# THE IMPACT OF INSTITUTIONAL HOLDING AND BANK LEVERAGE ON STOCK RETURN VOLATILITY

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# Abstract

This paper analyses the relation between stock return volatility and institutional holdings and company's leverage in the US banking industry in the period 1980 to 2013. We find that institutional holdings and bank leverage have a negative relationship with stock return volatility. Our results are not driven only by cross-sectional variation as we find that bank characteristics such as size, age and ROE are significant in a fixed-effect specification.



Key word: institutional ownership; stock return volatility; bank leverage

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# 1. Introduction

Institutional investors have increased their holding in commercial banks in the past 50 years. In the early post war period, institutional holdings represent around 15% of bank's equity market, which grew to about 30% in the mid-70s, and has risen to 40% by the mid 80's. In the mid-90s, institutional ownership exceeded individual ownership in commercial banks for the first time. In 1995, institutional investors held over 50% of US-listed shares and this ratio has increased from 46.6% in 1987 to 57.2% in 1995. In some large banks, institutional investors own over 70% of total shares outstanding. (Analysis of corporate governance for commercial banks, Hongquan, 2005) Currently, institutional investors are the largest shareholder type in US banking industry. Institutions include pension funds, mutual funds, trust funds and life insurance department. The importance of institutional investors calls for the investigation of how they may affect market stability, which can be represented by volatility of stock returns.

We use D/E ratio to represent leverage in this paper. Bank leverage has long been a hot issue in risk management. Banking industry is known for having the highest D/E ratio. To some extent, banking is all about leverage. Bank leverage is an important capital requirement. Although bank's profit is mainly from interest discrepancy in lending and borrowing, banks viability is sensitive to how the lending ratio is managed; if bank debt is too high compared with shareholder equity, bank run may cause insolvency. Generally, leverage amplifies systematic risk. In economic upturns, companies with more leverage can enjoy higher than average returns while in bear market, they are also the ones that suffer from greater loss. Restriction on leverage in banking industry is extremely important: When banks are financed with more capital, it is easier for them to absorb losses on assets. So a bank is less vulnerable in economic downturns.

The organization of this paper is as follows: We review related literature on how institutional holding and leverage can affect stock return volatility, section 5 specifies methodology employed in this paper including data and variables. In section 6, we conduct the regression models and introduce fixed effect dummy variables to get unbiased coefficients. The final section concludes the paper.

## 2. Literature review

It is commonly hold that institutional investors are superior in information gathering and processing over individual investors. In the last century, institutional investor has been playing a significant role in US equity market. They are perceived to be better informed than individual investors (Lin. et. al 2007; Chiang et al 2009, Cohen et al, 2002, Campbell, 2009). Based on its superior information and preference (Rakotomaves, 2011), stocks with large portion of institutional holdings should exhibit more stable prices and lower volatility.

Conversely, there are also studies which prove a positive relationship between institutional holdings and stock volatility. Friedman (1995) holds that when the market is filled mostly with small investors, their order to buy or sell can cancel each other due to the law of large numbers, not leading to a large change in market price nor increasing volatility. However, when there is large institutional investors, decision making is concentrated by increasing institutional ownership, portfolio changes made by certain investors can provide misrepresented signals, causing market price more volatile even for random reasons and thus lead to higher volatility. Kothare and Laux find empirical evidence that institutional investors are associated with high volatility stocks.

Fagere and Shawky (2003) find out the difference in security holding between

institutional and individual investor during the time of market decline. They recorded that from March to November, 2000, when Nasdaq Composite Index fell 46.23% in value, institutional investors held stocks with less volatility than individual investors, indicating a positive relationship between institutional ownership and stock return volatility. The result is also in accordance with the preference of institutional investor: they prefer to hold lower volatility stocks in a declining market, indicating they have greater sensitivity to downside risk than individual investors. As consequence, institutional investors have better performance during certain period.

Rubin and Smith (2009) find empirical evidence that the relationship between institutional ownership and stock return volatility depends on dividend policy: institutional ownership is negatively (positively) related to non- dividend (dividend) paying stocks. The empirical result is consistent with institutional preference for low volatility stocks however higher level of institutional ownership will cause higher level of volatility due to their trading behavior.

