

The Impact of Investor Heterogeneous Beliefs on Stock Returns in China 's A-Share Market

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Abstract: Traditional asset pricing theory, grounded in strict assumptions of homogeneous investor beliefs and market efficiency, struggles to adequately explain the widespread irrational price fluctuations observed in China's stock market. With the development of behavioral finance, heterogeneous beliefs—a key variable capturing differences in investor opinions—offer a new perspective for understanding market inefficiency. This analytical perspective aligns more closely with the structure of China's stock market, which is predominantly composed of retail investors. Using A-share market data from January 2007 to August 2025, this study selects adjusted turnover rate and idiosyncratic volatility as proxies for heterogeneous beliefs. Through portfolio analysis, Fama-MacBeth cross-sectional regression, and time-series regression, we systematically examine the impact of investors' heterogeneous beliefs on stock returns. The findings reveal that: (1) Heterogeneous beliefs significantly and negatively predict future stock returns, supporting Millers (1977) theory of overvaluation under short-sale constraints; (2) This effect is stronger during bear markets and weaker in bull markets; (3) Over time, with improvements in market institutions, the pricing effect of heterogeneous beliefs shows a declining trend; (4) The impact of heterogeneous beliefs varies across market segments—most pronounced in the Main Board, followed by the ChiNext Board, and insignificant in the STAR Market. This research extends asset pricing theory from a behavioral finance perspective, examining its applicability within the practical context and investor structure of China's stock market. Based on the empirical findings, policy recommendations are proposed for regulatory bodies, and the study offers insights for investors to better understand cognitive biases and improve investment decision-making.

Keywords: Heterogeneous Beliefs; Stock Returns; Asset Pricing; Behavioral Finance; A-share Market.

1. Introduction

1.1. Research Background

As the core of the capital market, the stock market and its returns have always been a central focus of financial research. Modern financial theory, originating from Markowitz's (1952) portfolio theory, evolved into the Capital Asset Pricing Model (CAPM) by Sharpe (1964), Lintner (1965), and Mossin (1966), and was solidified by Fama's (1970) Efficient Market Hypothesis (EMH). The EMH posits that prices fully reflect all available information, implying that investors cannot consistently achieve excess returns.

However, since the 1980s, a growing body of empirical evidence has uncovered numerous "anomalies" that challenge the EMH, such as excess volatility (Shiller, 1981), the equity premium puzzle, and momentum effects. These phenomena suggest that markets are not perfectly efficient. Two main paths have emerged to explain these anomalies. The first, within the classical framework, seeks to add missing risk factors, as exemplified by the Fama-French three-factor model (1993). The second path, rooted in behavioral finance, relaxes the assumptions of perfect rationality and market efficiency, focusing on the impact of investor psychology and limited arbitrage.

This study follows the second path, specifically investigating how investor irrationality, particularly heterogeneous beliefs, affects asset returns. Miller (1977) pioneered this line of inquiry, proposing that when investors have divergent opinions about a stock's future and face short-sale constraints, pessimistic investors are forced out of the market. Consequently, prices reflect only the views of optimistic investors, leading to current overvaluation and

subsequently lower future returns. This concept of heterogeneous beliefs offers a powerful lens to understand price dynamics.

The heterogeneous beliefs framework is particularly relevant to the Chinese A-share market, which is dominated by retail investors. As of the end of 2024, the number of investors in the A-share market reached 237 million, with natural person investors accounting for over 99.7%. These investors often lack sophisticated analytical tools and are more susceptible to sentiment, rumors, and herd behavior, amplifying information asymmetry and speculative trading. Furthermore, market regulations such as the "T+1" trading rule and constrained short-selling mechanisms can exacerbate these effects by limiting the ability of informed, pessimistic investors to trade, further skewing prices. This unique institutional backdrop makes China's A-share market an ideal setting to test theories of heterogeneous beliefs.

1.2. Research Significance

1.2.1. Theoretical Significance

This research diverges from the classical "homogeneous beliefs" assumption by introducing heterogeneous beliefs as a key behavioral variable. It posits that belief divergence itself is a significant factor in price formation, offering a novel theoretical lens for explaining numerous pricing anomalies in China's capital market. By systematically testing Miller's (1977) hypothesis within the context of a major emerging market, this study contributes to the localization and refinement of behavioral asset pricing theory.

