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Investor Attention and Spatial Stock Price Co-movement

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SUMMARY: *Psychological Safety Zone Theory was used to explain the Spatial Stock Price Co-movement of Investors' Attention in this paper. Based on the data of Shanghai Stock Exchange companies from 2020 to 2025, it was found that there is a negative correlation between spatial stock price co-movement and psychological safety distance, mediated by attention co-movement. The above evidence also shows that attention comovement is formed via attention transfer in the process of information spread, and this transfer has a spatiotemporal pattern. After dividing the attention sentiment into positive and negative components, this study found that there is a double asymmetric effect: positive attention is more correlated with the bull market than negative attention, and negative attention is more correlated with the bear market than positive attention. Based on the above results, portfolio construction, hedging decisions and risk management should consider the spatial distance of the assets, attention sentiment and changes in the market, etc., when evaluating stock price co-movement.*

KEYWORDS: *investor attention; spatial stock price comovement; psychological safety zone; information diffusion; double asymmetry*

1 Introduction

Based on the premise that attention is scarce, research on investor attention began. As investors are unable to collect all the information on a particular company, they only monitor some representative companies and indicators [1]. Attention can also be drawn to a group's search for information on stocks in the same category or to correlated shocks that increase the demand for information about related companies [2, 3]. Therefore, attention comovement has a price impact because it is related to the comovement of stock returns [4-6]. Based on the theory of psychological safety zone and by combining geographical distance with economic distance, this paper studies how investor attention affects the spatial structure of stock price co-movement.

Stock price fluctuations are to be considered in terms of portfolio diversification, hedging and risk management; thus, they have received much attention from the study of equity and bond markets [7-12]. Research shows that there is a phenomenon of home- and local-biased investment; thus, investors are more inclined to choose domestic assets for their foreign investment allocation [13], invest too heavily in near-shore companies [14-16], and show return co-movement around location-related trading events [17]. Evidence of the local preference has been found in the studies of individual investors and institutions [18-22]. The participation of the industry in the general product-market environment may affect the share

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price; otherwise, it would not be this way [23-26]. Social communication will further spread the excess return comovement [27].

According to the above data, the spread of spatial stock price correlation in various countries, regions, industries and headquarters cities differs [28-32]. The problem in the literature that is addressed by this study is whether comovement is systematically related to spatial distance and how to define spatial distance in terms of the joint effect of geographical distance and economic-characteristic distance. Studies in Spatial Econometrics on dependence in Location and Proximity have offered some solutions to this problem [33-38]. Behaviors are influenced by spatial proximity; that is to say, investors are more likely to pay attention to well-known companies and learn local soft information through socialisation with neighbours, co-workers, etc. [39-41]

The cause of the comovement is not the fundamentals. The Demand for Sentiment-driven Investors is the reason behind this correlation, according to behavioural explanations. Style investing is likely to have an excess positive comovement within the same style and an excess negative comovement among different styles [42]. Habitat formation is another way to extend the trading scope; that is, after investors increase the scope of trading habitats and add more assets, the demand for these assets may be more correlated with those already in the habitats.

Building on this, the purpose of this paper is to test whether spatial stock price co-movement can be explained by psychological safety zone theory. People generally know the vicinity of their homes and workplaces, have some industry knowledge, and know social information sources. The information in this area is more likely to attract people's attention and be spread, and the information outside is more likely to be overlooked. Therefore, the ladder-shaped attention pattern will reduce investor attention to the comovement and thus decrease the stock price comovement. Region and industry are selected for their ease of natural division; thus, the corresponding regulations, labour laws, litigation situations, etc., and financial performance of enterprises can be spread.

Attention movement also has the attribute of time. If the attention transfer is not immediate, then the spatial stock price co-movement should have a spatiotemporal characteristic. Attention is also about emotions. Positive and negative attention will have different market effects, and these effects will vary in a bull market and a bear market. Therefore, in the estimation of the impact of investor attention on spatial stock price co-movement, attention sentiment and market conditions are employed in the empirical tests.