In 'Institutional Ownership and Stock Volatility: An Information Asymmetry Perspective' , institutional ownership is a convex function of stock volatility: as the percentage of institutional ownership increases, volatility declines at a decreasing rate until it reaches its minimum threshold of 60%, after which volatility starts to increase.

'Leverage effect' shows the well- established relationship between stock return and volatility: volatility increases when stock price falls. The earliest study into this phenomenon is done by Black (1976), and it has been repeatedly proved by Christie (1982), Schwert (1989), Glosten, Jogannathan and Runkle (1992), Brann, Nelson and Sunnier (1995). (Stephen Figlewski and Xiaozu Wang, 2000). However, Duffee (1995) argues that when include small firms into the sample, the relationship doesn't hold anymore.

If exploring the explanation for leverage effect inside the firm, a standard explanation

is the effect that a change in market valuation of firm's equity has on firm's leverage which will also affect firm's capital structure. (Stephen Figlewski, Xiaozu Wang, 2000). One of their contributions in their paper is to examine whether directly measured changes in leverage, computed from actual debt and equity outstanding, are also associated with 'leverage effect'. In one of the regression, they separate leverage changes into changes in outstanding debt, outstanding shares and market valuation of shares. Although a true leverage effect should not depend on the cause of change in leverage, but they find that neither changes in outstanding bond nor stock produced a significant change in volatility. Only changes in stock price can affect volatility when market falls. Campbell, Hetschel (1992) and Bekaert, Wu also developed models for asymmetric volatility: During market downturns, a significant decrease in market price will lead to a large increase of stock return volatility, which is more apparent than price rising period.

# 3. Methodology

## 3.1 Data and variable

We collect data from three sources: institutional holding percentage data from Thomson- Reuters institutional holding database, stock price and stock return data from The Center for Research in Security Prices (CRSP), and accounting data from The CRSP/Compustat Merged database.

Our data period covers more than 30 years from 1980 to 2013. We firstly calculated yearly stock return volatility from monthly data and merged it with institutional holdings, leverage, ROE, size and age data. After deleting incomplete information, the final sample has 7191 annual observations for 1970 firms in the United States, the following is the description of variables.

### 3.1.1 Volatility

Our dependent variable throughout the paper is volatility. Since institutional ownership and accounting data is annually from 1980 to 2013, volatility is calculated annually based on the standard deviation of monthly returns

### 3.1.2 Institutional holdings

We collect data from Thomson- Reuters institutional (13F) holdings to measure the total percentage of bank's shares outstanding held by institutions at the end of each year from 1980 to 2013.

### 3.1.3 Leverage

In this paper, we take bank's D/E ratio to measure bank's leverage condition at the end of each year. Calculated as long term debt divided by market value of equity, Market value of equity equals shares outstanding at the end of each year time the stock's closing price at the end of the calendar year.

### 3.1.4 Control variables

According to Rubin and Smith (2009), literature in corporate finance finds that there is connection between firm-specific characters and volatility. We use three control variables that have been shown to be related to volatility: firm size (size), firm age (age) and accounting profitability (ROE).

The three control variables that we include in the model are proved to be related to volatility by prior researchers: (1). Sias (1996) find out a negative relationship between size and volatility, indicating the larger the firm size, the less volatile the stock return is. (2). Pastor and Veronesi (2003) claimed that younger firms are

perceived to have more uncertainty in profitability and thus have higher volatility in stock market. (3). Wei and Zhang (2006) suggest a negative relationship between stock return volatility and level of profitability which is represented by ROE.

## 3.2 Model

There are eight set of specifications of an OLS regression model in this paper. Firstly, we conduct regression of stock volatility on institutional holdings and bank size. Secondly, we include both institutional holdings and bank leverage, as well as control variables ROE, size and age followed by an industry and year fixed-effect model in the third specification with all variables. Finally, we conduct a firm and year fixed-effect model in the fourth specification.

In the second part of regression, we conduct specifications in the same way as in the first part using fixed-effect model except for dividing banks into large cap and small cap groups. We discover more detailed information by comparing results between different bank sizes.

We did not follow a usual way to avoid endogenous problem which is to have all dependent variables lag one period than independent variable. So there can be flaw in regression results which is not in accordance with empirical norms.

## 3.3 Summary statistics

Table 1 provides descriptive summary of data on number of institutional holdings, bank size and stock return volatility, from which we can have a big picture of the industry level.

