Journal of Applied Finance & Banking, Vol. 10, No. 4, 2020, 1-24
ISSN: 1792-6580 (print version), 1792-6599(online)
Scientific Press International Limited

Breadth of Ownership and the Comovement of Equity Prices in China Stock Market

Jiahe Ou[1]

Abstract

In the past few decades, scholars have made extensive research on the breadth of ownership or the comovement of equity prices separately. However, the connection between these two factors has not been revealed. This paper attempts to find out the relationship between them and address this gap. Based on "A Simple Model of Capital Market Equilibrium with Incomplete Information" built up by Merton in 1987, I find that breadth of ownership have a great impact on the stock prices comovement with the market. As the breadth of ownership increases, the comovement between the stock prices and the market also increases. Besides, I find that some characters of stocks also affect this relationship, such as growth ability, volatility and the shareholders' risk preferences. Higher growth ability, volatility or risk-aversion among shareholders could amplify this effect. Using data in China stock market between 2003 and 2014, I find that a 10%-increase in the number of shareholders of a stock is associated with additional 0.0113-0.0170 (about 1.08%-1.62%) increase in its beta with the market when other things are hold equal. It provides great evidence that investor behavior can affect the stock price comovement with the market.

JEL classification numbers: G40, G11, G12
Keywords: Breadth of Ownership, Comovement, Investor Behavior

[1] PBC School of Finance, Tsinghua University, Beijing 100083, China.

Article Info: *Received:* January 26, 2020. *Revised:* February 14, 2020.
Published online: May 1, 2020.

1. Introduction

Since the Capital Asset Pricing Model (CAPM) put forward by Sharpe in 1964, “Beta” has become the most important part in the field of modern financial investment. In this model, “Beta” measures the comovement between the return of a single stock or stock portfolio and the return of market. And in this paper, I focus on the impact of breadth of ownership on the comovement of stock prices in China stock market.

CAPM assumed that in a market with complete information, rational investors and different kinds of securities, investors will spontaneously select the securities with higher utility, and sell those securities with lower utility, which will make the price of all kinds of securities reach a balance. When the idiosyncratic risk of the securities can be fully dispersed, there is a relationship between the return of the stock portfolio and the return of the market. And in this model, this comovement relationship is represented by “Beta”. Later, Lintner(1965), Mossin(1966) and other scholars improved the model, making it an important part of modern financial theory.

Subsequently, scholars examine the effectiveness of CAPM in different ways. Black, Jensen and Scholes(1972) use the data of New York Stock Exchange from 1935 to 1968 and test the CAPM in a time-series method. Fama and Macbeth(1973) use the same data and test the model in a cross-sectional way. Their results both show that there is a relationship between the return of stocks and their comovement with the market (beta), which means that CAPM can effectively reflect the operation of the market. However, some scholars have questions about the verification method. Roll(1977) argues that CAPM cannot be tested by actual data. On the one hand, it is unable to know the actual composition of market index. On the other hand, he argues that neither Black-Jensen-Scholes test nor Fama-Macbeth test can effectively test the authenticity of CAPM. Some scholars argue that the assumptions of CAPM are too strict to be satisfied in reality, which leads to the abnormality in the empirical test. Black(1986) believes that due to the existence of excessive "noise" in market transactions, it is difficult to get effective conclusions from the empirical test results.

In the subsequent research, many scholars focus on the assumptions of CAPM. They remove some strict assumptions, and give a reasonable explanation to the abnormal situation found in the past research. Merton(1987) challenges the assumption of "complete information". He believes that due to the different ability to obtain information, the amount of information mastered by different investors are unequal, and large institutional investors have more advantages than individual investors. When the amount of information is different among investors, the expected return of stocks will deviate from that of CAPM. Therefore, he creatively puts forward some new assumptions, such as each investor has its own information set, and constructs a "market equilibrium model under incomplete information" to explain market anomalies. He finds that stocks with higher investor awareness will lead to a lower expected return. Merton's research also attracts some attention on the

research on the breadth of ownership.

1.1 Research on the Breadth of Ownership

Many scholars have studied the relationship between the breadth of ownership and stock returns. Chen, Hong and Stein(2002) study the impact of the breadth of ownership on stock returns in the case of short-sale constraints. Previously, Miller(1977) finds that in the presence of short-sale constraints, the stock price only reflects the valuation of the optimistic investors, but not the valuation of the pessimists, which makes the stock price deviate. Therefore, the number of optimists and pessimists also has an impact on stock prices. Chen, Hong, and Stein(2002) use stock data from the U.S. market between 1979 and 1998 in their research. They find that the decrease of the number of shareholders will lower the expected return of the stock, and they find that the stocks with higher proportion of shareholders have higher expected return than the stocks with lower proportion. Priestley and Ødegaard(2005) use the data of Norwegian stock market from 1989 to 2003 to do the same research again, and also reach similar conclusions.

However, in the follow-up study, different scholars put forward different views on the above conclusions. Nagel(2005) expands the data of Chen, Hong, and Stein(2002) from 15 years to 20 years, and conducts the same research. However, the results demonstrate that there is not enough evidence to show that the change of breadth of ownership has a significant impact on the stock returns. In addition, Choi, Jin and Yan(2012) conduct the same research based on the data of Shanghai Stock Exchange from 1996 to 2007, and find that the stocks with large shareholder growth rate will perform better than those with small growth rate when only considering institutional investors, which is consistent with the conclusion of previous scholars' research. However, if considering the whole investors, the performance of the stocks with large shareholder proportion increase is weaker than that of the stocks with small shareholder proportion increase.

The existing research only focus on the impact of the breadth of ownership on the stock return or stock price, and fail to reveal the impact of the breadth of ownership on the comovement between the stocks and the market.

1.2 Research on Stock Price Comovement

Recently, some research on stock price comovement has been conducted. The traditional view is that stock price comovement is mainly reflected in their relationship with economic factors (fundamentals). This view was first proposed by Sharpe (1964) in the CAPM. However, Shiller(1989) finds that the comovement of stock prices between the U.K. and U.S. stock markets is far greater than the correlation of economic factors in the two countries. Recent research also finds that the comovement of stock price is not only influenced by traditional factors, but also related to the existence of market friction and investors' sentiment. In view of the excessive comovement between stock prices, scholars put forward three possible views:

1. Category view. Barberis and Shleifer(2003) find that investors have the habit of classifying stocks according to industry or related concepts, and they also choose to set their own investment plans according to the classification rather than focusing on individual assets. Barberis, Shleifer and Wurgler(2005) use the data of S&P 500 index, and find that the classification of stocks will increase the stock price comovement between similar stocks. Greenwood(2008) repeats the test using Nikkei 225 index, and his research finds similar results. Boyer(2011) shows that in order to reduce the difficulty of investment tasks, financial institutions will habitually label stocks. He divides the components of the S&P 500 index into growth stocks and value stocks. His research finds that stocks in the same type show stronger stock price comovement.
2. Habitat view. Different investors have different information. Investors are used to investing in stocks they know more. The investment habits of different types of investors will affect the price comovement between stocks.
3. Information diffusion view. Relatively speaking, the information diffusion speed of different stocks is inconsistent. The speed of information diffusion makes the reaction speed of stock price different, and the stock price comovement between stocks with similar reaction speed will be higher. Therefore, the speed of information diffusion is also an important factor affecting the comovement between stock prices.