The paper has made three contributions. First, according to the theory of psychological safety zone, it is believed that attention from investors will cause spatial stock price co-movement. Second, it is geographically and economically divided, and all kinds of direct, indirect, etc., effects have been investigated. Thirdly, given that the market environment is different, it will also explore the double asymmetric effect of attention and sentiment on asset prices, portfolio allocation and risk control.

2 Variables and Samples

2.1 Measure Attention

Sina.com is employed as the source of investor attention because it offers firm-level financial information with timestamps, click counts and text content. With the help of VBA extraction, all the messages related to the 1,231 listed companies in Shanghai on the stock exchange from January 1, 2020, to December 31, 2025, were collected and stored in a Bayes classification database. For every message, record its posting time, the number of clicks, and the message

content in the database. First, the total clicks of the firm-related post is used to measure firm-level investor attention:

$$A_{i,t} = \sum_{n=1}^{N_{i,t}} c_{i,t,n} \tag{1}$$

where $N_{i,t}$ is the number of posts about firm i on day t, $c_{i,t,n}$ is the click count of the nth post, and $A_{i,t}$ is the raw attention level. The raw attention series is then standardized to remove firm-level scale differences:

$$SA_{i,t} = \frac{A_{i,t} - \min(A_i)}{\max(A_i) - \min(A_i)} \tag{2}$$

where $\min(A_i)$ and $\max(A_i)$ are the minimum and maximum values in firm i's attention series, respectively, and $SA_{i,t}$ is the standardized investor-attention variable used in the subsequent comovement tests.

Following the stock-message-board sentiment literature [43], a Naive Bayes classifier is used to classify message content into buy-oriented and sell-oriented posts. Let $M_{i,t}^B$ and $M_{i,t}^S$ denote the numbers of buy-oriented and sell-oriented posts for firm i on day t. Attention sentiment is measured as follows:

$$s_{i,t} = \frac{M_{i,t}^B - M_{i,t}^S}{M_{i,t}^B + M_{i,t}^S} \tag{3}$$

$s_{i,t}$ equals zero when buy-oriented and sell-oriented posts are balanced; it is positive when buy-oriented posts dominate and negative when sell-oriented posts dominate. To separate negative and positive attention intensity, two sentiment-attention variables are constructed:

$$C_{i,t}^N = SA_{i,t}(-s_{i,t}) I(s_{i,t} < 0) \tag{4}$$

$$C_{i,t}^P = SA_{i,t} \times s_{i,t} \times I(s_{i,t} \geq 0) \tag{5}$$

In Equations (4) and (5), $I(\cdot)(\cdot)$ is an indicator function. $C_{i,t}^N$ measures the intensity of negative attention and $C_{i,t}^P$ measures the intensity of positive attention. Both variables combine standardized attention and sentiment while keeping the two sentiment directions non-negative and separately identifiable.

2.2 Measure Comovement

The following is the daily stock return:

$$R_{i,t} = \ln(P_{i,t}) - \ln(P_{i,t-1}) \tag{6}$$

where $P_{i,t}$ is the closing stock price of firm i on day t, and $R_{i,t}$ is the corresponding log return.

Stock price co-movement is measured by regressing one company's stock return on another company's return over each 30-day window before the end of the fiscal month. The explained variation R^2 is taken as the covariance proxy and the standard synchronicity method in stock price informativeness research [44]. The regression of each firm-month is as follows:

$$R_{i,d} = \alpha_{ij,t} + \beta_{ij,t} R_{j,d} + \varepsilon_{ij,d}, \quad d = t - 29, \ldots, t \tag{7}$$

where i and j index firms and d indexes trading days in the rolling 30-day window ending at t. The fitted R^2 from Equation (7) is transformed by the logit form to obtain an unbounded return-comovement measure:

$$CMR_{ij,t} = \ln\left(\frac{R^2_{ij,t}}{1-R^2_{ij,t}}\right) \tag{8}$$

The same rolling-window procedure is used to measure investor-attention comovement by replacing $R_{i,d}$ and $R_{j,d}$ in Equation (7) with $SA_{i,t}$ and $SA_{j,\mathrm{d}}$; the resulting logit-transformed measure is denoted as $A_{ij,t}$.