From the table we find out an increasing trend institutional holding during the past

over 30 years. There are different opinions on how institutional investors can pose effect on market stability. The supporters believe that institutional investors can help diversify and spread risk. Besides, with different types of institutional investors and different investment strategies they adopt, stock market tends to be stabilized. The quick reaction to market can also help adjusting asset price to fundamentals in the market (Pim Lescrauwaet, 2006). However, with the large volume of institutional trading in the market, there will be misleading signals which are unfavorable.

# 4. Regression

## 4.1 Regression part one

Table 2 is the regression result using volatility as dependent variable. In the first column, the only dependent variable is institutional holdings and size. We find a negative relationship existed between firm size and volatility at 99% confidence level, indicating that the larger the firm size, the lower the stock return volatility.

In the second column, we added several control variables: size, age and ROE as well as leverage. The impact that institutional holding and leverage have on volatility is not significant. Meanwhile, bank size has a negative correlation as was also shown in specification (1). Interestingly, the regression result shows that age is positively correlated with the stock return volatility.

In the third column, we introduce two dummy variables: industry fixed effect and year fixed effect. After omitting controlling for time and industry, we find out that institutional holding is negatively correlated with stock return volatility. The result is consistent with two hypotheses by Amir Rubin and Daniel R. Smith (2009):

(1) Institutional sophistication: institutional investors have access to more information than individual investors (Lin et al, 2007) and more price information helps

reduce variance of stock returns.

(2) Institutional preference hypothesis: institutional investors prefer low volatility and stable dividend stocks, which enhance the negative relationship with volatility.

We also find that bank age and ROE have positive influence on volatility, while size has a negative relationship with volatility.

In the fourth specification, the dummy variables we use are firm fixed- effect and year fixed-effect. However, no dependent variable is significant in explaining changes in stock return volatility.

## 4.2. Regression part two

We run the same regression in the second part except that we split banks into two groups by their size: small firms and large firms. In Table 3 column 6, dependent variable is stock return volatility of large banks, we find that institutional holdings, leverage and size are negatively related to volatility. Negative relationship between institutional holding and stock return volatility applies with institutional investor's superior information and their preference for low volatility stocks (Rakotomaves, 2011, A. Rubin, D. R.Smith, 2009 ).

In our regression, the negative relationship between leverage and stock return volatility can be explained by endogeneity in the following ways:

(1) Omit variables. In our regression, we only take three control variables: ROE, size and age. However, in real world, there are more factors that can influence stock return volatility and are related to variables we have in the model. Thus, the influence of these omitted variables is in error term which interacts with independent variables, and endogenous problem arises.

(2) Mutual influence between independent and dependent variable. As it is common in

economic models, while independent variables have impact on dependent variable, the change of dependent variable will also cause a change in independent variables. In this case, as error term interacts with dependent variable, the relationship will transfer to independent variables and cause endogenous problems.

## 5. Conclusion

In this study, we investigated that institutional holdings and bank leverage are negatively related to stock return volatility. Our result is consistent with literature: institutional investor has superior information and prefer stocks with lower volatility, thus the higher the institutional holding, the lower stock return volatility is (Rakotomaves, 2011, A. Rubin, D. R.Smith, 2009). And financial leverage decreases the level of stock return volatility by endogenous problems.

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# List of Tables

## Table 1 Summary Statistics

The sample includes 1970 banks and 7191 firm annual observations in the period 1980 to 2013. The table reports information on mean of stock return volatility, mean of institutional holdings (%), mean of bank leverage, mean of bank size (million), age (year) and ROE across all banks. All data is on annual base. We also include standard deviation, Min and Max values to have a clue of data distribution.

| 1980-1984 | Obs | Mean | Std. Dev. | Min | Ma |
|---|---|---|---|---|---|
| Volatility | 135 | 0.99 | 0.36 | 0.18 | 2.14 |
| Institution | 133 | 0.30 | 0.21 | 0.01 | 0.70 |
| Size | 135 | 627.99 | 1180.12 | 0.00 | 8090.45 |
| Age | 135 | 12.53 | 9.00 | 0.00 | 54.00 |
| Leverage | 125 | 0.73 | 1.64 | 0.00 | 13.14 |
| ROE | 125 | 0.13 | 0.23 | -2.28 | 0.33 |