In addition, different scholars find that other factors can also affect the comovement between stock prices. For example, Green and Hwang(2009) find that the stock price is an important factor affecting the stock price comovement, and the stocks with similar prices will have strong comovement. Pirinsky and Wang(2004) find that the institutional shareholding is an important factor affecting the stock price comovement. Pirinsky and Wang(2006) also find that geographical factors are also important factors affecting the stock price comovement.

Many scholars believe that the existence of individual investors will have an impact on the stock market transactions. Some scholars analyze the trading behavior of individual investors to understand the impact of individual investors' behavior on the stock market. Most studies consider that the buying and selling behavior of individual investors is a kind of "noise" to the change of the stock market price, which will affect the stock price fluctuation, so that the stock price cannot effectively express the basic information it contains. Barber, Odean and Zhu(2009) find that the investment behavior of individual investors reflected the obvious psychological deviation, which would lead to a series of irrational behaviors, such as excessive buying of stocks with strong performance recently, unwillingness to sell stocks that have been lost and buying stocks with obvious abnormal trading volume. At the same time, Barber, Odean and Zhu(2009) also find that when such individual investors trade in the market, the operation with psychological bias will make the stock price significantly overestimate or underestimate, and make the stock price far away from its fundamental value. In addition, Kumar and Lee(2006) find that individual investors' sentiment can affect their trading behavior. Individual

investors have obvious similarity in stock investment, that is, they will buy or sell different kinds of stocks at the same time, thus increasing the correlation between different stock returns. In addition, Kelley and Tetlock(2013) find that there is obvious speculation in the stock trading of some individual investors, which also increase the corresponding liquidity of the market and promoted the rationalization of the market prices.

From the recent research, we know that the trading behavior of individual investors does have a significant impact on the fluctuation of stock prices. However, existed research mainly focuses on the impact of individual investors on the expected return of stocks, but its impact on the comovement between stock prices and the market has not yet been revealed. This study will focus on the impact of the breadth of ownership on the comovement between the stock and the market. The discovery of the relationship between the breadth of ownership and the stock price comovement provides an important evidence for the theory that the stock price comovement can be affected by investor sentiment or investor trading behavior.

2. Method and Data

2.1 Method

When considering how to measure the comovement between stocks and the market, I refer to the methods used by Barberis and Shleifer(2003) and Pirinsky and Wang(2004). I regress the daily return of stocks against the daily return of market index, and take the coefficient as the beta value of the stock. This beta value can be easily compared, and it is also a commonly used method to study systemic risk.

In addition, Fama and French(1993) find that in addition to the comovement with the market, there are also some factors that affect the stock returns, such as the size of stock and book-to-market ratio. These factors play certain roles in explaining the stock returns. Therefore, I try to add two factors, SMB and HML, in the process of finding the beta value of stocks. In the following research, I will mainly use the beta value obtained by CAPM (the model is shown in formula (1)) as the main research object, and use the beta value obtained by Fama-French Three Factors Model (the model is shown in formula (2)) as the robustness test.

$$R_{i,t} = \alpha_{i,t} + \beta_{i,t} R_{M,t} + \varepsilon_{i,t} \tag{1}$$

$$R_{i,t} = \alpha_{i,t} + \beta_{i,t} R_{M,t} + s_{i,t} SMB_t + h_{i,t} HML_t + \varepsilon_{i,t} \tag{2}$$

In the study of the impact of the breadth of ownership on the comovement between the stock prices and the market, I refer to the time-series method used by Black, Jensen and Scholes(1972) and the cross-sectional method used by Fama and Macbeth(1973). The results of these two analysis methods can also be compared with each other, so that the effectiveness of the results is more guaranteed.

When using the time-series method, I find that the number of shareholders has a significant positive correlation with the market value of the stock. Moreover,

Roll(1988) shows that the comovement between the price of stocks with large size and the market index is relatively large. Therefore, in order to eliminate the impact of the stock size on our research results, I adopt the research method of grouping. For stocks in each quarter, I first divide them into five groups according to the market value of the stocks at the beginning of each quarter, and then divide each size group into five sub-groups according to the number of shareholders at the beginning of each quarter. This method can eliminate the impact of the size of the stock on the comovement between the stock and the market, and it is similar to the method used by Sias and Starks(1997a, 1997b).

When using cross-sectional regression method, in addition to the previously mentioned market value, Pirinsky and Wang(2004) show that institutional ownership will also have an impact on the comovement between the stock and the market. Therefore, in cross-sectional regression, I also take the institutional shareholding as an independent variable and add it to the regression model.

From Merton's(1987) theoretical model, we know that some factors of the stock itself, such as the growth ability, volatility and the shareholders' risk preferences, etc., will change the impact of the number of shareholders on the comovement between the stock and the market. However, in reality, in addition to the volatility of the stock, the other two factors are not easy to be observed. For the growth ability, Rozeff and Zaman(1998) have shown that the cash flow per share to price per share (CF/P) can be used as a good indicator. The stocks with low CF/P can be regarded as growth stocks, while the stocks with high ratio can be regarded as value stocks. Fama and French(1998) also show that in addition to the CF/P ratio, the net profit to price (E/P) and book-to-market ratio (B/M) can also be regarded as indicators. In this study, I take these three indicators as alternative indicators. The stocks with lower ratio can be considered as growth stocks, while the stocks with higher ratio can be considered as value stocks.

For the risk-aversion coefficient of shareholders, according to the existing research, scholars divide the stocks into lottery-type stocks and non-lottery-type stocks. Kumar(2009) shows that lottery stocks can be distinguished by three indicators: stock price, idiosyncratic volatility and idiosyncratic skewness. He suggests that when a stock has low price, high idiosyncratic volatility and high idiosyncratic skewness, it can be defined as a lottery stock, otherwise it can be defined as a non-lottery stock. We can assume that the risk-aversion coefficient of investors who buy lottery stocks is relatively low, while that of investors who buy non-lottery stocks is relatively high. Therefore, we can use these three indicators as an alternative indicator of shareholders' risk aversion.