2.3 Measurement of Psychological Safety Distance

According to the theory of psychological safety zones, people are more likely to process information in their familiar areas and pay less attention to those outside. Familiarity does not only refer to the place in an investment. Investors will also build an economic safety net for enterprises that are similar to each other in terms of industry, supply chain, etc. Therefore, in this paper, spatial psychological safety distance will be referred to as the combination of geographical psychological safety distance and economic psychological safety distance.

(1) Measure of geographical psychological safety distance

Geographical psychological safety distance is the distance in provinces of the head offices of two enterprises. The provincial distance data are from www.nianjianku.com.

(2) Measure of economic psychological safety distance

Economic psychological safety distance is measured from interindustry input-output linkages. In this setting, economic proximity reflects the similarity of firm attributes and the interdependence of production activities. Two coefficients are used. The direct consumption coefficient a_{ij} measures the intermediate input from department i required to produce one unit of total output in department j:

$$a_{ij} = \frac{X_{ij}}{X_j} \tag{9}$$

where X_{ij} is the intermediate input from department i used by department j and X_j is the total output of department j. The matrix formed by all a_{ij} values is the direct consumption coefficient matrix A.

The total consumption coefficient b_{ij} is the sum of direct and indirect consumption coefficients. It captures both direct and indirect economic linkages between departments and is defined as follows:

$$b_{ij} = a_{ij} + \sum_{k=1}^{n} a_{ik}\, a_{kj} + \sum_{k=1}^{n}\sum_{\ell=1}^{n} a_{ik}\, a_{k\ell} a_{\ell j} + \cdots \tag{10}$$

The matrix formed by all b_{ij} values is the complete consumption coefficient matrix B. It can be calculated from the direct consumption coefficient matrix A using the Leontief inverse:

$$\mathbf{B} = (\mathbf{I} - \mathbf{A})^{-1} - \mathbf{I} \tag{11}$$

where $\mathbf{B}$ is the complete consumption coefficient matrix, I is the identity matrix with the same order as $\mathbf{A}$, and $\mathbf{A}$ is the direct consumption coefficient matrix. The input-output data are taken from the 2020 interim input-output table published on www.nianjianku.com. Economic distance is measured using the complete consumption coefficient.

3 Spatial Stock Price Co-movement, Investor Attention and Psychological Safety Zone.

3.1 Test of the Mediation Effect

A mediation effect test is used to see if the attention co-movement of investors can mediate the relationship between psychological safety distance and stock price co-movement. It is a typical mediation model [45]. Equations (12)-(14) are the total effect, the mediator equation and the outcome equation, respectively:

$$CMR_{ij,t} = \alpha_0 + \alpha_1 PSD_{ij,t} + \Omega_{ij,t} + \varepsilon_{ij,t} \tag{12}$$

$$CMA_{ij,t} = \beta_0 + \beta_1 PSD_{ij,t} + \Omega_{ij,t} + \nu_{ij,t} \tag{13}$$

$$CMR_{ij,t} = \delta_0 + \delta_1 PSD_{ij,t} + \delta_2 CMA_{ij,t} + \Omega_{ij,t} + \eta_{ij,t} \tag{14}$$

In Equations (12)-(14), $PSD_{ij,t}$ denotes either geographical distance or economic distance, and $\Omega_{ij,t}$ represents the control-variable and fixed-effect block used in the regressions. The indirect effect is calculated as $\beta_1 \times \delta_2$. A significant indirect effect indicates that investor attention comovement mediates the relationship between psychological safety distance and stock price comovement.

Table 1: Summary of the Mediating-Effect Test.

