

Predicting Firm Stock Returns with Customer Stock Returns: A Mediated Moderation Model of Customer Concentration and Investor Attention

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How to cite this paper: Lu, W. X., Han, Y. S., & Zhang, R. J. (2025). Predicting Firm Stock Returns with Customer Stock Returns: A Mediated Moderation Model of Customer Concentration and Investor Attention. *Modern Economy*, 16, 1836-1855.
<https://doi.org/10.4236/me.2025.1611085>

Received: May 24, 2025

Accepted: November 18, 2025

Published: November 21, 2025

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Abstract

As interactions between companies in the same industry chain become more interconnected, customers have become a key factor impacting company strategy and operations. Along the same lines, advanced customer information has become an increasingly reliable predictor of corporate stock returns. Specifically, we propose a mediated moderation model in which customer concentration moderates the predictive effect of customer stock returns, where this moderating effect is mediated by investor attention. Using panel data from Chinese A-share listed manufacturing firms between 2017 and 2023, we empirically test our model. The results show that customer stock returns significantly predict company stock returns. Furthermore, higher customer concentration strengthens this predictive relationship, but only when it attracts sufficient investor attention. These findings highlight the importance of customer-related market signals in investment decision-making and suggest that investor attention plays a crucial role in translating customer performance into firm valuation in capital markets.

Keywords

Customer Stock Returns, Stock Return Prediction, Investor Attention, Customer Concentration

1. Introduction

China's securities market has revolutionized over the past two decades, making significant progress in many aspects such as market supervision and institutional

infrastructure. However, compared with developed countries, China's capital market has a young history, a high proportion of retail investors, a strong speculative atmosphere, and inefficiencies in information transmission and regulation, which constrain the healthy development of the securities market. As an emerging transitional economy, China's securities market remains a weakly efficient market, with numerous restrictions on the flow of stock-related information, making it highly feasible to predict stock returns using information available in advance. Since stock returns are an important reference for investors to determine whether a company is worth investing in, and information is the bridge connecting investors' cognitive processes and decision-making behaviors, it is particularly important to make full use of information available in advance to predict stock prices.

Customers, as non-financial stakeholders of a company, represent significant economic resources and exert substantial influence on the company's strategy and operations. Companies' economic dependence on customers is particularly pronounced in China, where relationship-based transactions are emphasized. Since the 1990s, China has gradually transformed from a seller's market to a buyer's market, with an increasing number of companies recognizing the significant impact of customers on their value creation. The academic community has also begun to focus on the role of customers in corporate management and modern financial theory (Cui & Qiao, 2024). Scholars have pointed out that customers can influence a company's financial decisions (Kale & Shahrur, 2007), accounting behaviors (Hui et al., 2012), cash holdings (Nguyen et al., 2021), and corporate performance (Irvine, Park, & Yildizhan, 2016). Customers' influence on a company's actual activities and financial decisions may further affect the company's market performance (Cohen & Frazzini, 2008). Menzly and Ozbas indicated from an industry perspective that customer industry stock returns can predict company stock returns (Menzly & Ozbas, 2010). Compared to interactions between industries, there may be more direct connections between customers and companies. Lee et al. found that customer concentration affects a company's stock price synchronicity (Lee, Jiraporn, & Song, 2020). Cohen and Frazzini, from the perspective of investor attention, confirmed that customer stock returns can serve as an important indicator for predicting company stock returns (Cohen & Frazzini, 2008). Customer stock returns describe customers' market performance and reflect consumer demand and customers' production and operation conditions.

The aforementioned studies provide empirical evidence that customer stock returns can predict company stock returns, but there is insufficient understanding of the specific mechanisms involved. Identifying the conditions under which customer stock returns more strongly predict company stock returns can deepen our understanding of the underlying mechanisms and improve their practical application. As suppliers of goods, the higher the customer concentration of supplier companies, the more it strengthens information sharing and production cooperation between companies and their customers, while also enhancing customers'

bargaining power (Zheng, Ang, & Yang, 2024), thereby strengthening supplier companies' economic dependence on customers. Therefore, this paper argues that higher customer concentration can enhance the predictive effect of customer stock returns on company stock returns.

The emerging behavioral finance theory suggests that, due to the vast amount of information available to investors and their limited cognitive abilities, investors tend to focus on only a few important information sources (Cohen & Frazzini, 2008), resulting in a delay for all relevant information to be fully reflected in stock prices (Teja et al., 2019). When customer concentration is high, major customers occupy a higher market share and have prominent characteristics, which attracts more attention from investors in the market, increases information transmission efficiency, and thereby strengthens the impact of customer stock returns on company stock returns. Evidently, customer concentration and investor attention are closely related to the prediction of company stock returns. A profound understanding of the psychological mechanisms connecting customer concentration and stock returns can more definitively reveal the predictive mechanism of customer stock returns on company stock returns.