| 1985-1989 | Obs | Mean | Std. Dev. | Min | Max |
|---|---|---|---|---|---|
| Volatility | 272 | 0.96 | 0.34 | 0.17 | 2.16 |
| Institution | 261 | 0.25 | 0.21 | 0.00 | 0.96 |
| Size | 274 | 682.18 | 1896.73 | 0.00 | 14544.96 |
| Age | 274 | 7.81 | 7.69 | 0.00 | 56.00 |
| Leverage | 133 | 0.79 | 1.90 | 0.00 | 17.39 |
| ROE | 155 | -0.27 | 2.99 | -36.10 | 0.67 |

| 1990-1994 | Obs | Mean | Std. Dev. | Min | Max |
|---|---|---|---|---|---|
| Volatility | 591 | 0.91 | 0.35 | 0.00 | 2.33 |
| Institution | 568 | 0.20 | 0.18 | 0.00 | 0.77 |
| Size | 601 | 555.54 | 1836.33 | 0.00 | 15275.50 |
| Age | 601 | 7.84 | 6.49 | 0.00 | 29.00 |
| Leverage | 371 | 0.95 | 2.20 | 0.00 | 30.05 |
| ROE | 396 | -0.23 | 3.85 | -73.87 | 3.94 |

| 1995-1999 | Obs | Mean | Std. Dev. | Min | Max |
|---|---|---|---|---|---|
| Volatility | 817 | 0.96 | 0.36 | 0.03 | 2.39 |
| Institution | 813 | 0.19 | 0.18 | 0.00 | 0.87 |
| Size | 820 | 3227.10 | 19975.45 | 0.00 | 384126.50 |
| Age | 821 | 8.56 | 7.67 | 0.00 | 37.00 |
| Leverage | 808 | 0.55 | 0.87 | 0.00 | 7.65 |
| ROE | 812 | 0.06 | 0.08 | -1.36 | 0.48 |

| 2000-2004 | Obs | Mean | Std. Dev. | Min | Max |
|---|---|---|---|---|---|
| Volatility | 2077 | 1.06 | 0.50 | 0.01 | 6.82 |
| Institution | 2079 | 0.21 | 0.19 | 0.00 | 1.00 |
| Size | 2078 | 6640.85 | 80780.73 | 0.14 | 2103249.00 |
| Age | 2079 | 10.06 | 8.01 | 0.00 | 44.00 |
| Leverage | 2075 | 1.61 | 9.27 | 0.00 | 218.13 |
| ROE | 2077 | 0.12 | 0.63 | -6.43 | 7.35 |

| 2005-2009 | Obs | Mean | Std. Dev. | Min | Max |
|---|---|---|---|---|---|
| Volatility | 1922 | 1.12 | 0.63 | 0.00 | 8.41 |
| Institution | 1939 | 0.29 | 0.24 | 0.00 | 1.66 |
| Size | 1939 | 56372.26 | 618129.40 | 0.97 | 12200000.00 |
| Age | 1939 | 12.40 | 8.85 | 0.00 | 49.00 |
| Leverage | 1935 | 1.61 | 5.02 | 0.00 | 111.10 |
| ROE | 1936 | -0.28 | 2.53 | -70.71 | 12.12 |

| 2010-2013 | Obs | Mean | Std. Dev. | Min | Max |
|---|---|---|---|---|---|
| Volatility | 1340 | 1.10 | 0.63 | 0.07 | 8.16 |
| Institution | 1340 | 0.37 | 0.27 | 0.00 | 2.20 |
| Size | 1336 | 4336.57 | 19128.35 | 0.97 | 238676.90 |
| Age | 1342 | 15.81 | 9.46 | 0.00 | 52.00 |
| Leverage | 1335 | 1.37 | 4.12 | 0.00 | 73.72 |
| ROE | 1335 | -0.10 | 1.31 | -27.89 | 2.26 |

## Table 2 Volatility, Ownership and other characteristics

The Dependent variable volatility is defined as monthly log return volatility during the year. Institution is the sum of percentage held by institutional investors. Size is the log of market value of equity. Age is the log of the years that the firm is on CRSP. Leverage is long term debt divided by market value of equity. ROE is net income divided by book value of equity. *,**,*** indicate the statistical significance at the 10%，5% and 1%, respectively.