Panel A: Geographical distance			
Variables	ComoveR		ComoveA
Model	Equation (12)	Equation (14)	Equation (13)
Intercept	0.0109	0.0709	0.0288
	(0.8000)	(0.1332)	(0.8047)
G-D	-0.0894***	-0.0031*	-0.1006***
	(-3.0018)	(-1.8079)	(-4.1050)
ComoveA	_	0.0866***	_
	_	(3.0002)	_
F	5.6764	11.5933	6.7782
R^2	0.2104	0.2320	0.2033
Mediation coefficient	_	**0.0017****	_
Panel B: Economic distance			
Variables	ComoveR		ComoveA
Model	Equation (12)	Equation (14)	Equation (13)
Intercept	0.0136	0.0122	0.0106
	(0.9094)	(0.8030)	(0.8204)
E-D	-0.1198***	-0.0028*	-0.1236***
	(-4.9647)	(-1.8260)	(-5.2489)
ComoveA	_	0.1105***	_
	_	(4.2126)	_
F	6.2035	12.2014	8.1024
R^2	0.2120	0.2173	0.2081
Mediation coefficient	_	**0.0041****	_

Notes. Table A and Table B present the results of the mediated effect with geographical distance and economic distance, respectively, and the corresponding t-statistics based on firm-clustered standard errors are shown below the coefficient estimates. The coefficient of interest is in bold, and *, ** and *** denote statistical significance at the 10%, 5% and 1% levels, respectively.

Table 1 shows the mediation tests of Equations (12)-(14). As shown in Panel A, the total-effect coefficient of G-D is -0.0894 and it is statistically significant at the 1% level; therefore, the distance of geographical psychological safety negatively affects return commitment. G-D is also negative (-0.1006) and statistically significant at the 1% level in the mediator equation; that is to say, attention comovement decreases with an increase in geographical distance. After adding ComoveA to the outcome equation, the coefficient of G-D is -0.0031, and ComoveA is still positive (0.0866) and significant at the 1% level. The mediation coefficient is 0.0017, and it is statistically significant at the 1% level. Panel B is the same as for economic distance: the total effect coefficient is -0.1198, the mediator-equation coefficient is -0.1236, ComoveA is positive at 0.1105, and the mediation coefficient is 0.0041. Based on the above results, it can be concluded that there is an attention-comovement channel linking psychological safety distance and spatial stock price comovement.

3.2 The Relationship Between Geographical Distance and Economic Distance

Both the distance in terms of geography and the economy can affect attention movement; proximity in terms of geography may also be related to economic connections [46]. To know whether the two distances are related, the following model is employed:

$$CMA_{ij,t} = \pi_0 + \pi_1 GD_{ij,t} + \pi_2 ED_{ij,t} + \pi_3 \left(GD_{ij,t} \times ED_{ij,t}\right) + \Omega_{ij,t} + \xi_{ij,t} \qquad (15)$$

where $GD_{ij,t}$ and $ED_{ij,t}$ denote geographical and economic distance between firms i and j, respectively. The interaction term captures whether the effect of one type of psychological safety distance changes with the other.

Table 2 is the estimation of Equation (15), and the dependent variable is investor attention comovement. Both the coefficient of G-D and E-D are negative and statistically significant; thus, it can be concluded that geographical and economic distance affect attention comovement through different paths. The interaction term E-D×G-D is also negative and significant; thus, the two distance dimensions are correlated in their effect on attention comovement.

Table 2: Summary of the Interaction Effect Test.

Variables	Intercept	G-D	E-D	E-D × G-D	R^2
ComoveA	0.0106	-0.0758***	-0.1020***	**-0.0532*** **	0.2507
	(0.7090)	(-2.8804)	(-4.5217)	(-3.1139)	

Notes. This table shows the results of the interaction with geographical distance and economic distance. The T-statistics of the firm-clustered standard errors are shown in the table below. The coefficients of interest are in bold font, and *, ** and *** represent a 10%, 5% and 1% level of statistical significance.