1.2.2. Practical Significance

For regulators, the findings provide empirical evidence that investor disagreement can lead to price deviations from fundamentals. This underscores the importance of optimizing

the information environment, such as enhancing the quality and timeliness of corporate disclosures to reduce information asymmetry. It also supports the prudent relaxation of short-selling constraints to allow pessimistic views to be incorporated into prices, thereby improving price discovery and market stability.

For investors, particularly the dominant retail participants, the study serves as a cautionary tale. It reveals that stocks with high levels of disagreement are susceptible to overvaluation driven by collective optimism, followed by subsequent price corrections. This insight encourages a shift from speculative herding towards a focus on fundamental value, fostering more rational investment practices.

1.3. Research Methodology and Structure

This paper employs a combination of literature analysis, qualitative analysis, and quantitative empirical research.

Literature Analysis: Systematically reviews the definition, causes, and measurement of heterogeneous beliefs, as well as its relationship with stock returns.

Qualitative Analysis: Analyzes the unique characteristics of China's A-share market, including its investor structure and institutional environment, to select appropriate proxy variables.

Empirical Analysis: Employs a robust suite of econometric techniques, including univariate portfolio sorting, time-series regression with the Fama-French three-factor model, and Fama-MacBeth cross-sectional regressions. Heterogeneity analyses are conducted for different market states (bull/bear markets), time periods, and market segments (Main Board, ChiNext, STAR Market).

The paper is structured as follows: Section 2 reviews the literature. Section 3 outlines the theoretical model and research hypotheses. Section 4 details the research design. Section 5 presents the main empirical results. Section 6 provides heterogeneity analysis. Section 7 concludes and offers recommendations.

2. Literature Review

2.1. The Connotation of Investor Heterogeneous Beliefs

2.1.1. Definition of Investor Heterogeneous Beliefs

Investor heterogeneous beliefs, or divergence of opinion, refer to the situation where different investors hold varying expectations about the future returns, risk levels, or intrinsic value of the same asset. Several key definitions exist:

-Miller (1977): Focuses on the outcome of divergent opinions in a market with short-sale constraints, leading to prices biased by optimistic views.

Scheinkman & Xiong (2003): Attributes heterogeneous beliefs to investor overconfidence and the speculative motive, introducing the concept of a "resale option."

Basak (2005): Emphasizes the role of ex-ante differences in information access and processing as the root cause.

Zhang & Zhang (2006) and Hong & Stein (2007): Provide a comprehensive definition, integrating ex-ante heterogeneity, gradual information flow, and limited attention as core drivers of belief divergence.

Despite different emphases, all definitions converge on the core idea that investors' expectations about an asset's future are not uniform.

2.1.2. Formation Mechanisms of Heterogeneous Beliefs

The formation of heterogeneous beliefs stems from systematic frictions and limitations in financial markets:

(1) **Gradual Information Flow:** New information is not disseminated to all market participants simultaneously. This delay creates temporary information asymmetries, leading to divergent valuations (Hong & Stein, 2007).

(2) **Limited Attention:** Investors have limited cognitive capacity and cannot process all available information. They selectively focus on salient cues (e.g., high trading volume, news headlines), resulting in different information sets and, consequently, different beliefs (Peng & Xiong, 2006; Barber & Odean, 2008).

(3) **Ex-ante Heterogeneity:** Investors possess inherent differences in knowledge, experience, risk preferences, and analytical models. This means that even when faced with the same information, they may interpret it differently, leading to divergent posterior beliefs (Kandel & Pearson, 1995).

2.2. Measurement of Investor Heterogeneous Beliefs

Measuring heterogeneous beliefs is challenging, and methods are broadly classified into direct and indirect approaches. A summary is provided in Table 1.