| SPECIFICATIONS | (1) | (2) | (3) | (4) |
|---|---|---|---|---|
| VARIABLES | Volatility | Volatility | Volatility | Volatility |
| Institutional Holdings | -0.0228 | -0.0477 | -0.0980*** | 0.0216 |
| | (-0.0315) | (-0.0337) | (-0.0367) | (-0.086) |
| D/E | | -0.0001 | -0.000614 | 0.000122 |
| | | (-0.00114) | (-0.00116) | (-0.00142) |
| Size | -0.00972*** | -0.0178*** | -0.0167*** | -0.0156 |
| | (-0.00348) | (-0.00381) | (-0.00449) | (-0.0142) |
| Age | | 0.0285*** | 0.0171* | 0.0351 |
| | | (-0.00838) | (-0.00909) | (-0.0245) |
| ROE | | 0.00454 | 0.00821* | 0.0051 |
| | | (-0.00441) | (-0.00447) | (-0.0055) |
| Constant | 1.111*** | 1.108*** | 1.156*** | 1.084*** |
| | (-0.0174) | (-0.0217) | (-0.122) | (-0.147) |
| Observations | 7,094 | 6,735 | 6,735 | 6,735 |
| R-squared | 0.002 | 0.005 | 0.032 | 0.169 |
| Firm Fixed-Effect | No | No | No | Yes |
| Industry Fixed-Effect | No | No | Yes | No |
| Year Fixed-Effect | No | No | Yes | Yes |

## Table 3 Volatility, Ownership and other characteristics with small and large firm

Volatility, Ownership and other characteristics. Dependent variable volatility is defined as monthly log return volatility during the year. Institution is the sum of percentage held by institutional investors. Size is the log of market value of equity. Age is the log of the years that the firm is on CRSP. Leverage is long term debt divided by market value of equity. ROE is net income divided by book value of equity. *,**,*** indicate the statistical significance at the 10%， 5% and 1%, respectively.

| SPECIFICATIONS | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) |
|---|---|---|---|---|---|---|---|---|
| VARIABLES | Volatility | Volatility | Volatility | Volatility | Volatility | Volatility | Volatility | Volatility |
| Institutional Holdings | -0.0752 | 0.0154 | -0.108 | -0.0143 | -0.139 | -0.0878** | -0.0457 | 0.0458 |
| | (-0.0718) | (-0.0349) | (-0.0808) | (-0.0375) | (-0.0865) | (-0.0427) | (-0.174) | (-0.113) |
| D/E | | | 0.000712 | -0.00824 | -0.000532 | -0.0166** | -0.000696 | -0.00956 |
| | | | (-0.00135) | (-0.00681) | (-0.0014) | (-0.00724) | (-0.00185) | (-0.0106) |
| Size | 0.0155 | -0.00844* | -0.00243 | -0.0142*** | -0.0194 | -0.0155*** | -0.0369 | -0.00301 |
| | (-0.0104) | (-0.00465) | (-0.0126) | (-0.00499) | (-0.0147) | (-0.00594) | (-0.0265) | (-0.0195) |
| Age | | | 0.0293** | 0.0273** | 0.0149 | 0.0216* | 0.0245 | 0.0620* |
| | | | (-0.0128) | (-0.011) | (-0.015) | (-0.0121) | (-0.0415) | (-0.0359) |
| ROE | | | 0.00428 | -0.00825 | 0.00948* | -0.0182 | 0.00811 | -0.0164 |
| | | | (-0.0048) | (-0.0316) | (-0.00513) | (-0.0346) | (-0.00688) | (-0.0369) |
| Constant | 1.034*** | 1.079*** | 1.062*** | 1.074*** | 1.164*** | 1.168*** | 1.281*** | 1.005*** |
| | -0.0393 | -0.0331 | -0.0513 | -0.0372 | -0.196 | -0.165 | -0.485 | -0.196 |
| Observations | 3,520 | 3,574 | 3,267 | 3,468 | 3,267 | 3,468 | 3,267 | 3,468 |
| R-squared | 0.001 | 0.001 | 0.002 | 0.004 | 0.033 | 0.054 | 0.215 | 0.182 |
| Firm Fixed-Effect | No | No | No | No | No | No | Yes | Yes |
| Industry Fixed-Effect | No | No | No | No | Yes | Yes | No | No |
| Year Fixed-Effect | No | No | No | No | Yes | Yes | Yes | Yes |