Therefore, this paper uses Chinese A-share listed manufacturing companies as a sample to construct a mediated moderation model. It first examines the predictive effect of customer stock returns on company stock returns, it analyzes the moderating role of customer concentration and further explores the mediating role of investor attention in this moderating mechanism. This research focuses on the micro-enterprise level, offering an in-depth analysis of how customer concentration influences investor attention and subsequently affects company market performance, providing theoretical and empirical evidence for listed company stock price prediction.

The main contributions of this paper are as follows: First, it identifies the boundary conditions and internal mechanisms of customer stock returns predicting company stock returns. Although existing research has discussed the individual effects customer stock returns and customer concentration on company stock returns (Cohen & Frazzini, 2008; Menzly & Ozbas, 2010), it has overlooked the interaction effects between the two, especially the inadequate exploration of the role of investor attention in this influence process. This paper analyzes the interaction effect of customer stock returns and customer concentration in predicting company stock returns, and clarifies the mediating role of limited investor attention in the predictive mechanism of customer characteristics on company stock returns. Second, it enriches research on cross-sectional prediction of stock market returns and expands the application of investor attention theory. While existing studies have used time-series analysis methods to confirm that investor attention can influence price indices (Vozlyublennai, 2014), they have often ignored how differences in firm-specific characteristics, such as customer concentration, can influence stock returns via investor attention. By constructing a mediated moderation model and using panel data, this paper investigates how customer

concentration affects the predictive mechanism of customer stock returns on company stock returns by influencing investor attention, depicts the specific process of investor attention influencing individual company stock returns, and supplements the cross-sectional empirical evidence of investor attention affecting stock returns.

2. Theoretical Analysis and Research Hypotheses

2.1. The Predictive Effect of Customer Stock Returns on Company Stock Returns

Early financial theory, when studying corporate behavior, primarily focused on stakeholders with contractual relationships such as shareholders and creditors (Jensen & Meckling, 1976). As research deepened, scholars turned their attention to non-financial stakeholders such as suppliers, customers, and workers, focusing on their impact on corporate operational behavior and performance. Schumacher pointed out in his research that trade between companies and their customers forms a “community of interests” relationship where they prosper or suffer together (Schumacher, 1991). In supply chain relationships, supplier companies have significant economic dependence on customers (Freeman, 2010), specifically manifested in three aspects: First, production dependence. For companies, customer demand for products affects the actual inventory level and expected inventory level of upstream companies. Therefore, companies, as upstream product suppliers, must increase product inventory or reduce backlogs to adapt to customer expectations based on the actual situation of their overall customers (Anand & Goyal, 2009). Second, financial dependence. Customer demand not only affects the production costs of their suppliers but also affects the liquidity of accounts receivable, increasing the instability of operational performance and the uncertainty of cash flows, thereby transferring impacts to upstream companies (Kim, Song, & Zhang, 2015). Third, resource dependence. According to resource dependence theory, the core resources controlled by various companies in the supply chain differ from each other, and due to information asymmetry and differences in target interests, companies cannot achieve complete free flow of resources between them. Therefore, to reduce transaction costs and gain more benefits, companies need to engage in deep cooperation with customers to obtain support for their resources (Paulraj & Chen, 2007). The existence of the bull-whip effect amplifies the aforementioned economic dependence of supplier companies on customers. The bullwhip effect theory suggests that the large-scale implementation of self-protective ordering strategies between companies makes it difficult for them to achieve timely information sharing, and sales information and product information cannot be effectively transmitted from end customers to original supplier companies. Therefore, distortions in product demand are amplified along the supply chain from bottom to top, ultimately making the impact of customers’ unstable demand on companies increasingly intense (Lee, Padmanabhan, & Whang, 1997).

With technological advancement and continuous changes in market structure, dominance now rests with consumers, and demand has become a scarce resource. Market consumer demand shocks first affect customers and then are transmitted to supplier companies. Due to companies' economic dependence on customers, fluctuations in customer stock prices signal to investors about the business conditions of both the customers themselves and their supplier companies. When investors receive signals that a company's customers are performing well in the market, they become more confident about the company's future cash flows and tend to buy the company's stock at higher prices, increasing the company's stock returns. Conversely, when investors receive signals that customers are performing poorly in the market, they tend to sell the company's stock, causing the company's stock price to decline and stock returns to decrease. Based on this, this paper proposes the following hypothesis:

H1: Customer stock returns positively predict subsequent company stock returns.