2.2 Data

In this study, the sample contains all A-share stocks listed and traded in Shanghai Stock Exchange and Shenzhen Stock Exchange from 2003 to 2014, with a total of 2162 stocks and 48 quarters. Among the variables, the data of daily return of SMB and HML factors are from Resset Financial Research Database, and other data are

from Wind Financial Database. The variables involved in the empirical study are as follows:

Table 1: Variables Description

Variables	Description
Ln(SH)	The natural logarithm of the number of shareholders at each quarter.
Ln(Size)	The natural logarithm of the market value at each quarter.
ri	Stock's daily return
rm	Market's value-weighted index return
rf	Risk-free return
Ri	Stock's daily excess return. Ri=ri-rf
Rm	Market's index daily excess return. Rm=rm-rf
SMB	The difference between the returns of low market value stock portfolio and high market value stock portfolio.
HML	The difference between the returns of high book-to-market stock portfolio and low book-to-market stock portfolio.
BM	Book-to-Market Ratio
MOM6	Stock's cumulative return in the last 6 months
Price	Stock Price
Turnover	Stock's cumulative turnover ratio in the last 6 months
Institution	The proportion of institutional ownership
EP	Net profit per share to price per share
CFP	Cash flow per share to price per share
STD12	Standard deviation of stock's daily return in the last 12 months.
IV12	Idiosyncratic volatility of stock's daily return in the last 12 months. (Kumar(2009))
SKEW12	Idiosyncratic skewness of stock's daily return in the last 12 months. (Harvey and Siddique (2000))

Next, the tables below show the descriptive statistics and the pairwise correlation of all variables shown above.

Table 2: Descriptive Statistics

Variables	Obs.	mean	std	P1	P25	Median	P75	P99
Ln(SH)	78,507	10.41	1.00	8.47	9.79	10.36	11.00	12.97
Ln(Size)	78,211	21.68	1.33	18.85	20.87	21.67	22.44	25.34
ri(%)	4,745,560	0.04	2.95	-8.84	-1.38	0.00	1.48	9.48
rm (%)	2,911	0.01	1.64	-4.98	-0.77	0.09	0.88	4.09
SMB(%)	2,911	0.03	0.69	-2.06	-0.32	0.09	0.47	1.61
HML(%)	2,911	0.02	0.50	-1.25	-0.28	-0.01	0.27	1.47
BM	78,216	0.38	0.32	-0.28	0.21	0.34	0.52	1.21
MOM6	75,397	0.03	0.36	-0.85	-0.18	0.01	0.24	1.01
Ln(Price)	78,211	2.17	0.68	0.76	1.71	2.12	2.59	3.93
Turnover	78,288	2.61	2.19	0.00	1.07	1.98	3.51	9.94
Institution	78,288	0.20	0.24	0.00	0.03	0.08	0.36	0.83
EP	77,655	0.04	0.10	0.00	0.01	0.03	0.05	0.30
CFP	78,162	0.04	0.13	-0.29	-0.00	0.03	0.07	0.41
STD12	77,155	0.03	0.01	0.01	0.02	0.03	0.03	0.05
IV12	76,613	0.02	0.01	0.01	0.02	0.02	0.03	0.04
SKEW12	76,613	0.60	0.89	-1.08	0.19	0.53	0.90	3.13

Table 3: Pairwise Correlation

Variables	Ln (Size)	BM	MOM6	Ln (Price)	Turn-over	Institution	EP	CFP	STD12	IV12	SKEW12
Ln(SH)	0.43	0.28	-0.11	-0.34	-0.12	0.09	0.05	0.15	-0.03	-0.12	0.11
Ln(Size)		0.03	0.18	0.46	0.04	0.56	-0.07	0.08	0.10	0.04	0.09
BM			-0.19	-0.30	-0.19	0.04	-0.21	0.18	-0.17	-0.26	0.04
MOM6				0.29	0.36	0.05	-0.08	-0.01	0.14	0.22	0.17
Ln(Price)					0.22	0.28	-0.19	-0.07	0.16	0.13	-0.06
Turnover						-0.26	-0.06	-0.08	0.53	0.35	0.03
Institution							-0.02	0.05	-0.05	-0.06	0.02
EP								-0.00	-0.03	0.00	-0.03
CFP									-0.08	-0.08	0.01
STD12										0.76	0.20
IV12											0.28

3. Empirical Tests and Results

3.1 Time-Series Approach

In the time-series method, I will separate samples into different groups according to the number of shareholders, form the corresponding stock portfolio in each group, and compare the beta values between the stock portfolios. There is a significant positive correlation between the market value of stocks and the number of shareholders. Moreover, Roll(1988) shows that the comovement between the price of stocks with large size and the market index is relatively large. In order to eliminate the impact of the market value of stocks, I first divide stocks into five

groups according to the market value of the stocks at the beginning of each quarter, and then divide each size group into five sub-groups according to the number of shareholders at the beginning of each quarter. Finally, I will regroup stocks with same rank in the number of shareholders, and form a new stock portfolio. Among them, group 1 represents the group with the smallest number of shareholders, and group 5 represents the group with the largest number of shareholders. In this way, the stock portfolios are adjusted by market value and stratified by the number of shareholders.

From the descriptive statistics in Table 4, the number of observations of the stock portfolio is roughly equal to each other, and the market value of each group is also similar. The minimum value of Ln(Size) is 21.5998, and the maximum value is 21.8669, that is, the average difference between the maximum and minimum market value is 30%. Such a grouping design can eliminate the impact of stock market value on the number of shareholders and beta value. There are obvious differences in the number of shareholders in each group. Among them, the minimum mean value of Ln(SH) is 9.3151 and the maximum is 11.4731, that is to say, the average number of shareholders in the portfolio with the largest number of shareholders is 8.65 times of the minimum. There are also significant differences in the number of shareholders between groups.

Table 4: Descriptive Statistics of Groups with Different Number of Shareholders

Group	Obs	Average of Ln(Size)	Average of Ln(SH)
1	15,554	21.5998	9.3151
2	15,690	21.6095	10.0310
3	15,680	21.6322	10.4741
4	15,693	21.6829	10.8771
5	15,584	21.8669	11.4731

In the following analysis, I get the daily excess return of each stock and market daily excess return in each quarter. In each stock portfolio stratified by the number of shareholders, I use the Black-Jensen-Scholes(1972) time-series regression method, find out the beta values in each breadth of ownership group, and compare the beta values between groups.

Table 5: Time-Series Analysis

Ln(SH) Group	Group1	Group2	Group3	Group4	Group5	Group5-Group1
Equal Weighted Beta	0.9339 (152.51)	0.9967 (178.25)	1.0238 (193.57)	1.0379 (196.79)	1.0071 (199.76)	0.0732*** (43.68)
Value Weighted Beta	0.9629 (132.89)	1.0273 (151.46)	1.0580 (162.82)	1.0744 (165.85)	1.0514 (171.61)	0.0885*** (44.34)

From the results in Table 5, it can be seen that the beta value increases monotonously between groups 1-4, and decreases slightly after group 5, but its beta value is still larger than the first two groups. Under the equal-weighted average method, the beta value of group 1 (the smallest number of shareholders) is 0.9339, while that of group 5 (the largest number of shareholders) is 1.0071, with a difference of 0.0732; under the value-weighted average method, the beta value of group 1 (the smallest number of shareholders) is 0.9629, while that of group 5 (the largest number of shareholders) is 1.0514, with a difference of 0.0885. Under these two methods, the beta value of the largest group is larger than that of the smallest group. Also, the difference between these two groups is significantly positive under the Chow-test, which also proves our assumption: the number of shareholders has a positive impact on the comovement between the stock and the market.