To find the leading distance dimension of this interaction, four distance situations are set up based on geographical and economic distance. Table 3 is the case and the corresponding grouping rule.

Table 4 is the regression result table for the four cases. Columns 1 and 2 are the independent variables for economic distance; E-D is still negative and significant in both the local and non-local environments. Columns 3 and 4 are the geographical distances; G-D is negative and significant only when the economic distance is close. Based on the above results, it can be seen that economic distance is the main factor. If the two firms are economically distant, then attention comovement will be weak even if the distance is small.

Table 3: Description of the Four-Distance Situations.

situation	condition	Implementation plan
1	Geographical distance is very close(local)	Randomly select a company and divide the whole sample into local and non-local groups according to the location of the company.
2	Geographical distance is very far(non-local)	
3	Economic distance is very close(industry)	Randomly select a company and divide the whole sample into peer and non-peer groups according to the industry of the company.
4	Economic distance is very far(non-industry)	

Table 4: Summary of Regression Estimates for the Four Distance Scenarios.

Variables	Situation			
	1	2	3	4
intercept	0.0109	0.0078	0.0102	0.0016
	0.0034	0.0520	0.0080	0.0049
G-D	_	_	-0.1106***	-0.0512
	_	_	4.0042	1.1034
E-D	-0.1341***	-0.1020***	_	_
	(-6.7223)	(-4.0018)	_	_
R^2	0.2433	0.2201	0.2136	0.2017

Notes. The above table is the result of interaction with geographical distance and economic distance. The T-statistics of the firm-clustered standard errors are presented in Table 3. Coefficients of interest are in bold; *, ** and *** denote statistical significance at the 10%, 5% and 1% levels, respectively.

Figure 1 is the mechanism summary. Spatial comovement of investor attention and stock prices reflects information diffusion: Information released by one company can affect related companies through the channels of industry, region and investor attention [47-49]. As shown in the above evidence, both geographical and economic psychological safety distances directly affect the spread of information, and geographical distance may also affect it indirectly via economic distance.

Economic Psychology, Safety Distance, Information Diffusion, Geographical Psychology, Safety Distance.

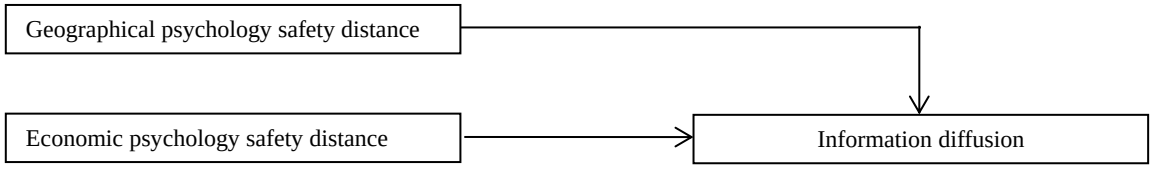

Figure 1: Complementary Relationship Between Geographical Psychological Safety Distance, Economic Psychological Safety Distance and Information Diffusion.

4 Attention Transfer and Spatial Stock Price Co-movement

4.1 Attention Transfer to Peer/Non-Peer Firms Around Earnings Announcements

This part is to check if earnings announcements attract attention transfer. A company will release its earnings; at this time, information about other enterprises in the same area or industry may be available. Previous studies of the transmission of information have shown that earnings

announcements can affect related enterprises [50, 51]. At present, the test is expanding to see if the announcing company also attracts the attention of investors in the peer group.

The attention-transfer test is to check whether earnings announcements increase the attention of investors to the announcing firm as well as to related peer, non-peer, local and non-local firms. Given that earnings announcements are identifiable information events, they can be matched with weekly attention measures.

