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Heterogeneous Beliefs, Institutional Investors and Stock Returns – Evidence from China

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ABSTRACT

Using the turnover decomposition model, I extract unexpected trading volume from the institutional investors' trading activity to measure the institutional investors' heterogeneous beliefs and explore the explanatory power of that on stock returns. Portfolios built according to the magnitude of institutional investors' heterogeneous beliefs are significantly profitable. The expected returns of portfolios with higher heterogeneous beliefs are significantly higher than other portfolios, particularly for small companies, and the influence of institutional investors' heterogeneous beliefs on stock returns during the current month is significantly positive, but it is significantly negative for the next month. When considering beta, bm, size and short-sales constraints, the conclusion is still valid.

Keywords: heterogeneous beliefs, institutional investor, unexpected trading volume, asset pricing

INTRODUCTION

This paper analyzes the role of heterogeneous beliefs of institutional investors in predicting the cross-section of future stock returns. I find that stocks with a higher degree of heterogeneous belief earn significantly lower future returns than similar stocks. In particular, a portfolio of stocks in the highest institutional investors' heterogeneous belief underperforms a portfolio of stocks in the lowest institutional investors' heterogeneous belief by an average of 4.37% per month. This effect is the strongest in small stocks. After introducing this factor into the Fama–Macbeth model, the results also show that the influence of opinion divergence on stock returns over a month is significantly positive, whereas that on the stock returns of the following month is significantly negative. The conclusion remains valid when further considering size, bm and short-sales constraints.

Miller (1977) provides an early theoretical analysis of the implications of heterogeneous beliefs on stock returns. Under short-sales constraints heterogeneity in beliefs is negative related to future returns because the opinion of pessimists would not be incorporated into the current price of a stock, asset prices reflect only the valuation of optimistic investors. Therefore, when short-sales constraints and heterogeneous beliefs are present, there is greater disagreement among investors, higher current stock prices and lower future stock prices in the future. Based on Miller's (1977) theory, Harrison and Kreps (1978), Harris and Raviv (1993) and Basak (2005) develop dynamic asset pricing models that incorporate heterogeneous beliefs. Heterogeneous beliefs often refer to the differences in opinion among investors, known as disagreement (Hong and Stein, 2007).

Empirical research on the relationship between investor heterogeneity and stock returns lags behind theoretical research. Heterogeneous beliefs convey investors' private valuations of assets (Qin & Zhu, 2015). Subsequently, the burgeoning empirical literature is strongly supported Miller's (1977) argument. Diether et al. (2002) finding that regarding the current degree of heterogeneity of investors, the greater the trading volume is, the lower the future earnings; also, considering short selling (Detemple and Murthy, 1997). Heterogeneous beliefs can explain some of the excess returns that the traditional asset pricing model cannot explain (Goetzmann and Massa, 2001). In addition, the excess returns derived from an arbitrage portfolio constructed based on the level of heterogeneous beliefs cannot be explained by risk factors such as the market's risk, size and value (Chen et al., 2015). In prior empirical research, differences of opinion among investors are generally viewed as a proxy for heterogeneous beliefs, the

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Contribution of this paper to the literature

- This paper employs the Institutional investors' unexpected trading volume (HBR_B) as proxies for heterogeneity, and uncovers the relationship between the proxy and stock returns in Chinese A-share stock market.
- This paper shows that stock returns are more significantly related to the institutional investors' unexpected trading volume even if considering the factors of size, book-to-market and short-sale Constraint.
- This paper suggests that the institutional investors' heterogeneous beliefs can explain the stock return effectively in Chinese A-share stock markets.

heterogeneity proxies fall into two separate categories: (1)Analysts' forecast characteristics–dispersion in analysts' earnings forecasts (Diether et al., 2002); (2)The other proxies focusses directly on investors' trades, like as unexpected trading volume (Garfinkel and Sokobin, 2006), stock return volatility (Ang et al., 2006), turnover (Boehme et al., 2006), investor orders (Garfinkel, 2009) and so on.