3.2 Cross-Sectional Approach

As an alternative test, in this section I will use the cross-sectional regression method put forward by Fama and Macbeth(1973), to test the relationship between the number of shareholders and the beta value. In this analysis, I still use the market's value-weighted index excess return to solve the beta value of each stock of each quarter by CAPM, and test the effectiveness of the number of shareholders to explain the comovement between the stock and the market.

According to the results of time-series method above, the beta value increases with the increase of the number of shareholders when the number of shareholders is small. However, when the number of shareholders reaches a certain level, there will be a downward trend in the beta value, which also causes the beta value of the group with the largest number of shareholders to be smaller than that of the second-largest group. Therefore, in cross-sectional regression, I add the square term of the number of shareholders ((Ln(SH))2) to depict this relationship more precisely.

The dependent variable in cross-sectional regression -- the beta value of each stock in each quarter is solved by CAPM (the model is shown in formula (1)). In addition, some other control variables are added to the regression model. The specific control variables and the definition of variables have been described in previous chapter. The model used for regression is shown in formula (3), which uses two-way fixed effects to control individual and time differences.

$$\beta_{i,t} = b_0 + b_1 Ln(SH)_{i,t-1} + b_2 Ln^2(SH)_{i,t-1} + b_3 Ln(Size)_{i,t-1} + b_4 BM_{i,t-1} + b_5 MOM6_{i,t-1} + b_6 \Delta Ln(SH)_{i,t} + b_7 Ln(Price)_{i,t-1} + b_8 Turnover_{i,t-1} + b_9 Institution_{i,t-1} + \varepsilon_{i,t} \quad (3)$$

From the results in Table 6, all regression results show that the coefficient of the number of shareholders is significant, and the coefficient is large, which also reflects that the number of shareholders can effectively explain the differences of beta values between different stocks.

The coefficient of the level term of the number of shareholders is positive, indicating that the number of shareholders has a positive impact on the comovement between the stock and the market from the regression results; while the coefficient of the square term is negative, indicating that the impact is gradually decreasing with the increase of the number of shareholders.

For a stock whose characteristics are all in the average value, when the number of shareholders increases by 10%, according to the prediction of our model, the beta value of the stock will increase by 1.08%-1.62% (the absolute value will increase by 0.0113-0.0170). This is a significant change in the beta value of the stock.

For other variables, the stock with large market value has a greater comovement with the market, which is in line with the conclusion of previous scholars' research on this factor. In addition, value stock (the stocks with high BM value) has a stronger comovement with the market. The stocks with large volume of trading and the stocks with high proportion of institutional shareholding also show a stronger comovement, which is in line with Pirinsky and Wang(2004).

Table 6: Cross-Sectional Analysis

Dependent variable: Beta					
	(1)	(2)	(3)	(4)	(5)
Intercept	-4.9855*** (-22.33)	-8.8616*** (-38.26)	-9.2513*** (-37.23)	-8.7510*** (-34.67)	-7.0233*** (-27.98)
Ln(SH)	0.9760*** (27.07)	1.1158*** (31.50)	1.1367*** (30.77)	1.0635*** (28.31)	0.8213*** (22.03)
$(Ln(SH))^2$	-0.0387*** (-22.35)	-0.0465*** (-27.32)	-0.0476*** (-26.85)	-0.0444*** (-24.71)	-0.0336*** (-18.89)
Ln(Size)		0.1331*** (52.02)	0.1437*** (53.23)	0.1408*** (41.35)	0.1146*** (31.16)
BM		0.1526*** (26.73)	0.1468*** (25.22)	0.1482*** (25.33)	0.1624*** (27.86)
MOM6			-0.0355*** (-6.22)	-0.0284*** (-4.94)	-0.0758*** (-13.11)
△Ln(SH)				0.0974*** (13.38)	0.1147*** (16.00)
Ln(Price)					0.0032 (0.60)
Turnover					0.0467*** (51.39)
Institution					0.1700*** (19.30)
R^2	0.2845	0.3136	0.3166	0.3188	0.3434
Time Series	48	48	48	47	47
Cross Section	2138	2138	2112	2112	2112

3.3 Indirect Influence of Other Factors

In sections 3.1 and 3.2, I use the data of China's stock market to test the impact of the number of shareholders on the comovement between the stock and the market. Besides, there are some factors, such as growth ability, volatility and the shareholders' risk preferences, which will change the impact of the number of shareholders on the comovement between the stock and the market. Therefore, in this section, I will make an in-depth study and use the data of China's stock market to test the impact of these three factors.

3.3.1 Growth Ability

According to Merton's(1987) theoretical model, as the growth ability of the stock increases, the positive impact of the number of shareholders on the comovement between the stock and the market will become more significant.

Here, I will refer to the research methods used in sections 3.1 and 3.2, and use the time-series method and cross-section regression method to study the impact. Considering that the growth ability of stocks can't be directly observed, I choose the net profit per share to price per share (E/P), book-to-market ratio (B/M) and cash flow per share to price per share (CF/P) by referring to the research done by Rozeff and Zaman(1998) and Fama and French(1998). The stocks with lower ratio can be considered as growth stocks, while the stocks with higher ratio can be considered as value stocks.

Through the statistical analysis of the data of these three indicators, I find that there are some outliers in the data of these three indicators. Therefore, in the analysis process, I winsorize all three variables at 1% level, and avoid the bias caused by the occurrence of outliers.

The division method used in this study is the same as the previous. First, samples of each quarter are divided into 5 groups according to their market values (group 1 is the group with the smallest market value of shares, and group 5 is the group with the largest market value of shares), and then three sub-groups are divided according to the number of shareholders in each size group (low, median, high). However, I need to reveal the indirect effect of stock growth ability factor. Therefore, I choose to form value stocks and growth stocks portfolio according to E/P, B/M and CF/P in each sub-group divided by market value and the number of shareholders. I choose the stocks with all three variables in top 40% as value stocks, and stocks with all three variables in the bottom 40% as growth stocks. Compared the beta values difference between the large shareholders and small shareholders in the value stocks portfolio with that of the growth stocks portfolio, we can judge the indirect effect of the stock growth ability factor on the positive impact of the number of shareholders on the comovement between the stock and the market.

From the results in Table 7, I find that the beta values difference (H-L) in the growth stock is larger than that of the value stock in most market capitalization levels. Therefore, I think that stock growth ability factor has a certain indirect effect on the positive effect of the number of shareholders on the comovement between the stock

and the market. The greater the growth ability of the stock, the more significant the positive effect of the number of shareholders on the comovement between the stock and the market. And this is also in line with the conclusion in Merton's(1987) theoretical model.