The following pooled regression is used to examine the attention transfer around earnings-announcement weeks:

$$A_{i,w} = \theta_0 + \theta_1 EA_{i,w} + \boldsymbol{\theta}_2' \mathbf{PEA}_{j,w} + \boldsymbol{\theta}_3' \mathbf{NPEA}_{q,w} + u_{i,w} \quad (16)$$

where $A_{i,w}$ is the attention level for firm i in week w; $EA_{i,w}$ is firm i's own earnings-announcement indicator; $\mathbf{PEA}_{j,w}$ is the vector of contemporaneous and one-week-lagged peer-firm announcement indicators; $\mathbf{NPEA}_{q,w}$ is the corresponding non-peer vector; and $u_{i,w}$ absorbs controls, fixed effects, and the disturbance term.

If firm i and a peer firm report their earnings in the same week, then the firm-week observation will be dropped; otherwise, it is not possible to determine whether the increase in attention was caused by the focal firm or by the peer firm due to simultaneous announcements. EA is the attention in a firm's own announcement week in the estimation of Equation (16), and PEA and NPEA are used to measure the spread of attention among related firms.

Table 5 is the result of Equation (16). Both in the region and industry specifications, the coefficient of EA is positive and significant; thus, it can be concluded that investor attention rises during the earnings-announcement week of the focal firm. More importantly, the coefficient of PEA is also positive and significant; that is to say, investors pay more attention to a company when its peers release earnings data. It helps to spread awareness among relevant companies of the announcing company.

Table 5: Attention Transfer: Attention Levels Around Peer-Firm Earnings Announcements.

EA_{i,w}	Region	Industry
t-stat.	1.624***	1.624***
Att_{i,w-1}	27.669	27.570
t-stat.	0.913***	0.911***
PEA_{j,w}	14.446	14.459
t-stat.	0.118*	0.217*
PEA_{j,w-1}	1.850	1.892
t-stat.	0.306**	0.505***
NPEA_{q,w}	2.715	10.738
t-stat.	0.006	0.050
NPEA_{q,w-1}	0.078	1.249
t-stat.	0.152*	0.063
R^2	1.858	1.569
R^2	0.448	0.452

Notes. In column 1, we present the results of attention transfer in the same region, where PEA is the earnings announcements of firms in the peer industry with firm i, and NPEA is the earnings announcements of firms in the non-peer industry with firm i. Column 2 shows the results of attention transfer in the same industry; that is to say, PEA is the earnings announcements of firms in the peer region with firm i, and NPEA is the earnings announcements of firms in the non-peer region with firm i. * , ** and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively.

At the same time, the PEA coefficients for region and industry were 0.118 and 0.217, and the lagged PEA coefficients were 0.306 and 0.505. The larger the lagged coefficient, the more time it will take for the attention shift to occur at the firm level and spread to a wider area or industry. The NPEA coefficient is small at the regional level and insignificant at the industry level; therefore, the attention transfer will be limited to related enterprises and not to unrelated ones.

4.2 Attention Transfer Partitioned by Spatial Stock Price Co-movement

The above part connects attention transfer with the spatial stock price comovement. Equation (16) is estimated separately for firms with low spatial stock price comovement and firms with high spatial stock price comovement, and the partition threshold is based on the sample median of ComoveR. The goal is to see if attention transfer around peer-firm earnings news is more pronounced when the firm's stock price generally moves in line with that of related companies.

Table 6 is the partitioned result. The PEA coefficients are positive in both the low-comovement and high-comovement subsamples, so there is still attention transfer in both groups. The size is larger in the high-comovement subsample: Both the contemporaneous and lagged PEA coefficients for regions are 0.139 and 0.291, up from 0.108 and 0.211; for industries, they are 0.294 and 0.507, compared with 0.198 and 0.471 earlier. The above differences show that the firm with stronger spatial stock price co-movement will be paid more attention to when the related company releases its earnings report. The lower EA coefficient in the high-comovement subsample is also in line with earnings announcements that have less firm-specific information and are more tightly correlated with the stock prices of other companies.

Table 6: Attention Transfer: Partition of Attention Levels for Peer-Firm Earnings Announcements Based on Spatial Stock Price Co-movement.