For a variety of reasons, financial economists tend to view individuals and institutions differently. In particular, while institutions are viewed as informed investors, individuals are believed to have psychological biases and are often thought of as the proverbial noise traders in the sense of Kyle (1985) or Black (1986). In the mature capital market, the institutional investors have been regarded as an important factor in asset pricing. Since the establishment of the Chinese stock market in 1990, individual investors have been the key market participants. Until late May 2016, the share value of institutional investors, which mainly depended on investing funds, accounted for 40% of the entire A-share market. Then short-selling was totally prohibited in the Chinese stock market before March 30, 2010, when the China Securities Regulation Committee (CSRC) formally announced permission for margin purchase and short-selling. Compared to overseas stock markets, the Chinese stock market is a more appropriate environment to study the effects of heterogeneous beliefs and short-sales constraints on stock returns.

In the literature, institutional investors are considered better at estimating the intrinsic value of the firm by means of their informationally advantages and stock investment skills, using the investing strategy of buying and holding for a period (Chopra et al., 1992; Zhong & Fan, 2016); and they are wiser, not easily influenced by market noise, and they can counteract the impact of emotional individual investors, meaning that they can alleviate the market's fluctuation (Hirshleifer et al., 1994). In contrast, some research shows that institutional investors have the motive and manipulate asset prices on their own benefit (Franklin et al., 2006; Ben-David et al., 2013). When market sentiment is constantly going up, institutional investors will adopt positive-going trading strategies to constantly fuel bubbles to aggravate market risk (De Long et al., 1990b). GuoJin, Chen (2010) believes that institutional investors take advantage of individual investors' behavioral biases and pocket them and are deemed to be facilitators in the bubble and crash in Chinese stock market.

This paper employs the institutional investor unexpected trading volume (HBR_B) as a proxy for heterogeneity and uncovers the relationship between the proxy and stock returns, the listed companies in China's A-share market are the object of study, and from the perspective of investor heterogeneous beliefs, the relationship between the institutional investors' heterogeneous beliefs and stock returns are studied. The results show that the heterogeneous beliefs of institutional investors is significantly positively correlated with the current return of the stock, which is significantly negatively correlated with the return in subsequent month, particularly for smaller companies even if considering the factors of size, the book-to-market ratio and short-sale constraints.

The remainder of this study is organized as follows: Section 2 constructs the measurement of institutional investor's heterogeneous beliefs; Section 3 describes the data sample and portfolio strategies; Section 4 is based on the Fama-Macbeth cross-section regression analysis and reports the empirical results; Section 5 summarizes the major findings and provides conclusions.

MEASURING HETEROGENEOUS BELIEFS OF INSTITUTIONAL INVESTORS

Because heterogeneous beliefs are related to investors' cognition and behavior, they cannot be measured directly. Empirical research on the relationship between heterogeneous beliefs and stock returns, indirect variables are used as proxies for investors' heterogeneous beliefs like as the bid-ask spread, stock return volatility and analysts' forecast dispersion. The bid-ask spread may reflect either information asymmetry or liquidity (Lepone, & Leung, 2013; Liu, 2016). Additionally, dispersion in analysts' earnings forecasts is the earliest and the most widely used proxy for heterogeneous beliefs (Barron et al., 2009). However, there are still potential problems with this measure. Analysts' forecast dispersion merely represents the differences in beliefs between professional investors,

and analysts may issue biased forecasts due to their own self-interest, which leads to information distortion of the heterogeneous beliefs measured by forecast divergence.

Theoretically, stock return volatility is affected by information and risk. Because the literature has shown that unexpected volume strongly reflects divergence in investors' opinions (Garfinkel, 2009), I extract institutional investors' heterogeneous beliefs from the unexpected trading volume. Garfinkel (2009) compares unexpected trading volume to other proxies from the extant literature and claims that the unexpected trading volume is the best proxy for heterogeneous beliefs. The results of Chen et al. (2015) and Qin and Zhu (2015) also show that the unexpected trading volume in China's securities market is the most effective proxy variable for measuring investors' heterogeneous beliefs. This paper uses the unexpected trading volume as a measure of heterogeneous beliefs. Similar to Garfinkel (2009) and Chen et al. (2015), the market-adjusted unexpected trading volume is first calculated.