Table 7: Time-Series Analysis: Growth Ability

Size	Growth Stock(8499 obs)				Value Stock(8841 obs)			
	L	M	H	H-L	L	M	H	H-L
1	1.0030 (22.22)	1.1565 (29.01)	1.1606 (27.59)	0.1576	0.9727 (30.01)	1.0542 (32.80)	1.0914 (29.63)	0.1187
2	1.0555 (24.33)	1.0713 (26.06)	1.0580 (28.01)	0.0025	0.9316 (31.51)	1.0472 (32.82)	1.1191 (37.18)	0.1875
3	0.9304 (23.50)	1.1281 (30.08)	1.0709 (29.66)	0.1405	0.9755 (32.71)	1.0698 (35.20)	1.0299 (33.96)	0.0544
4	0.9844 (23.87)	1.0705 (31.79)	1.0853 (33.10)	0.1009	1.0195 (35.77)	1.0794 (37.47)	1.0076 (37.99)	- 0.0119
5	0.9317 (22.83)	1.0746 (32.38)	1.0798 (37.57)	0.1481	1.0427 (36.52)	1.1297 (45.19)	1.0651 (49.24)	0.0224

Similarly, I will use cross-sectional regression to test the results again. In order to reflect the indirect effect of stock growth ability factors on the positive impact of the number of shareholders on the comovement between the stock and the market, in addition to adding three alternative indicators, I also add the cross terms between the indicators and the number of shareholders. From the perspective of the model, the coefficient of the cross terms between the indicators and the number of shareholders represents the indirect impact of the stock growth ability factors. The dependent variable in cross-sectional regression -- the beta value of each stock in each quarter is solved by CAPM.

From the results in Table 8, I find that the coefficients of cross terms are all negative, which means that with the increase of these indicators, the positive impact of the number of shareholders on the comovement between the stock and the market will be weakened, that is to say, the larger the stock growth ability factor, the more significant the positive impact of the number of shareholders on the comovement between the stock and the market.

However, in terms of the size and significance of the coefficients, there are some differences among these three alternative indicators. Among them, the most obvious impact is from the book-to-market ratio (B/M). The coefficient of the cross term between the book-to-market ratio and the number of shareholders is negative and significant. Under the same other conditions, when the book-to-market ratio increases by 1%, the impact of the number of shareholders on the beta value of the stocks will be reduced by 0.15%-0.17% (the absolute value will be reduced by 0.0016-0.0018). In contrast, the indicators of E/P and CF/P are relatively weak. Although the coefficient shows that both indicators have negative impact, the impact is not as large as the book-to-market ratio. At the 10% confidence level, the

coefficient of the cross term between indicators and the number of shareholders is not significant in regression, which also reflects that the indirect effect of these two indicators on the number of shareholders on the comovement between the stock and the market is relatively weak.

Table 8: Cross-Sectional Analysis: Growth Ability

Dependent variable：Beta						
	(1)	(2)	(3)	(4)	(5)	(6)
Intercept	-8.4457*** (-34.14)	-7.1866*** (-29.20)	-7.5067*** (-30.05)	-6.3485*** (-25.56)	-8.5012*** (-34.29)	-7.2293*** (-29.31)
Ln(SH)	1.0976*** (29.79)	0.8994*** (24.55)	0.8627*** (22.84)	0.6872*** (18.30)	1.0954*** (29.72)	0.9002*** (24.54)
$(Ln(SH))^2$	-0.0455*** (-25.68)	-0.0367*** (-20.91)	-0.0319*** (-17.35)	-0.0244*** (-13.36)	-0.0456*** (-25.77)	-0.0369*** (-21.00)
Ln(Size)	0.1182*** (41.04)	0.1025*** (27.82)	0.1181*** (41.36)	0.1023*** (27.84)	0.1214*** (42.36)	0.1035*** (28.06)
MOM6	-0.0300*** (-5.18)	-0.0729*** (-12.54)	-0.0100* (-1.73)	-0.0527*** (-9.09)	-0.0221*** (-3.84)	-0.0653*** (-11.27)
Ln(Price)		0.0037 (0.67)		0.0066 (1.21)		0.0104* (1.90)
Turnover		0.0416*** (45.56)		0.0405*** (44.38)		0.0413*** (45.16)
Institution		0.1500*** (17.04)		0.1434*** (16.33)		0.1455*** (16.51)
EP	0.9014** (2.25)	0.6714* (1.70)				
BM	0.1560*** (17.47)	0.1955*** (21.09)	2.1781*** (27.20)	2.0627*** (26.10)	0.1594*** (17.99)	0.1460*** (17.29)
CFP					0.2574 (1.49)	0.1579 (0.93)
EP* Ln(SH)	-0.1318*** (-3.50)	-0.1120*** (-3.01)				
BM* Ln(SH)			-0.1859*** (-25.39)	-0.1715*** (-23.73)		
CFP* Ln(SH)					-0.0297* (-1.86)	-0.0204 (-1.30)
R^2	0.2993	0.3196	0.3033	0.3225	0.2972	0.3173
Time Series	48	48	48	48	48	48
Cross Section	2111	2111	2111	2111	2111	2111

3.3.2 Volatility

Reviewing the Merton's(1987) theoretical model, the increase of stock volatility will enlarge the positive impact of the number of shareholders on the comovement between the stock and the market. Here, I use the volatility of stock historical return to represent the volatility of stock. Considering that there is a time span in the

measurement of volatility, I obtain the historical return data of each stock in the past 12 months, and calculate the 12-month volatility (STD12). Meanwhile, I winsorize STD12 at 1% level, and avoid the bias caused by the occurrence of outliers.

In the same way, I use time-series method and cross-sectional regression method to analyze the indirect impact of stock volatility. In the time-series method, I adopt the same grouping method as in section 3.3.1. I choose the top 20% stocks with the highest volatility to form the high volatility stock portfolio, and the bottom 20% stocks to form the low volatility stock portfolio. Compared the beta values difference between the large shareholders and small shareholders in the high-volatility stocks portfolio with that of the low-volatility stocks portfolio, we can judge the indirect effect of the stock volatility factor on the positive impact of the number of shareholders on the comovement between the stock and the market.

From the results in Table 9, I find that the beta values difference (H-L) in the high-volatility stocks portfolio is significantly larger than that of the low-volatility stocks portfolio in the smallest market capitalization levels. However, the beta values differences in other four size groups are almost equal, which is hard to identify the effect. Therefore, we need to judge the hypothesis by cross-sectional regression results.

Table 9: Time-Series Analysis: Volatility

Size	Low Volatility Stock(15010 obs)				High Volatility Stock(15106 obs)			
	L	M	H	H-L	L	M	H	H-L
1	0.8939 (26.32)	0.8730 (25.03)	0.7889 (20.90)	-0.1050	1.0014 (33.07)	1.0300 (36.30)	1.0903 (39.22)	0.0889
2	0.9586 (34.52)	1.0061 (39.67)	1.0520 (44.84)	0.0934	1.0334 (35.27)	1.0549 (39.66)	1.0787 (40.75)	0.0453
3	0.9571 (35.74)	1.0426 (42.81)	1.0358 (45.69)	0.0787	1.0401 (34.68)	1.0771 (41.37)	1.1009 (38.00)	0.0608
4	0.9007 (31.72)	0.9790 (42.66)	1.0134 (47.71)	0.1127	1.0024 (33.80)	1.1253 (42.81)	1.1419 (46.85)	0.1395
5	0.9042 (28.30)	1.0078 (48.17)	0.9675 (53.68)	0.0633	1.0898 (35.95)	1.1652 (45.76)	1.1442 (49.23)	0.0544

Similarly, I add stock volatility and its cross term with the number of shareholders in the regression to reflect the indirect impact of stock volatility. According to the regression results in Table 10, the cross term coefficient between the 12-month volatility of the stock and the number of shareholders is positive and significant when the market return is measured by simple average. Under the same other conditions, when the stock volatility increases by 0.01%, the impact of the number of shareholders on the beta value of the stock will increase by 0.74%-0.77% (the absolute value will increase by 0.0078-0.0081). However, when the market return is measured by value-weighted average, although the coefficient of cross term is positive, the effect is obviously reduced, and the effect is not significant, which is

similar to the results obtained in the time-series method.