	Region		Difference	Industry		Difference
	L-comoveR	H-comoveR		L-comoveR	H-comoveR	
EA_{i,w}	1.693***	1.500***	-0.193***	1.712***	1.591***	-0.121***
t-stat.	29.388	24.546	-6.346	30.083	26.485	-7.203
Att_{i,w-1}	0.968***	0.849***	-0.117***	0.993***	0.908***	-0.085***
t-stat.	16.140	15.328	-5.212	17.190	16.138	-4.110
PEA_{j,w}	0.108*	0.139*	0.031*	0.198*	0.294*	0.104*
t-stat.	1.792	1.910	1.840	1.712	1.901	1.927
PEA_{j,w-1}	0.211**	0.291**	0.080**	0.471***	0.507***	0.036***
t-stat.	2.500	2.816	2.358	9.849	16.569	3.212
NPEA_{q,w}	0.004	0.007	0.003	0.049	0.061	0.012
t-stat.	0.078	0.717	0.018	0.137	0.569	0.190
NPEA_{q,w-1}	0.147*	0.162*	0.015*	0.048	0.099	0.051
t-stat.	1.821	1.897	1.793	1.327	1.638	1.521
R^2	0.448	0.462		0.449	0.467	

Notes. L-comoveR is low spatial stock price comovement, and H-comoveR is high spatial stock price comovement. The columns of the region are tests of attention transfer from peer and non-peer industry firms in the same region; the columns of the industry are tests of attention transfer from peer and non-peer regional firms in the same industry. *, ** and *** indicate that the test results are statistically significant at the 10%, 5% and 1% levels, respectively.

4.3 Double Asymmetric Effect: Attention Sentiment and Market State

Attention transfer is the spread of information in the market. Based on the above studies, the market's response to good news and bad news is asymmetrical [52-57]. Therefore, this paper will be divided into the positive and negative parts and further divided into bull and bear situations of the market. According to the bull-bear market dating framework, the Shanghai and Shenzhen 300 Index is used to identify local highs and lows. The bull or bear trend should not be one-sided for more than four consecutive months, and the total length of the peak-to-trough or trough-to-peak cycle should be no less than 16 months. The time from a trough to the next peak is called a bull market, and the time from a peak to the next trough is called a bear market.

The test checks whether positive and negative attention have different effects on the spatial co-movement of stock prices in bull and bear markets. Comover is regressed on all the sentiment-specific attention-comovement variables and lagged return comovements.

$$CMR_{ij,t} = \rho_0 + \rho_1 CMR_{ij,t-1} + \rho_2 CMA^{s}_{ij,t} + u_{ij,t}, \quad s \in \{P, N\} \tag{17}$$

where $CMA^{s}_{ij,t}$ denotes sentiment-specific attention comovement; $s = P$ corresponds to positive attention and $s=N$ corresponds to negative attention, and $u_{ij,t}$ absorbs controls, fixed effects, and the disturbance term.

Table 7: Double Asymmetry: Attention Sentiment and Market Conditions.

Independent variable	*ComoveR*			
	Bull		Bear	
ComoveA^N		0.088***		0.109***
t-stat.		3.145		4.212
ComoveA^P	0.121***		0.076***	
t-stat.	5.494		3.126	
R^2	0.42	0.37	0.35	0.40

Note. *, ** and *** are statistical significance at 10%, 5% and 1%, respectively.

Table 7 is the estimation of Equation (17). The coefficient of Cross_negative_comoveA is 0.088 in a bull market and 0.109 in a bear market, and both are statistically significant at the 1% level. The coefficient of Cross_positive_comoveA is 0.121 in bull markets and 0.076 in bear markets, and it is also significant at the 1% level. Therefore, positive attention is more effective than negative attention in a bull market, and negative attention is more effective than positive attention in a bear market. Figure 2 is the double-asymmetric pattern.