$$\Delta TO_{i,t} = \left[\left(\frac{Vol_{i,t}}{Shs_{i,t}}\right) - \left(\frac{Vol_t}{Shs_t}\right)\right] - \frac{1}{N}\sum_{N}\left[\left(\frac{Vol_{i,t}}{Shs_{i,t}}\right) - \left(\frac{Vol_t}{Shs_t}\right)\right] \quad (1)$$

Where $Vol_{i,t}$ is the trading volume of stock i on day t, where $Shs_{i,t}$ is the outstanding shares of stock i on day t, where Vol_t is the market trading volume of stock i on day t, where Shs_t is the total number of shares outstanding for stock i on day t, where N is the control period. Theoretically, trading is usually caused by three factors: (i) investors' exogenous liquidity needs; (ii) information impacts; and (iii) investors' opinion divergence (Bessembinder et al., 1996; Garfinkel & Sokobin, 2006). Therefore, this paper subtracts trading activity over a control period, from the above measure of market-adjusted turnover. And the daily trading volume is composed of individual and institutional investors' trading volume. Therefore, this paper subtracts institutional investors' trading activity from the market trading volume and calculate the institutional investors' unexpected trading volume like formula (1) (labeled HBR_B). The higher the value of HBR_B, the higher the degree of institutional investors' heterogeneous beliefs.

DATA AND PORTFOLIO STRATEGIES

Data and Descriptive Statistics

In this paper, I collected daily and monthly data from the Chinese Stock Market and Accounting Research (CSMAR) database for all of the domestic (i.e., A) shares (excluding special treatment stocks) listed on the Shanghai or Shenzhen stock exchanges. In my sample, I required firms to have at least one years of monthly observations. I select the sample period as 2004 to 2014. To obtain reliable model estimations, I exclude the first month of data following any initial public offering and delete the firm/month if there are fewer than 22 daily observations in that firm/month. The final samples consist of 6,476,288 daily data items and 293,568 monthly data items for 2224 listed companies.

Table 1 provides descriptive statistics for the variables. The sample period is from January 2004 to December 2014, N is defined as the average number of firms per quarterly period, RET is the mean of monthly stock returns. HBR_B is the average number of valid samples for the four quarters of the year. BETA is the systematic risk obtained from CAPM over the previous year. $SIZE$ is the natural logarithm of the firm's market capitalization at the end of the previous year (unit: RMB 100 million), BM is the book-to-market ratio. I winsorize all continuous variables at the 1st and 99th percentiles to reduce the potential impact of extreme values.

Table 1 indicates that the degree of institutional investors' heterogeneous beliefs is between 0.011 and 0.093, Stock returns fluctuate over sample period. In 2009, the average returns on stocks were 8.0 percent, respectively, while it was −5.7 percent in 2008.

Table 2 presents the Pearson correlation coefficients of the variables (probability values in parentheses). The results clearly demonstrate a size effect and show that the degree of heterogeneous beliefs has a significant impact on current returns.

Portfolio Strategies based on Institutional Investors' Heterogeneous Belief

According to the theoretical analysis above, the higher the degree of institutional investors' heterogeneous beliefs, the higher the current stock returns and the lower the future returns, we will use portfolio strategies to prove it in this section. I assign stocks to portfolios based on certain characteristics, such as difference of HBR_B, to compare the difference between the average monthly returns of these stock portfolios. Additionally, taking into consideration the effects of size and value factors on stock returns (Fama & French, 1993), the size and book-to-market ratios of firms are controlled for during sorting and grouping.