Table 10: Cross-Sectional Analysis: Volatility

Dependent variable: Beta				
	(1)	(2)	(3)	(4)
	Equal Weighted	Equal Weighted	Value Weighted	Value Weighted
Intercept	-4.0844***	-3.7867***	-5.0173***	-4.6248***
	(-18.25)	(-16.84)	(-20.13)	(-18.46)
Ln(SH)	0.7442***	0.7167***	0.7638***	0.7419***
	(23.58)	(22.64)	(21.73)	(21.04)
$(Ln(SH))^2$	-0.0313***	-0.0296***	-0.0313***	-0.0295***
	(-20.73)	(-19.62)	(-18.61)	(-17.54)
Ln(Size)	0.0123***	0.0023	0.0446***	0.0260***
	(4.78)	(0.68)	(15.57)	(6.77)
BM	0.0913***	0.0966***	0.1239***	0.1336***
	(14.98)	(15.63)	(18.25)	(19.40)
MOM6	0.0235***	0.0025	0.0080	-0.0170***
	(4.59)	(0.48)	(1.40)	(-2.87)
Ln(Price)		0.0214***		0.0407***
		(4.40)		(7.51)
Turnover		0.0137***		0.0142***
		(14.19)		(13.16)
Institution		0.0488***		0.0494***
		(6.14)		(5.58)
STD12	7.5346***	5.6201***	15.419***	13.947***
	(4.56)	(3.37)	(8.37)	(7.51)
STD12* Ln(SH)	0.8108***	0.7819***	0.1543	0.0628
	(5.26)	(5.05)	(0.90)	(0.36)
R^2	0.3309	0.3336	0.3582	0.3609
Time Series	48	48	48	48
Cross Section	2105	2105	2105	2105

3.3.3 Shareholders' Risk Preferences

According to Merton's(1987) theoretical model, as the risk aversion coefficient of shareholders increases, the breadth of ownership will have a more significant positive impact on the comovement between the stock and the market.

As before, I also adopt time-series method and cross-sectional regression method to analyze the indirect impact of shareholders' risk preferences. However, considering that the shareholders' risk preferences is difficult to measure accurately, I use three indicators by referring to Kumar(2009): stock price, stock idiosyncratic volatility and idiosyncratic skewness. When the price of a stock is low, and it has high idiosyncratic volatility and idiosyncratic skewness, it can be defined as a lottery stock, otherwise it can be defined as a non-lottery stock. I assume that for lottery stocks, the risk aversion coefficient of shareholders is relatively low, but for non-lottery stocks, the risk aversion coefficient of shareholders is relatively high.

In the time-series method, I use the same group method. In each size-shareholder group, I select the stocks whose stock price is 40% lower than all the stocks in this group, and the stocks whose idiosyncratic volatility and idiosyncratic skewness are in the top 40% as lottery stocks; while the stocks whose stock price is in the top 40% and the idiosyncratic volatility and idiosyncratic skewness are in the bottom 40% as non-lottery stocks. Compared the beta values difference between the large shareholders and small shareholders in the lottery-type stocks portfolio with that of the non-lottery-type stocks portfolio, we can judge the indirect effect of the shareholders' risk preferences factor on the positive impact of the number of shareholders on the comovement between the stock and the market.

Table 11: Time-series Analysis: Shareholders' Risk Preferences

Size	Lottery-type Stock(15010 obs)				Non-lottery-type Stock(15106 obs)			
	L	M	H	H-L	L	M	H	H-L
1	1.0132 (14.49)	1.0769 (20.20)	1.1316 (17.62)	0.1184	0.9609 (18.52)	1.0858 (21.93)	1.0324 (22.77)	0.0715
2	1.1053 (20.21)	1.1146 (21.17)	1.0781 (20.18)	-0.0272	0.9480 (16.51)	1.0836 (25.26)	1.0661 (25.06)	0.1181
3	1.2434 (23.03)	1.1386 (21.64)	1.1064 (22.44)	-0.1370	1.0253 (20.20)	1.0009 (21.28)	1.1044 (26.22)	0.0791
4	1.0082 (19.57)	1.2237 (22.30)	1.0869 (21.92)	0.0787	0.8219 (15.68)	1.0773 (23.90)	1.0167 (23.45)	0.1948
5	1.0914 (21.37)	1.1420 (24.68)	1.1048 (26.55)	0.0134	0.7523 (17.14)	1.0006 (23.23)	1.0748 (23.70)	0.3225

From the results in Table 11, I find that the beta values difference (H-L) in the non-lottery-type stocks portfolio is significantly larger than that of the lottery-type stocks portfolio in most market capitalization levels. I consider that the risk aversion coefficient has a certain indirect effect on the positive effect of the number of shareholders on the comovement between the stock and the market. The greater the risk aversion coefficient is, the more significant the positive effect of the number of shareholders on the comovement between the stock and the market is.

Similarly, I will use cross-sectional regression to test the results. In order to reflect the indirect effect of the risk aversion coefficient of shareholders on the number of shareholders on the comovement between the stock and the market, in addition to adding three alternative indicators, I also add the cross term between the indicators and the number of shareholders. The coefficient of the cross term between the indicators and the number of shareholders represents the indirect effect of the risk aversion coefficient of shareholders.

From the results in Table 12, the cross term coefficient of stock price and number of shareholders is positive, which is significant at 1% confidence level, in explaining the indirect effect of the risk aversion coefficient of shareholders on the comovement between the stock and the market. It shows that with the rise of stock price, the number of shareholders is positive to the comovement between the stock

and the market. According to our regression results, when the stock price rises by 10%, the impact of the number of shareholders on the beta value of the stock will increase by 0.27%-0.40% (the absolute value will increase by 0.0029-0.0042).

In addition, the cross term coefficient between the stock idiosyncratic skewness and the number of shareholders is negative, and it is significant at the 1% confidence level. It shows that with the increase of the stock idiosyncratic skewness, the positive effect of the number of shareholders on the comovement between the stock and the market will be weakened. This conclusion is consistent with our results in the theoretical analysis. From the regression results, as the other conditions remain unchanged, when the idiosyncratic skewness of the stock increases by one standard deviation, the impact of the number of shareholders on the beta value of the stock will be reduced by 0.63%-1.39% (the absolute value will be reduced by 0.0066-0.0146).