2.3. The Impact of Heterogeneous Beliefs on Stock Returns

2.3.1. Early and Evolving Empirical Research

Miller's (1977) hypothesis that high disagreement leads to overvaluation and subsequent low returns has been empirically validated in various markets. Diether et al. (2002) provided seminal evidence using analyst forecast dispersion, finding that stocks with higher disagreement earn significantly lower future returns. Subsequent research highlighted the conditional nature of this effect. Boehme et al. (2006) confirmed that the negative return effect is only significant for stocks facing binding short-sale constraints. More recent studies have explored non-linearities and even positive "disagreement premiums" under specific conditions (Bali & Ramadorai, 2020).

2.3.2. Research on the Chinese Capital Market

Studies on the Chinese market largely support Miller's hypothesis. Researchers like Chen et al. (2009) and Liu & Zhang (2021) found a significant negative relationship between heterogeneous beliefs and future returns, confirming the role of short-sale constraints in China's unique institutional context. Studies have also utilized localized data, such as Baidu search indices and stock forum posts, to capture retail investor attention and sentiment, further enriching the understanding of disagreement in China (Yu & Zhang, 2012; Zheng et al., 2016).

2.4. Literature Review Summary

The literature has established a robust theoretical and empirical foundation for the impact of heterogeneous beliefs on stock returns. However, gaps remain, particularly in the accurate measurement of beliefs in retail-dominated markets and in understanding how this effect varies across different market conditions, over time, and across different segments of a complex market like China's A-share system. This study aims to address these gaps.

Table 1. Measurement Methods for Investor Heterogeneous Beliefs

Measurement Category	Measurement Method	Explanation
Direct Measurement	Questionnaire Surveys	Directly asking investors about their future price expectations.
	Experimental Methods	Observing investor decisions in simulated market environments.
	Text Mining / Sentiment Analysis	Analyzing social media or forum posts using NLP to quantify opinion divergence.
Indirect Measurement	Analyst Forecast Dispersion	Using the standard deviation of analysts' earnings or price forecasts as a proxy (Diether et al., 2002).
	Turnover Rate	Higher trading volume is often associated with greater disagreement. Adjusted turnover aims to isolate belief-driven trading from liquidity needs (Garfinkel, 2009).
	Idiosyncratic Volatility (IVol)	The volatility of the residual from a factor model. Higher IVol is argued to reflect greater divergence of opinion about firm-specific information (Boehme et al., 2006).
	Bid-Ask Spread	Wider spreads can indicate higher information asymmetry and disagreement (Houge et al., 2001).

This study adopts ****adjusted turnover rate**** as the primary proxy for heterogeneous beliefs, supplemented by idiosyncratic volatility****** for robustness checks, due to their data availability and suitability for the Chinese market.

3. Theoretical Model and Research Hypotheses

3.1. Theoretical Model

This study is primarily grounded in Millers (1977) static asset pricing model. The model posits two key conditions: (1) investors have heterogeneous beliefs about a stocks future value, and (2) there are binding short-sale constraints. Under these conditions, pessimistic investors cannot sell the stock short, so their negative views are not reflected in the price. The demand for the stock comes solely from optimistic investors, and the equilibrium price is set by the most optimistic among them. Consequently, the stock becomes overvalued relative to its fundamental value. The greater the divergence of opinion, the higher the overvaluation. As information is revealed over time and uncertainty resolves, prices revert toward their fundamental value, resulting in lower future returns for stocks that were initially subject to high disagreement.

3.2. Research Hypotheses

Based on the theoretical framework and the specific characteristics of the Chinese A-share market, the following hypotheses are proposed:

H1: Investor heterogeneous beliefs have a significant negative predictive power for future stock returns in the Chinese A-share market. This is the core test of Millers hypothesis.

H2: The negative effect of heterogeneous beliefs on future stock returns is stronger during bear markets than during bull markets. In bear markets, pessimism dominates, and any disagreement is more likely to trigger panic selling, amplifying the price correction. In bull markets, optimism may dilute the impact of disagreement.

H3: The predictive power of heterogeneous beliefs for future stock returns has declined over the sample period (2007-2025). This hypothesis posits that as Chinas capital markets have developed—with improved information

disclosure, the gradual introduction of short-selling mechanisms (margin trading), and a more sophisticated investor base—pricing efficiency has increased, thereby attenuating the mispricing caused by disagreement.