Table 1. Descriptive Statistics

			2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
N	Mean	1719	1228	1240	1288	1396	1488	1568	1903	2205	2200	2199	2194
RET	Mean	0.021	-0.011	-.0.007	0.059	0.109	-0.057	0.080	0.014	-0.030	0.005	0.022	0.036
	SD	(0.103)	(0.024)	(0.023)	(0.042)	(0.058)	(0.035)	(0.037)	(0.036)	(0.031)	(0.021)	(0.032)	(0.030)
BETA	Mean	1.049	0.995	1.056	1.107	0.953	0.948	1.065	1.038	1.044	1.128	1.163	1.042
	SD	(0.067)	(0.280)	(0.247)	(0.223)	(0.247)	(0.223)	(0.160)	(0.209)	(0.201)	(0.230)	(0.264)	(0.240)
SIZE	Mean	3.423	2.971	2.755	2.529	2.986	4.060	3.144	4.006	4.080	3.648	3.641	3.833
	SD	(0.562)	(0.799)	(0.824)	(0.867)	(1.034)	(1.127)	(1.082)	(1.008)	(0.943)	(0.958)	(0.984)	(0.931)
BM	Mean	-1,080	-0.989	-0.774	-0.443	-0.904	-1.865	-0.754	-1.587	-1.712	-1.090	-0.828	-0.933
	SD	(0.447)	(0.572)	(0.576)	(0.541)	(0.702)	(0.730)	(0.686)	(0.680)	(0.843)	(0.710)	(0.574)	(0.685)
HBR_B	Mean	0.044	0.011	0.014	0.032	0.081	0.035	0.093	0.053	0.039	0.041	0.057	0.039
	SD	(0.035)	(0.030)	(0.033)	(0.071)	(0.081)	(0.066)	(0.090)	(0.063)	(0.053)	(0.057)	(0.063)	(0.074)

Notes: $BETA$, $SIZE$, BM are the average of monthly valid samples. $BETA$ is a systematic risk obtained from CAPM over the previous year; $SIZE$ is the natural logarithm of the firm's market capitalization at the end of the previous year (unit: RMB 100 million), and HRB_B is the unexpected volume of institutional investors'. To eliminate impact extremes bring about to the analysis. $BETA$, $SIZE$, BM, HRB_B are floated up and down at 1% level.

Table 2. Pearson Correlation Matrix

	BETA	BM	SIZE	HBR_B	R_t
BETA	1				

BM	0.161***	1			
	(0.000)	-----			
SIZE	-0.070***	-0.224***	1		
	(0.000)	(0.000)	-----		
HBR_B	0.032***	0.073***	-0.091***	1	
	(0.000)	(0.000)	(0.000)	-----	
R_t	-0.022***	0.339***	-0.288***	0.227***	1
	(0.000)	(0.000)	(0.000)	(0.000)	-----

Notes: This table reports the Pearson correlation of all of the variables. The probabilities are shown in parentheses. *** Significance at the 1 percent levels, respectively.

To control for the possible influence of the size and value effect on stock returns, I triple-sort on size, book-to-market ratio (BM) and HBR_B. In each month, all stocks are divided into three groups based on stock market capitalization at the end of the previous year. Each group is then divided into three groups based on BM. Lastly, each of these nine groups is further divided into three groups according to the degree of the institutional investors' heterogeneous beliefs (HBR_B). Thus, I obtain 27 portfolios. All portfolios are held for one month, and the returns of each are then calculated for current and subsequent months.

Table 3 provides the average monthly returns of each portfolio in the current month (Panel A) and the subsequent month (Panel B) and the difference between the returns earned by extreme portfolios throughout the whole sample period when the impact of size and value factors is controlled for. A t-test is performed to determine whether the difference between the average monthly returns of high- and low-HBR_B portfolios is significantly different from zero.

It can be observed from **Table 3** that the institutional investors' heterogeneous beliefs still have a significant impact on stock returns in the current and subsequent months. The current return of a portfolio based on a high degree of HBR_B is significantly higher than that based on a low degree of HBR_B, and vice versa in subsequent month.

In Panel A, each column of data strictly increases with the decreases in HBR_B from the portfolio's monthly return. Differences between the returns earned by extreme portfolios vary from 1.457 percent to 3.844 percent. The largest difference between a high-HBR_B portfolio and a low-HBR_B portfolio is 3.844 percent for average monthly returns and is significant at the 1 percent level in the small-size value stocks. Additionally, the smallest difference in returns is for big-size stocks (1.457%). From the left side of panel A, in big-size companies, within the groups of high, medium and low bm, a high-HBR_B portfolio earns significantly higher stock returns than a low-HBR_B portfolio. Therefore, when we employ HBR_B to capture institutional investor heterogeneity, these results are consistent with the Miller hypothesis. High heterogeneity in institutional investors' beliefs with short-sale constraints leads to overpricing, and higher heterogeneity of beliefs is linked to more serious overpricing.