However, the cross term coefficient between the stock idiosyncratic volatility and the number of shareholders is positive and significant at the 1% confidence level. It is not consistent with our hypothesis. Our explanation for this phenomenon is that considering the obvious correlation between the stock idiosyncratic volatility and the stock volatility (the correlation is higher than 70%), the result of this term in the regression is highly correlated with the result of the regression in section 3.3.2, which also leads to the positive coefficient of this term.

Table 12: Cross-Sectional Analysis: Shareholders' Risk Preferences

Dependent variable: Beta						
	(1)	(2)	(3)	(4)	(5)	(6)
Intercept	-6.2503*** (-21.94)	-5.3074*** (-18.83)	-7.3513*** (-27.84)	-6.8993*** (-26.33)	-8.4799*** (-33.71)	-7.4399*** (-29.85)
Ln(SH)	0.8240*** (19.72)	0.6342*** (15.30)	0.9601*** (24.98)	0.8579*** (22.46)	1.1373*** (30.46)	0.9324*** (25.12)
$(Ln(SH))^2$	-0.0368*** (-19.66)	-0.0287*** (-15.46)	-0.0397*** (-22.15)	-0.0353*** (-19.84)	-0.0468*** (-26.05)	-0.0383*** (-21.48)
Ln(Size)	0.1019*** (27.27)	0.1023*** (27.25)	0.0948*** (25.42)	0.0988*** (26.21)	0.1014*** (27.11)	0.1024*** (27.26)
BM	0.1702*** (26.12)	0.1806*** (28.08)	0.1980*** (30.01)	0.1829*** (27.92)	0.1439*** (22.50)	0.1553*** (24.60)
MOM6	-0.0245*** (-4.04)	-0.0672*** (-11.09)	-0.0434*** (-7.15)	-0.0742*** (-12.22)	-0.0416*** (-6.81)	-0.0851*** (-13.93)
Turnover		0.0414*** (44.15)		0.0367*** (36.06)		0.0419*** (44.67)
Institution		0.1508*** (16.92)		0.1327*** (14.76)		0.1463*** (16.43)
Ln(Price)	-0.3930*** (-13.35)	-0.4032*** (-13.88)	0.0304*** (5.62)	0.0093* (1.72)	0.0495*** (9.15)	0.0169*** (3.13)
IV12			0.6669 (0.28)	-0.6178 (-0.26)		
SKEW12					0.1100*** (4.13)	0.1058*** (4.03)
Ln(Price)* Ln(SH)	0.0420*** (15.14)	0.0399*** (14.56)				
IV12 * Ln(SH)			0.8100*** (3.59)	0.4683** (2.09)		
SKEW12 * Ln(SH)					-0.0072*** (-2.87)	-0.0066*** (-2.68)
R^2	0.3022	0.3210	0.3079	0.3204	0.3018	0.3210
Time Series	48	48	48	48	48	48
Cross Section	2111	2111	2111	2111	2111	2111

3.4 Robustness checks

Through the above empirical analysis, using the data of China's stock market, I find that major conclusions of Merton's(1987) theoretical model can be verified by the actual data. However, considering the methods I used in the empirical analysis and the progress of the data processing, I will use some alternative methods and other data processing progress to check the robustness of the results.

3.4.1 Solving Beta Value with Fama-French Three Factors Model

In the previous empirical analysis, when I solve the comovement (beta value) between each stock and the market using CAPM, I regress the daily excess return of the stock against the daily excess return of the market, and take the coefficient of the excess return of the market as the beta value of the stock. However, Fama and French(1993) find that the market returns cannot explain the stock returns very well. In addition to the correlation with the market, there are also some factors that will affect the stock returns, such as the size of stock and its book-to-market value. Therefore, I will add SMB and HML factors to the regression model, and use the Fama-French Three Factors model to solve the beta value of the stock.

From the results in Table 13 and Table 14, when the beta value is obtained by the Fama-French Three Factors model, the major results are still unchanged, and also consistent with that when using the CAPM. In cross-sectional regression, the positive effect of the number of shareholders on the comovement between the stock and the market slightly decreases, the coefficient of the level term of the number of shareholders decreases from 0.82 to 0.64, and the coefficient of the square term adjusts from -0.0340 to -0.0265. The results in this two methods are similar. It is shown that when we use the Fama-French Three Factors model as an alternative method to solve the beta value, our previous results are still robust.

Table 13: Time-Series Analysis: Robustness Check

Ln(SH) Group	Group1	Group2	Group3	Group4	Group5	Group5-Group1
Equal Weighted Beta	0.9254 (147.12)	0.9914 (171.02)	1.0225 (186.29)	1.0402 (190.44)	1.0201 (196.89)	0.0947*** (175.56)
Value Weighted Beta	0.9686 (144.09)	1.0366 (166.41)	1.0680 (180.17)	1.0858 (183.58)	1.0624 (187.99)	0.0938*** (164.77)

Table 14: Cross-Sectional Analysis: Robustness Check

Dependent variable: Beta					
	(1)	(2)	(3)	(4)	(5)
Intercept	-3.3612*** (-14.81)	-7.2089*** (-32.87)	-8.1783*** (-32.60)	-7.7252*** (-30.37)	-6.0338*** (-23.83)
Ln(SH)	0.7399*** (20.19)	0.8974*** (25.02)	0.9401*** (25.20)	0.8780*** (23.19)	0.6420*** (17.07)
$(Ln(SH))^2$	-0.0288*** (-16.35)	-0.0375*** (-21.78)	-0.0396*** (-22.16)	-0.0370*** (-20.41)	-0.0264*** (-14.70)
Ln(Size)		0.1491*** (57.55)	0.1580*** (57.96)	0.1544*** (55.86)	0.1279*** (34.49)
BM		0.1636*** (28.31)	0.1568*** (26.69)	0.1584*** (26.86)	0.1721*** (29.28)
MOM6			-0.0296*** (-5.13)	-0.0219*** (-3.78)	-0.0681*** (-11.67)
△Ln(SH)				0.0922*** (12.57)	0.1093*** (15.11)
Ln(Price)					0.0032 (0.59)
Turnover					0.0456*** (49.78)
Institution					0.1773*** (19.95)
R^2	0.2156	0.2538	0.2594	0.2631	0.2882
Time Series	48	48	48	47	47
Cross Section	2138	2138	2112	2112	2112

3.4.2 Selection of the Standard of the Style-like Portfolio

When I analyze the positive impact of other factors on the relationship between the number of shareholders and the comovement between the stock and the market, I adopt a certain limit to select specific stock portfolios in the time-series method. For the study of stock growth ability factor and shareholders' risk preferences, I set the proportion of the three variables at top/bottom 40%; for the stock volatility factor, I set the proportion of the stock volatility at top/bottom 20%. Considering that different partition proportion may affect the research results, I change the partition proportion to 30%, and repeat the above analysis. The results are similar to the previous results. It is shown that the results obtained before are still robust considering the different partitions of variables.