H4: The impact of heterogeneous beliefs on stock returns varies across different market segments, being strongest on the Main Board and weaker on the ChiNext and STAR Markets. Due to differences in short-sale constraints, investor structure, and firm characteristics (e.g., higher uncertainty on the STAR Market), the mechanism driving the disagreement effect is expected to differ in strength and significance across these boards.

4. Research Design

4.1. Variable Construction

Heterogeneous Beliefs Proxy (Turn): The primary proxy is the adjusted turnover rate for stock i in month $t-1$. It is calculated by first subtracting the daily market turnover from the daily stock turnover to remove market-wide effects. This difference is then further adjusted by subtracting its own average over a prior window (days -125 to -6) to remove the component related to normal liquidity needs (Garfinkel, 2009). The monthly value is the average of these daily adjusted turnover figures.

Alternative Proxy (Idvol): Idiosyncratic volatility is used for robustness. For each stock and month, the daily excess returns are regressed on the Fama-French three factors. Idvol is the standard deviation of the regression residuals for that month.

Dependent Variable (Return): The individual monthly stock return, considering cash dividend reinvestment.

Control Variables: To isolate the effect of heterogeneous beliefs, several control variables are included: systematic risk (Beta), firm size (Size, measured as log of market capitalization), earnings-to-price ratio (E_p), illiquidity (Illiquidity, following Amihud, 2002), and return on assets (Roa).

4.2. Sample Selection

The sample comprises all A-share companies listed on the Shanghai and Shenzhen Stock Exchanges from January 2007 to August 2025. Following standard practice, financial firms and companies labeled as ST or *ST during the sample period are excluded. All data are sourced from the CSMAR database.

4.3. Empirical Methods

Portfolio Analysis: At the end of each month, stocks are sorted into quintiles based on their Turn (or Idvol). Portfolio 1 (Low) contains stocks with the lowest disagreement, and Portfolio 5 (High) contains those with the highest. The equal-weighted returns of these portfolios are tracked over the subsequent month. A long-short hedge portfolio (Low-High) is constructed to capture the return spread.

Time-Series Regression: The monthly returns of the quintile and hedge portfolios are regressed on the Fama-

French three factors (Market, SMB, HML). The intercept (alpha) from this regression measures the risk-adjusted abnormal return attributable to the disagreement-based sorting.

Fama-MacBeth Cross-Sectional Regression: This two-step procedure is used to test the predictive power of Turn in a multivariate setting. In each month, a cross-sectional regression of stock returns on lagged Turn and control variables is run. The time-series averages of the monthly slope coefficients are then computed and tested for statistical significance.

5. Empirical Analysis

5.1. Portfolio Analysis

Table 2. presents the descriptive statistics for the monthly returns of the five portfolios sorted by adjusted turnover.

Table 2. Descriptive Statistics of Portfolio Monthly Returns

Statistic	Portfolio1 (Low)	Portfolio 2	Portfolio 3	Portfolio 4	Portfolio5 (High)	Low-High
Mean (%)	1.529** (2.34)	1.529** (2.53)	1.418** (2.46)	1.103* (1.93)	0.119 (0.19)	1.410*** (6.51)
Std. Dev. (%)	9.62	8.91	8.50	8.44	9.44	3.19

Note: t-statistics in parentheses. * p<0.1, ** p<0.05, *** p<0.01.

Table 3. Fama-French Three-Factor Model Regression Results

Variable	Low	Portfolio 2	Portfolio 3	Portfolio 4	High	Low-High
Alpha	0.004*** (2.84) **	0.005*** (4.30) **	0.005*** (4.34) **	*0.002* (1.78) *	-0.010*** (-6.26) **	0.013*** (6.28) **
Market	0.985***	0.972***	0.979***	0.993***	1.034***	-0.049
SMB	0.976***	0.831***	0.738***	0.694***	0.883***	0.093*
HML	-0.133***	-0.075*	0.007	0.018	-0.009	-0.124
Ann. Alpha (%)	4.59%	6.09%	5.66%	2.25%	-11.60%	16.19%

Note: t-statistics in parentheses. * p<0.1, ** p<0.05, *** p<0.01. Annualized Alpha is monthly Alpha * 12.