Table 3. Average Monthly Returns of Portfolios Sorted by Measures of Heterogeneity, SIZE and BM

Panel A: average mothly returns (%) of portfolios in the current quarter (%)									
	SIZE (Big)			**SIZE**			**SIZE (Small)**		
HBR_B	**BM1**	**BM2**	**BM3**	**BM1**	**BM2**	**BM3**	**BM1**	**BM2**	**BM3**
	(High)		**(Low)**	**(High)**		**(Low)**	**(High)**		**(Low)**
HBR_B1	3.809***	3.191***	2.422***	4.348***	3.891***	3.182***	5.057***	4.884***	4.543***
(High)	(3.73)	(3.27)	(2.69)	(4.16)	(3.87)	(3.22)	(4.69)	(4.73)	(4.53)
HBR_B2	1.472	1.425	0.908	1.891**	1.662*	1.382	2.285**	2.135**	1.949**
	(1.63)	(1.59)	(1.13)	(1.98)	(1.77)	(1.59)	(2.28)	(2.19)	(2.01)
HBR_B3	0.474	0.307	0.965	0.693	0.745	0.890	1.213	1.146	1.052
(Low)	(0.58)	(0.39)	(1.31)	(0.77)	(0.88)	(1.13)	(1.31)	(1.25)	(1.20)
HBR_B1 – HBR_B3	3.335***	2.883***	1.457***	3.654***	3.146***	2.292***	3.844***	3.739***	3.491***
(t_statistics)	(9.97)	(8.18)	(3.98)	(13.13)	(10.93)	()	(12.82)	(12.43)	(10.06)
Panel B: average monthly returns (%) of portfolios in the next quarter (%)									
	SIZE (Big)			**SIZE**			**SIZE (Small)**		
HBR_B	**BM1**	**BM2**	**BM3**	**BM1**	**BM2**	**BM3**	**BM1**	**BM2**	**BM3**
	(High)		**(Low)**	**(High)**		**(Low)**	**(High)**		**(Low)**
HBR_B1	1.7772*	1.400	1.305	1.940**	1.763*	1.360	2.385**	2.259**	1.924**
(High)	(1.90)	(1.52)	(1.51)	(1.98)	(1.80)	(1.44)	(2.37)	(2.28)	(2.01)
HBR_B2	1.916**	1.697*	1.520*	2.302**	1.995**	1.908**	2.807***	2.825***	2.503***
	(2.07)	(1.93)	(1.87)	(2.39)	(2.22)	(2.16)	(2.86)	(2.93)	(2.68)
HBR_B3	1.940**	1.774**	1.390*	2.561***	2.461***	2.121***	2.850***	2.876***	2.646***
(Low)	(2.23)	(2.07)	(1.83)	(2.70)	(2.75)	(2.62)	(3.03)	(3.03)	(2.90)
HBR_B1 – HBR_B3	-0.168	-0.374	-0.085	-0.621***	-0.697***	-0.761**	-0.465*	-0.617**	-0.722***
(t_statistics)	(-0.68)	(-1.45)	(-0.26)	(-2.92)	(-2.80)	(-2.53)	(-1.86)	(-2.55)	(-2.80)

Notes: Each month's stocks are sorted into three groups based on the level of market capitalization at the end of last year. Each size group is then sorted into three book-to-market groups. The book-to-market ratio is computed by financial figures of last year. Lastly, these nine groups are divided into three groups according to the degree of HBR. Thus, I obtain 27 portfolios. Each portfolio is held for one month, and I calculate its returns for the current and subsequent months. This table provides the value-weighted average returns of all portfolios in the current month (shown in Panel A) and subsequent month (shown in Panel B). The t-statistics in parentheses test whether the mean of differences are equal to zero. ***, **, * indicates significance at the 1,5 and 10 percent levels, respectively.

In panel B of **Table 3** provides the relationship between heterogeneity and stock returns in the following quarter. I find that HBR_B has a negative effect on stock returns. Differences between the returns earned by extreme portfolios vary from -0.761 percent to -0.085 percent. Additionally, non-significant values appear in big-size companies. So stock returns are significantly related to institutional investors' unexpected trading volume.