4. Conclusion

Through the extension and analysis of Merton's "market equilibrium model under incomplete information" and the corresponding empirical analysis based on the data of China's stock market, I find that the number of shareholders plays an important role on the comovement between stock and market. The specific conclusions are as

follows:

1. When other conditions remain unchanged, the more the number of shareholders, the greater the comovement between the stock and the market. For a stock whose characteristics are all in the average value, when the number of shareholders increases by 10%, according to the prediction made by our model, the beta value of the stock will increase by 1.08%-1.62% (the absolute value will increase by 0.0113-0.0170). However, the impact of the number of shareholders on the comovement between the stock and the market is gradually reducing with the increase of the number of shareholders.
2. Some factors of the stock itself will also have an indirect impact on the positive impact of the number of shareholders on the comovement between the stock and the market. When other conditions remain unchanged, the increase of stock growth ability, stock volatility, or the risk aversion coefficient of shareholders, will enlarge the positive impact of the number of shareholders on the comovement between the stock and the market.

In order to ensure the reliability of empirical research results, I use some alternative methods and other data processing methods to test the robustness of the results obtained in the previous empirical analysis. The results of robustness test are similar to those of previous analysis, which also proves that our conclusion is robust and stable.

The conclusion of this study, which the number of shareholders has a positive impact on the comovement between the stock and the market, provides great evidence that investor behavior can affect the stock price comovement with the market.

References

[1] Barber, Brad M., Terrance Odean., and Ning Zhu., Systematic noise., Journal of Financial Markets 12.4, 2009: 547-569.

[2] Barber, Brad M., Terrance Odean., and Ning Zhu., Do retail trades move markets?, Review of Financial Studies 22.1, 2009: 151-186.

[3] Barberis, Nicholas, and Andrei Shleifer., Style investing., Journal of Financial Economics 68.2, 2003: 161-199.

[4] Barberis, Nicholas., Andrei Shleifer., and Jeffrey Wurgler., Comovement., Journal of Financial Economics 75.2, 2005: 283-317.

[5] Bekaert, Geert, Robert J. Hodrick, and Xiaoyan Zhang., International stock return comovements., The Journal of Finance 64.6, 2009: 2591-2626.

[6] Black, Fischer., Noise., The journal of finance 41.3, 1986: 529-543.

[7] Boyer, Brian H., Style-Related Comovement: Fundamentals or Labels?, The Journal of Finance 66.1, 2011: 307-332.

[8] Chen, Joseph., Harrison Hong., and Jeremy C. Stein., Breadth of ownership and stock returns., Journal of financial Economics 66.2, 2002: 171-205.

[9] Choi, James J., Li Jin., and Hongjun Yan., What does stock ownership breadth measure?, Review of finance 2012: rfs026.

[10] Fama, Eugene F., and James D. MacBeth., Risk, return, and equilibrium: Empirical tests., The Journal of Political Economy, 1973: 607-636.
[11] Fama, Eugene F., and Kenneth R. French., Common risk factors in the returns on stocks and bonds., Journal of financial economics 33.1, 1993: 3-56.
[12] Fama, Eugene F., and Kenneth R. French., Value versus growth: The international evidence., The Journal of Finance 53.6, 1998: 1975-1999.
[13] Green, Clifton T., and Byoung-Hyoun Hwang., Price-based return comovement., Journal of Financial Economics 93.1, 2009: 37-50.
[14] Greenwood, Robin., Excess comovement of stock returns: Evidence from cross-sectional variation in Nikkei 225 weights., Review of Financial Studies 21.3, 2008: 1153-1186.
[15] Harvey, Campbell R., and Akhtar Siddique., Conditional skewness in asset pricing tests., The Journal of Finance 55.3, 2000: 1263-1295.
[16] Jensen, Michael C., Fischer, Black., and Myron S. Scholes., The capital asset pricing model: Some empirical tests., Praeger Publishers Inc., 1972. Available at SSRN: http://ssrn.com/abstract=908569.
[17] Kelley, Eric K., and Paul C. Tetlock., How wise are crowds? Insights from retail orders and stock returns., The Journal of Finance 68.3, 2013: 1229-1265.
[18] King, Mervyn, Enrique Sentana, and Sushil Wadhwani., Volatiltiy and links between national stock markets., No. w3357. National Bureau of Economic Research, 1990.
[19] Kumar, Alok., and Charles Lee., Retail investor sentiment and return comovements., The Journal of Finance 61.5, 2006: 2451-2486.
[20] Kumar, Alok., Who gambles in the stock market?, The Journal of Finance 64.4, 2009: 1889-1933.
[21] Lintner, John., The Valuation of Risk Assets and the Selection of Risky Investments in Stock Portfolios and Capital Budgets., The Review of Economics and Statistics, 1965: 13-37.
[22] Merton, Robert C., A simple model of capital market equilibrium with incomplete information., The journal of finance 42.3, 1987: 483-510.
[23] Miller, Edward M., Risk, uncertainty, and divergence of opinion. The Journal of Finance 32.4, 1977: 1151-1168.
[24] Mossin, Jan., Equilibrium in a capital asset market., Econometrica: Journal of the econometric society, 1966: 768-783.
[25] Nagel, Stefan., Short sales, institutional investors and the cross-section of stock returns., Journal of Financial Economics 78.2, 2005: 277-309.
[26] Pirinsky, Christo A., and Qinghai Wang., Institutional investors and the comovement of equity prices., 6th Annual Texas Finance Festival, Available at SSRN: http://ssrn.com/abstract=585884.
[27] Pirinsky, Christo, and Qinghai Wang., Does corporate headquarters location matter for stock returns?., The Journal of Finance 61.4, 2006: 1991-2015.
[28] Priestley, Richard., and Bernt Arne Ødegaard., Another look at Breadth of Ownership and Stock Returns., 2005, Unpublished working paper, Norwegian School of Management BI.

[29] Roll, Richard., A critique of the asset pricing theory's tests Part I: On past and potential testability of the theory., Journal of financial economics 4.2, 1977: 129-176.
[30] Roll, Richard., R2., Journal of Finance 43, 1988: 541–566.
[31] Ross, Stephen A., The arbitrage theory of capital asset pricing., Journal of economic theory 13.3, 1976: 341-360.
[32] Rozeff, Michael S., and Mir A. Zaman., Overreaction and insider trading: Evidence from growth and value portfolios., The Journal of Finance 53.2, 1998: 701-716.
[33] Sharpe, William F., Capital Asset Prices: A Theory of Market Equilibrium Under Conditions of Risk., Journal of Finance 19, 425-442.
[34] Shiller, Robert J., Comovements in stock prices and comovements in dividends., The Journal of Finance 44.3, 1989: 719-730.
[35] Sias, Richard W., and Laura T. Starks., Institutions and Individuals at the Turn-of-the-Year., The Journal of Finance 52.4, 1997: 1543-1562.
[36] Sias, Richard W., and Laura T. Starks., Return autocorrelation and institutional investors., Journal of Financial economics 46.1, 1997: 103-131.