Philosophy and Social Science Vol. 3 No. 6, 2026

Asymmetric Transmission Channels of Investor Sentiment on Stock Return Volatility

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Abstract: Although it is known that the investor sentiment asymmetrically affects the stock volatility, how the differential mechanisms are unclarified. We use the Ashare data in China (2015--2025) to construct a composite sentiment index. We use the bootstrap mediation framework in the setting of multivariate regression. The results are as follows: (1) Pessimism's marginal effect on the volatility is about 1.4time that of optimism; (2) In the optimistic period, the liquidity channel is the dominate (the indirect effect is 38.6%); in the pessimistic period, the leverage channel is the dominate (the indirect effect is 52.7%); (3) The asymmetry is broaden to 2.54time in the bear market. These results can clarifying the mediation paths, and it also can give the differentiated risk monitoring.

Keywords: Investor Sentiment; Stock Return Volatility; Asymmetry; Transmission Channels; Mediation Effect

1. Introduction

The formation mechanism of stock return volatility has long been the core issue of financial economics. Traditionally pricing models are difficult to fully explain the market anomaly, such as "volatility clustering" and "large noninformational fluctuations". From the perspective of behavioural finance, the systematic cognitive biases and irrational trading behaviours embedded in investor sentiment are widely regarded as important drivers of volatility changes. Most of existing studies are on the linear impact of sentiment and give in sufficient characterisation of how the sentiment transmits through the market microstructure to the volatility. More, there is a lack of the detailed identification of the directional differences between optimistic and pessimistic sentiment in the transmission process. Using monthly Ashare data, in this paper we construct a composite sentiment index, introduce two mediating paths, namely the liquidity (turnover) and leverage (margin financing balance), and adopt bootstrap mediation testing to systematically study the asymmetric transmission mechanism of sentiment on the volatility[1].

2. Theoretical Foundations and Research Hypotheses

The influence of the investor sentiment on the volatility of the stock return can be interpreted by the direct and indirect mechanism. For the direct mechanism, the changes of the sentiment would change investors' risk preference and the decisions of buying/selling. When the sentiment is optimistic, the purchase demand will be higher, and we know that in this case the price will be pushed up. When the sentiment is pessimistic, the concentrated selling will be triggered, and both of them directly increase the price fluctuation. For the indirect mechanism, the sentiment is optimistic, and the market turnover and the trading volume will be increased, and the orderflow friction and price noise will be increased, and thus the volatility is amplified. For the sentiment is pessimistic, the liquidity may be drying up, and at the same time the sentiment may trigger the forced liquidation of the margin account and the leverage contraction, and thus it forms the spiral amplification loop of the decline the liquidation and further decline[2]. Because of loss aversion, the disposition effect and the shortsale constrains in the Ashare market, the effect of the pessimistic sentiment on the volatility is though stronger than that of the optimistic sentiment. During the down phases, the forced liquidation mechanism of the leveraged fund can also enlarged a lot the effect of the cascading of the volatility. With these arguments, we make the following hypotheses.

H1: Investor sentiment has a positive effect on stock return volatility. However, the marginal effect of pessimistic sentiment is larger than that of optimistic sentiment. 3. 6.5. H1: Investor sentiment has a positive effect on stock return volatility, but the marginal effect of pessimistic

sentiment is significantly larger than that of optimistic sentiment.

H2: Both the liquidity path and the leverage path are also significant mediating channels, however, their asymmetric pattern is different, namely, the liquidity path will dominate in the period of optimistic, and the leverage path will dominate in the period of pessimistic.

H3: Market state (bull vs. bear) moderates the asymmetry, with the asymmetry being more pronounced in bear markets.

3. Research Design

3.1 Variable Definition and Data Sources

Here, we use the monthly data of the Ashare market in China from January 2015 to December 2025, which is taken from the Wind and CSMAR data base, and there is 132 monthly data.

Dependent variable: Stock return volatility (RV): the standard deviation of the daily returns of the Shanghai Composite Index in each month.

Core explanatory variable: Investor sentiment index (Sent). We choose five proxy indicators: closedend fund discount, market turnover, new investor account openings, firstday IPO return, and consumer confidence index. The composite index is the first principal component extracted via principal component analysis. We define the periods with Sent > 0 as optimistic period (Optim), and the periods with Sent < 0 as pessimistic (Pess). The variable values are taken as the positive value and the absolute value, respectively[3].

Mediating variables: (1) Liquidity (Liq): measured as the monthly average daily turnover rate (%); (2) Leverage (Lev): measured as the monthend margin financing balance as a percentage of total market capitalisation (%).