FAMA-MACBETH REGRESSION ANALYSIS

The statistical results of **Tables 3** demonstrate that regardless of whether the size and value factors are controlled for, the degree of institutional investors' heterogeneous beliefs is always an important factor influencing stock returns. In this section, I further explore the cross-section relationship between stock returns and institutional investors' heterogeneous beliefs by means of Fama and Macbeth (1973) regression. The regression takes the following form:

$$R_{i,t} - R_{f,t} = c_0 + c_1 HBR\_B_{i,q} + c_2 BETA_{i,T} + c_3 SIZE_{i,T} + c_4 BM_{i,T} + \varepsilon_{i,t} \quad (2)$$

where $R_{i,t}$ is the month t return of stock i and $R_{f,t}$ is the monthly risk-free return in China. HBR_B is employed as institutional investors' heterogeneous beliefs on stock i in quarter q. Additionally, $SIZE_{i,T}$ and $BM_{i,T}$ are the natural logs of firm i market capitalization and book-to-market ratio, respectively, at the end of last year, $T-1$. $BETA_{i,T}$ is calculated from CAPM model on the firm i daily returns of year $T-1$.

Miller (1977) argues that investors who are pessimistic are unable to adequately express their opinions and cannot participate in market transactions due to the short-sale constraints. Additionally, in this case, asset prices mainly reflect the attitude of optimistic investors, resulting in overvalued asset prices. The greater the degree of investors' heterogeneous beliefs, the more the stock price is overvalued, especially in the market with the limitation posed by short-sale constraints. As time passes, the price tends to be intrinsic value when the information is conveyed and the investor's expectation becomes more consistent.

Table 4. Fama-Macbeth cross-sectional return regressions

Independent Variables	Dependent variable=Monthly stock returns in the current quarter (%)		Dependent variable=Monthly stock returns in the next quarter (%)	
Panel A: January 2004 through December 2014				
	1	2	3	4
Constant	3.826***	3.026***	3.826***	3.825***
	(3.30)	(2.70)	(3.29)	(3.34)
HBR_B		10.530***		-1.645***
		(12.25)		(-3.27)
BETA	-0.458	-0.707	-0.608	-0.378
	(-0.95)	(-1.50)	(-1.33)	(-0.79)
SIZE	-0.343	-0.247	-0.330*	-0.348**
	(-1.93)	(-1.42)	(-1.84)	(-1.95)
BM	0.240	0.133	0.198	0.238
	(1.43)	(0.83)	(1.21)	(1.44)
Adj.R^2	0.060	0.086	0.057	0.064
Panel B: January 2004 through December 2009				
	1	2	3	4
Constant	4.126**	3.411**	4.176**	4.053**
	(2.30)	(1.97)	(2.34)	(2.30)
HBR_B		5.024***		-1.268
		(6.48)		(-1.64)
BETA	-0.132	5.023	-0.465	-0.046
	(-0.19)	(-0.25)	(-0.73)	(-0.07)
SIZE	-0.263	-0.234	-0.256	-0.256
	(-1.01)	(-0.91)	(-0.99)	(-0.98)
BM	0.287	0.171	0.209	0.278
	(1.29)	(0.81)	(0.95)	(1.30)
Adj.R^2	0.058	0.077	0.055	0.062
Panel C: January 2011 through December 2014				
	1	2	3	4
Constant	2.368	2.445*	3.309**	3.290**
	(1.63)	(1.66)	(2.23)	(2.22)
HBR_B	13.022***	13.053***	-2.056***	-1.917***
	(11.45)	(10.87)	(-3.18)	(-2.87)
HBR_B*NSSC		3.825		2.867**
		(1.15)		(1.98)
BETA	-1.306**	-1.349**	-0.780	-0.756
	(-2.06)	(-2.13)	(-1.21)	(-1.18)
SIZE	-0.178	-0.191	-0.373	-0.376
	(-0.68)	(-0.73)	(-1.37)	(-1.38)
BM	0.258	0.254	0.351	0.349
	(0.88)	(0.87)	(1.14)	(1.13)
Adj.R^2	0.100	0.102	0.067	0.067

Notes: HBR_B represents the unexpected trading volume of institutional investors. $BETA$, $SIZE$, and BM are control variables and represent the coefficient of individual stocks, the total market value, and the book-to-market ratio, respectively. $NSSC$ (no short-sale constraint) is a dummy variable: if the stock is allowed to be shorted, assign a value of 1; otherwise, assign 0. The t-statistics are reported in the corresponding parentheses. ***, **, * Significance at the 1, 5 and 10 percent levels, respectively.