A clear monotonic decreasing trend in average returns is observed from the Low disagreement portfolio (1.529%) to the High disagreement portfolio (0.119%). The long-short hedge portfolio (Low-High) yields a statistically and economically significant positive return of 1.41% per month (t=6.51). This provides strong initial support for H1, suggesting that high disagreement leads to lower future returns.

Table 3 shows that after adjusting for the Fama-French risk factors, the pattern persists. The Low disagreement portfolio earns a significant positive alpha (0.4% per month), while the High disagreement portfolio earns a significant negative alpha (-1.0% per month). The hedge portfolios alpha remains a highly significant 1.3% per month (16.19% annualized), confirming that the disagreement effect is not explained by exposure to market, size, or value risk.

5.2. Fama-MacBeth Cross-Sectional Regression Analysis

Table 4 presents the results of the Fama-MacBeth

regressions, where future stock returns are regressed on lagged variables. Model 1 includes only Turn, and subsequent models add control variables.

The coefficient on Turn~t-1~ is consistently negative and highly significant across all model specifications, with a value around -0.36. This confirms that the predictive power of heterogeneous beliefs is robust and independent of other well-known return predictors. The control variables generally have signs consistent with financial theory.

5.3. Robustness Check

Table 5 replicates the Fama-MacBeth analysis using idiosyncratic volatility (Idvol) as an alternative proxy for heterogeneous beliefs. The coefficient on Idvol~t-1~ is also negative and highly significant, even when Turn~t-1~ is included in the model (Model 7). This provides strong evidence that the main findings are not driven by the specific choice of proxy.

Table 4. Fama-MacBeth Cross-Sectional Regression Results

Variable	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
Turn~t-1~	-0.361* (-29.57) **	-0.361* (-29.57) **	-0.361* (-29.56) **	-0.359* (-29.44) **	-0.359* (-29.37) **	-0.359* (-29.37) **
Beta~t-1~		-0.0001 (- 0.15)	-0.0003 (- 0.56)	0.0003 (0.61)	0.0003 (0.62)	0.0003 (0.63)
Size~t-1~			-0.00004*** (-8.21)	-0.00004*** (-9.38)	-0.00004*** (-9.33)	-0.00004*** (-9.38)
E_p~t-1~				0.00003*** (19.51)	0.00003*** (19.57)	0.00003*** (18.67)
Illiquidity~t-1~					0.0011*** (5.02)	0.0011*** (5.02)
Roa~t-1~						0.0016** (2.27)

Note: t-statistics in parentheses. * p<0.1, ** p<0.05, *** p<0.01.

Table 5. Robustness Check with Idiosyncratic Volatility

Variable	Model 1	...	Model 7
Idvol~t-1~	-0.630* (-7.96) **	...	-0.452* (-5.52) **
Turn~t-1~		...	-0.216***
Controls	No	...	Yes

Note: t-statistics in parentheses. *** p<0.01.

6. Heterogeneity Analysis

6.1. Impact in Bull vs. Bear Markets

To test H2, the sample period is divided into bull and bear market phases based on a 20% index movement threshold (Pagan & Sossounov, 2003). Table 6 presents the Fama-MacBeth results for each market state.

Table 6. Fama-MacBeth Results in Bull vs. Bear Markets

Variable	Bull Market	Bear Market
Turn~t-1~	-0.315* (-3.98) **	-0.399* (-7.69) **
Controls	Yes	Yes

Note: t-statistics in parentheses. *** p<0.01.

The coefficient on Turn is significantly negative in both regimes, but its magnitude is larger in bear markets (-0.399) than in bull markets (-0.315). This supports H2, indicating that the negative impact of disagreement on future returns is amplified during periods of market pessimism and high uncertainty.

6.2. Impact Across Different Time Periods

To test H3, the full sample is split into three roughly equal sub-periods based on market development milestones: Period 1 (2007-2013), Period 2 (2014-2020), and Period 3 (2021-2025).