Control variables: Yearonyear CPI growth, industrial valueadded growth, and the lagged market return.

3.2 Model Specification

We use OLS regressions with Newey-West standard errors and test mediation by bias-corrected bootstrap (5,000 draws). For sake of exposition, we introduce, for all the models, the following: *t* is subscript , denoting month; RVt is the return volatility in month t; Optimt is the value of Sent when it is positive (otherwise 0); Pesst is the value of the absolute value of Sent when it is negative (otherwise 0); Medt is the mediator, which is Liqt (liquidity) or Levt (leverage); Xt is a vector of controls (CPI, industrial growth, and lagged market return); εt,ut,vt are random error terms; and α, β, a, b are parameters to be estimated.

Step 1: Testing total effect asymmetry. We estimate a regression with directional dummies:

$$RV_t = \alpha + \beta_1 Optim_t + \beta_2 Pess_t + \gamma X_t + \varepsilon_t \quad (1)$$

A Wald test compares the difference between β_1 and β_2; if $\beta_2 > \beta_1$, it supports the larger effect of pessimistic sentiment[4].

Step 2: Mediation effect test. We estimate the mediation equations separately for optimistic and pessimistic subsamples, using biascorrected bootstrap (5,000 repetitions).

$$Med_t = a_0 + a_1 Sent_t + a_2 X_t + u_t \quad (2)$$

$$RV_t = b_0 + b_1 Sent_t + b_2 Med_t + b_3 X_t + v_t \quad (3)$$

Indirect effect = $a_1 \times b_2$,Mediation is considered significant if the bootstrap 95% confidence interval does not contain zero.

Step 3: Moderating effect of market state. We use HP filtering to divide the sample into bull markets (trend up) and bear markets (trend down). Then we rerun the regressions to test H3.

4. Empirical Results

4.1 Descriptive Statistics

Table 1 reports the descriptive statistics of the main variables. The composite sentiment index has mean 0 and standard deviation 1.12. The optimistic months are 54.5 % and the pessimistic months 45.5 %, which is relatively balanced. The mean of RV is 6.21 %, with standard deviation 3.45 %. These are typical leptokurtic and fattailed

Table 1. Descriptive Statistics of Main Variables

Variable	Mean / Median	Std. Dev.	Min / Max
RV(%)	**6.21 / 5.87**	3.45	**1.82 / 19.76**
Sent	**0.00 / 0.13**	1.12	-2.58 / 2.31
Liq(%)	**2.34 / 2.15**	0.89	**0.76 / 5.12**
Lev(%)	**3.12 / 2.98**	1.01	**1.24 / 6.45**
CPI(%)	**2.06 / 2.10**	0.78	**0.50 / 4.30**

4.2 Total Effect Asymmetry Test

Table 2 reports the regression results of sentiment direction on volatility. In Model (1), we control only for macroeconomic variables; in Model (2), we further include lagged market return and an autoregressive term of volatility. The coefficient for optimistic sentiment is from

0.32 to 0.38, while that for pessimistic sentiment is from 0.52 to 0.61; the difference is significant at the 1% level (Wald test). The marginal effect of pessimistic sentiment is about 1.4 times that of optimistic sentiment, confirming H1.

Figure 1 shows the standardised time series of Sent and RV. Most of the periods the two series comove; when the 2015 crash, the 2018 down turn and the 2020 pandemic shock, there is a sharp drop of the sentiment with a sharp rise of the volatility. Furthermore, the volatility peak during the down turn of the sentiment is much higher than that during the peak of the sentiment. This gives a first evidence of asymmetry.

Table 2. Asymmetric Total Effect Regression Results

Variable	Model (1)	Model (2)
Optim	0.321***(0.078)	0.376***(0.065)
Pess	0.612***(0.095)	0.528***(0.081)
Macro/Dynamic controls	Yes / No	Yes / Yes
Adj R^2	0.284	0.412
Wald test (Optim=Pess)	12.37***	10.56***

Note: Robust standard errors in parentheses; *** p < 0.01.