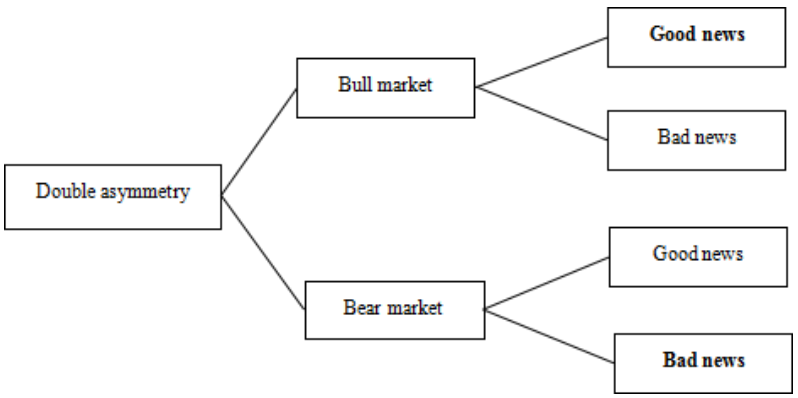

Figure 2: Double Asymmetry in the Market Response to Attention Sentiment.

The double asymmetry can be understood in terms of investor expectations, trader composition and investor psychology. During a bull market, positive attention will rise, the expectation of an increase in prices will grow, and a negative event will be regarded as a temporary fluctuation. Bear markets have attracted more negative attention and thus will likely fall further. Given that the number of retail investors in China is relatively large, information asymmetry and herd behaviour may lead to a virtuous cycle of trading. The spiral-of-silence effect may indicate that investors have already absorbed the main trend in the market. Information in line with the current market conditions will be more responsive to the public's behaviour.

5 Robustness Test

For the purpose of a robustness check, the measurement of psychological distance is replaced, but the main conclusions are the same.

First, the Haversine formula is employed to calculate the great-circle distance between the two offices more precisely. The address of the head office is converted into WGS84 latitude and longitude coordinates, and then the spherical distance between two points is calculated as follows:

$$d = 2r\arcsin\sqrt{\sin^2\left(\frac{\varphi_2-\varphi_1}{2}\right) + \cos(\varphi_1)\cos(\varphi_2)\sin^2\left(\frac{\lambda_2-\lambda_1}{2}\right)} \tag{18}$$

where d is the spherical distance between two headquarters, r is the Earth radius, and $(\varphi_1,\ \lambda_1)$ and $(\varphi_2,\ \lambda_2)$ are the latitude and longitude coordinates of the two headquarters.

Second, the economic distance will be based on the 2017 benchmark input-output table. The 2020 extended table is based on the available statistics and financial data; it is not a survey, and the 2017 benchmark table was constructed from survey data to obtain more detailed input-output information.

6 Finally

Based on the theory of psychological safety zones, this paper examines how the attention of investors in different spaces affects the movement of stock prices. Based on mediation analysis, it can be seen that the distance of spatial psychological safety negatively impacts stock price co-movement via investor attention co-movement. Based on interaction analysis, it has been found that geographical and economic psychological safety distances are related. Economic distance is relatively stable; that is to say, two enterprises are geographically far apart, but they will not show strong attention co-movement. Geographical distance has a more flexible effect and is affected by the degree of economic proximity.

Evidence from event studies shows that the attention comovement is caused by attention transfer in information diffusion. When a peer company releases its earnings, it will attract more attention from investors in the region or industry, and this attention will also be directed towards the first company. Lagged coefficients are also out of sync with attention transfer, so it is not synchronous. Attention transfer is stronger among related enterprises and is also more prominent when stock price co-movement is already large.

Sentiment-state analysis has the problem of asymmetry. Positive attention leads to stronger stock price co-movement than negative attention in a bull market; negatively it will have stronger co-movement than positively do in a bear market. Positive-feedback trading, herding

behaviour and investor psychology together help explain why positive market states become more positive and negative market states become more negative.

Based on the above, we have drawn the following conclusions. When the price of an asset rises, the return on capital will be lower. By using the different attention transfer in space and time, one can manage risk and discover investment opportunities. Market conditions and changes in people's attention should be added to the spatial co-movement analysis.

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