Note that the CSRC announced permission for margin purchase and short selling on March 31, 2010. To further understand the effect of short selling on stock returns, I divide the whole sample period into two subsample periods: January 2004 to December 2009 and January 2011 to December 2014. Due to the limited number of sample stocks, margin trading is not active in the early stages of the introduction. Thus, the impact of investors' heterogeneous beliefs is limited, and therefore, the second period that this study chose is from January 2011. During the period of loosening short-sale constraints (January 2011 through December 2014), I add the interaction term between $HBR\_B_{i,q}$ and $NSSC_{i,q}$ to the Fama-Macbeth regression. $NSSC_{i,q}$ is a dummy variable that equals one if stock i is permitted to short sell, and zero otherwise.

Panel A in **Table 4** shows the power of HBR_B to explain the cross-section of current stock returns and future returns during the whole sample period. Panel B does this during the period of tightening short-sale constraints (July 2004 through December 2009). From Panel A and Panel B, in models (2) and (4), the estimated coefficients of

HBR_B is significantly positively related to current stock returns and is significantly negatively related to future stock returns when other control variables are considered during the whole sample period and the subsample period (July 2004 through December 2009). From Panel A, I compare the adjusted R-squared of Model (1) with the adjusted R-squared of model (2), the adjusted R-squared increases by 2.6 percent. The difference between the adjusted R-squared of model (3) and that of model (4) is 0.7 percent. Therefore, HBR_B is capable of supplying incremental information.

The estimated coefficients of institutional investors' heterogeneous beliefs proxy and the interaction term between heterogeneity proxies and the short-sale constraint dummy variable during the subsample period (January 2011 through December 2014) are presented in Panel C. In model (2), the estimated coefficient of the interaction term HBR_B × NSSC is 3.825 percent and not significant. HBR_B is positively related to stock returns significant at the 1 percent level in models (1) and (2), and negatively related to stock returns significant at the 1 percent level in model (3) and (4) when the market relaxed short-sale constraints. In model (4), the coefficient of the interaction term is positive and significant at the 5 percent level. It indicates that the unexpected trading volume of institutional investors has the capacity to provide incremental information whatever considering short-sale.

CONCLUSION

The investors' heterogeneous belief is one of the key factors in asset pricing. This paper uses unexpected trading volume, which is directly extracted from trading activity, to ensure that institutional investors' heterogeneous beliefs obtained has been translated into actual trading activity and exerted an impact on asset prices. Portfolio strategies and Fama-Macbeth regression are used to investigate the effect of institutional investors' heterogeneous beliefs on stock returns. The main conclusions as follows:

Portfolio strategies developed according to the degree of institutional investors' heterogeneous beliefs have significant profitability. The expected return in the subsequent month of a portfolio with a low HBR_B is significantly higher than that of other portfolios, and this difference is most obvious with stocks of smaller companies. When considering factors as size and value, the expected average return in the subsequent month of a portfolio based on small-company stocks and with a low HBR_B is significantly higher than that of portfolios based on large-company stocks and with a high HBR_B;

Stock returns are significantly related to institutional investors' unexpected trading volume. When the institutional investors' unexpected trading volume introduced to Fama-Macbeth model, the cross-sectional regression shows that the degree of institutional investors' unexpected trading volume has a significantly positive correlation with the current month stock returns and a significantly negative correlation with the subsequent month stock returns. It indicates that institutional investors' heterogeneous beliefs are an important factor in asset pricing. The institutional investors' heterogeneous beliefs can effectively affect China's A-share market in asset pricing than other factors and is capable of supplying incremental information.

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