The results show a clear and monotonic decline in the

magnitude of the Turn coefficient over time, from -0.504 in the earliest period to -0.273 in the most recent period. This strongly supports H3, suggesting that improvements in market efficiency, information dissemination, and investor sophistication have progressively weakened the mispricing effect of heterogeneous beliefs.

Table 7. Fama-MacBeth Results Across Three Time Periods

Variable	Period 1 (2007- 2013)	Period 2 (2014- 2020)	Period 3 (2021- 2025)
Turn~t-1~	-0.504* (-6.82) **	-0.331* (-4.31) **	-0.273* (-3.73) **
Controls	Yes	Yes	Yes

Note: t-statistics in parentheses. *** p<0.01.

6.3. Impact Across Different Market Segments

To test H4, the sample is divided into stocks listed on the Main Board (Shanghai and Shenzhen), the ChiNext Board, and the STAR Market.

The negative effect of Turn is highly significant on both the Shanghai and Shenzhen Main Boards. It remains significant but is weaker on the ChiNext Board. On the STAR Market, the coefficient is not statistically significant. This supports H4 and suggests that the unique characteristics of the STAR Market (stricter investor suitability rules, different trading mechanisms, and the highly uncertain nature of its listed firms)

fundamentally alter the dynamics of belief formation and price discovery.

Table 8. Fama-MacBeth Results Across Market Segments

Variable	Shanghai A	Shenzhen A	ChiNext	STAR Market
Turnover _{t-1}	-0.403* (-7.24) **	-0.350* (-7.11) **	-0.293* (-4.17) **	-0.933 (-1.18)
Controls	Yes	Yes	Yes	Yes

Note: t-statistics in parentheses. *** p<0.01.

7. Conclusion and Recommendations

7.1. Main Conclusions

This study provides robust empirical evidence on the impact of investor heterogeneous beliefs on stock returns in China's A-share market. The key findings are:

Negative Predictive Power: Heterogeneous beliefs have a significant and robust negative effect on future stock returns, strongly supporting Miller's (1977) overvaluation hypothesis in the context of China's short-sale constrained market.

State-Dependence: The effect is more pronounced during bear markets, highlighting the role of market sentiment in amplifying the impact of disagreement.

Temporal Attenuation: The predictive power of heterogeneous beliefs has declined over the sample period, reflecting the gradual improvement in market efficiency, information environment, and investor composition.

Cross-Sectional Heterogeneity: The effect varies significantly across market segments, being strongest on the Main Board and weaker on the ChiNext and STAR Markets, due to differences in investor base, firm characteristics, and trading rules.

7.2. Policy Recommendations and Investment Insights

(1) For Regulators:

Enhance Information Environment: Continue to strengthen the quality, timeliness, and accessibility of corporate disclosures to reduce information asymmetry, a primary driver of heterogeneous beliefs.

Prudently Relax Short-Selling Constraints: Gradually expand the scope of securities eligible for margin trading and short-selling to allow pessimistic views to be incorporated into prices, thereby improving market efficiency and stability.

Implement Differentiated Regulation: Recognize the heterogeneous nature of different market boards and tailor regulations and investor education efforts accordingly.

(2) For Investors:

Avoid Herding in High-Disagreement Stocks: Be wary of

stocks with excessively high turnover, as they are susceptible to overvaluation driven by optimistic sentiment and may underperform in the future. Focus on fundamental analysis.

Consider Market Context: Acknowledge that the risks associated with high-disagreement stocks are magnified during bear markets.

Develop Quantitative Strategies: Institutional investors can potentially use measures of heterogeneous beliefs as a factor in constructing quantitative trading or risk management strategies.

7.3. Limitations and Future Research

This study has several limitations. First, the proxy variables (adjusted turnover and IVol) are imperfect and may contain noise. Future research could explore more refined measures, such as those derived from big data and sentiment analysis. Second, the analysis focuses on the level of disagreement, but the dynamics of belief formation and convergence warrant further investigation. Finally, distinguishing between disagreement among institutional versus retail investors could provide a more granular understanding of the underlying mechanisms.

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