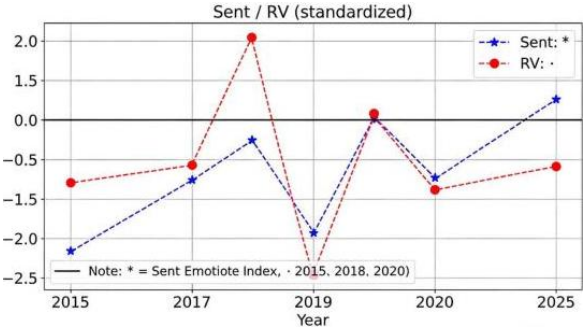

Figure 1. Monthly Path of Investor Sentiment Index and Return Volatility

4.3 Mediation Paths and Asymmetry Decomposition

The bootstrap mediation result is reported in Table 3. For the full sample, the indirect effect through the liquidity path is 0.098 (31.2%), and that through the leverage path is 0.124 (39.5%), both significant. After splitting the sample, the asymmetry becomes clear. For example, in optimistic periods, the liquidity path accounts for 38.6%, higher than that in the leverage path (22.4%); in pessimistic periods, the leverage path jumps to 52.7%, while the liquidity path drops to 19.3%. This supports H2.

Table 3. Mediation Effect Decomposition (Standardised Coefficients)

Subsample	Full Sample	Optimistic	Pessimistic
Liquidity path	0.098**(31.2%)	0.117***(38.6%)	0.072*(19.3%)
Leverage path	0.124**(39.5%)	0.068*(22.4%)	0.196***(52.7%)
Direct effect	0.092	0.118	0.105
Total effect	0.314	0.303	0.373

Note: Percentages in parentheses indicate the proportion of indirect effect; * p < 0.1, ** p < 0.05, *** p < 0.01.

4.4 Moderating Effect of Market State

We find 56 bullmarket months and 76 bearmarket months using HP filtering. In the bearmarkets the pessimistic coefficient is 0.71 and the optimistic is 0.28 for the asymmetry multiplier 2.54, in the bullmarket the coefficients are 0.39 and 0.48 for the multiplier 1.23. The interaction term is significant (p 0.05), so we confirm H3.

4.5 Robustness Checks

We perform three robustness checks: (i) we replace PCA with PLS for the construction of the sentiment; (ii) we substitute RV with a GARCH(1,1)-based conditional variance; (iii) we use the two-period lagged sentiment as an instrumental variable. The main conclusions are qualitatively the same.

5. Mechanism Illustration and Discussion

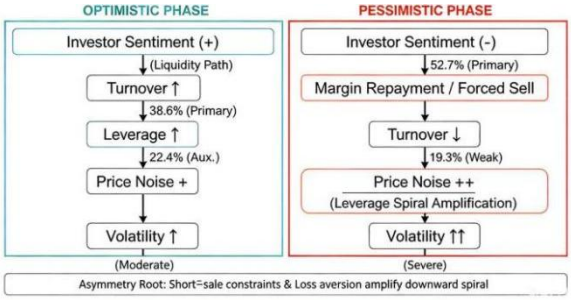

Figure 2 Schematic of Asymmetric Transmission Paths

Figure 2 illustrates the dominant role of the two mediating paths under different sentiment directions. In optimistic periods: Sentiment → Turnover ↑ → Price noise ↑ → Volatility ↑ (liquidity path dominates, 38.6%), with the leverage path as a secondary channel (22.4%). In pessimistic periods: Sentiment → Margin repayment / leverage contraction → Forced

liquidation spiral → Volatility ↑ (leverage path dominates, 52.7%), while the liquidity path weakens due to market drying- up (19.3%). This divergence originates from short- sale constraints in the A- share market, which make pessimistic sentiment more likely to trigger pro- cyclical chain reactions in leveraged trading, whereas optimistic sentiment mainly amplifies volatility through increased trading activity[5].

From the point of view of the regulator, during the declining markets it is necessary to closely monitor the balances of margin financing and the margin requirements in order to break the chain of leverageamplification. During the rising markets, then, one has to pay attention to the abnormal increase of the turnover in order not to have spillover of the volatility from the too much trading.

6. Concluding Remarks

In this paper, based on the monthly Ashare data, we empirically study the asymmetric transmission channels of the investor sentiment on the stock return volatility. The main conclusions are: (1) The marginal impact of the pessimistic sentiment on the volatility is about 1.4 times that of the optimistic sentiment, and it is widen to 2.54 times for the bear market; (2) The transmission paths have clear direction of differentation--the liquidity path dominates for the optimistic period, and the leverage path dominates for the pessimistic period; (3) The market state can significantly moderate the intensity of the asymmetry. This study enriches the mechanistic understanding of the sentiment-volatility relationship, and also gives the empirical evidence for the differentiated risk monitoring. The future work may be study on the highfrequency intraday paths, the diffusion for the heterogeneous agent, and the machinelearningbased prediction.

Acknowledgments

This paper is supported by Digital Credit in Dalian's Banking Industry and Its Role in Advancing the Event Economy Industrial Chain: A Research Study. (No. 2026dlskzd190).

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