0.0675
Volatility	0.0010	0.0095	0.9162
Age	0.0060	0.0014	0.0004
Mom-3,0	-0.0628	0.0157	0.0010
Mom-12,-3	-0.0443	0.0083	<.0001
S&P500	-0.0729	0.0079	<.0001

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금융위기 이전과 이후 미국 기관투자자들의 투자 패턴 변화

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요 약

본 논문에서는 2007-2008 금융위기가 기관투자자들이 보유하고 있는 주식의 특성에 미치는 영향을 연구하였습니다. 본 연구는 2005년 부터 2011년 까지 미국 주식시장에 상장되어 있는 주식에 대한 자료와 SEC의 13F filing에 공시되어 있는 기관 투자자들의 자료를 대상으로 분석 하였습니다. 분석 결과에 의하면 금융위기 이전에는 기관투자자들이 낮은 변동성을 가지는 주식을 선호하는 경향이 있었으나, 금융위기 이후에는 이러한 경향성이 사라졌으며, 특정기간에서는 오히려 높은 변동성을 가지는 주식을 많이 보유하고 있는 것으로 나타났습니다. 또한 기존 문헌들과 마찬가지로 기관 투자자들은 주식의 유동성이 높을수록, 저평가되어 있을 수 록 많이 보유하고 있는 것을 확인했습니다. 그러나 우리는 이러한 경향 마저 금융위기 기간 동안에는 약해지는 것을 확인 하였습니다.

주제어 : *기관투자자, 금융위기, 변동성, 유동성, 시가총액, 과소평가*
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