2.2. The Moderating Effect of Customer Concentration

Customers' production, operations, and market performance can affect company stock returns, but customers with different characteristics may have varying impacts on companies. Research by Kim et al. (Kim, Song, & Zhang, 2015) on the U.S. bank credit market and Shi et al. (2020) on Chinese companies' economic activities both indicate that customers' influence on companies strengthens as companies' dependence on customers increases.

Theoretically, customer concentration moderates the predictive effect of customer stock returns on company stock returns through several aspects. First, from the perspective of information acquisition motivation, customers' operating conditions affect the interests of suppliers who have established close business relationships with them, thus companies are motivated to pay attention to customer situations, prompting customers to improve information quality (Lee, Jiraporn, & Song, 2020). The higher the customer concentration, the greater the customers' influence on the company, the stronger the company's motivation to focus on customer information, and the more likely the company is to obtain relevant information from these major customers. Companies make operational management decisions based on information transmitted by customers. Therefore, companies with higher customer concentration are more susceptible to customer returns and risk contagion, strengthening the impact of customer-related information on the company's capital market performance. Second, according to marketing and operations management theory, high customer concentration can promote information sharing between customers and suppliers (Li, Liu, & Kou, 2023), reduce companies' motivation for information disclosure management (Ak & Patatoukas, 2016), alleviate information asymmetry between supply chain companies, form more stable supply chain relationships, enhance companies' economic dependence on customers, and play a moderating role in customers' influ-

ence on companies (Saboo, Kumar, & Anand, 2017). Therefore, we propose the following hypothesis:

H2: Customer concentration positively moderates the relationship between customer stock returns and company stock returns, such that the predictive effect is stronger when customer concentration is higher.

2.3. The Moderating Effect Mediated by Investor Attention

The research on the predictive effect of customer stock returns on company stock returns and the moderating role of customer concentration is mostly analyzed from the perspective of traditional finance. Considering theories such as market inefficiency and limited investor attention in behavioral finance, the process of customer information transmission can also affect company stock returns. Limited investor attention refers to the fact that investors have limited time and energy and cannot process all information in the market. Behavioral finance has confirmed that when making predictions and decisions, investors, due to limitations in memory and knowledge, tend to focus on information with prominent features, which to some extent slows down the speed of securities market price responses to information. In other words, when faced with different information in the securities market, the limited nature of investor attention causes differences in reaction efficiency to different information, so company stock prices may respond more fully and promptly to clear and easily obtainable information (Hirshleifer, Lim, & Teoh, 2011). Regarding the response patterns of stock prices to relevant information and the diffusion process of information in the market, many scholars have conducted research and discussions from the perspective of investor attention. Li and Yu found in measuring the degree of traders' under- and over-reaction to news that, compared to the more economically meaningful NYSE index and Amex index, the Dow index, which receives more investor attention, has stronger predictive power (Li & Yu, 2012). Della Vigna and Pollet compared investor reactions following the announcement of results on Fridays and other work days and found that weekends temporarily divert investor attention (Della Vigna & Pollet, 2005). These scholars' research has proven that investor attention plays an irreplaceable role in the information transmission process of company stock return influence mechanisms.

Cohen and Frazzini (2008) found in predicting stock returns that when two companies are linked through customer and supplier relationships, their operating conditions and returns show significant correlation. That is, customers play an important role in the potential cash flows of affiliated companies, so investors should pay attention to customer relationships. In China's stock market, retail investors are the main body of market transactions, and they lack time and professional knowledge compared to institutional investors when processing market information. Therefore, investor attention may have a more prominent effect on China's stock market prices (Dong et al., 2022). When a company's customer concentration is high, the company's economic dependence on customers becomes

more severe, and such customers tend to be more dominant in trade cooperation. This more “dominant” prominent feature is more likely to attract investor attention, enabling investors to acquire more information about the customer. Therefore, the moderating effect of customer concentration on the influence of customer stock returns on company stock returns is transmitted through investor attention. In other words, the higher the customer concentration, the more it attracts investor attention, and information such as customer stock returns is more easily noticed and processed by investors, thereby more promptly and significantly affecting company stock returns. Based on the above analysis, this study proposes the following hypothesis:

H3: The moderating effect of customer concentration on the predictive relationship between customer stock returns and company stock returns is mediated by investor attention.

In summary, a mediated moderation model is established as shown in **Figure 1**, to explore the predictive effect of customer stock returns on company stock returns, the moderating effect of customer concentration, and the mediating effect of investor attention.

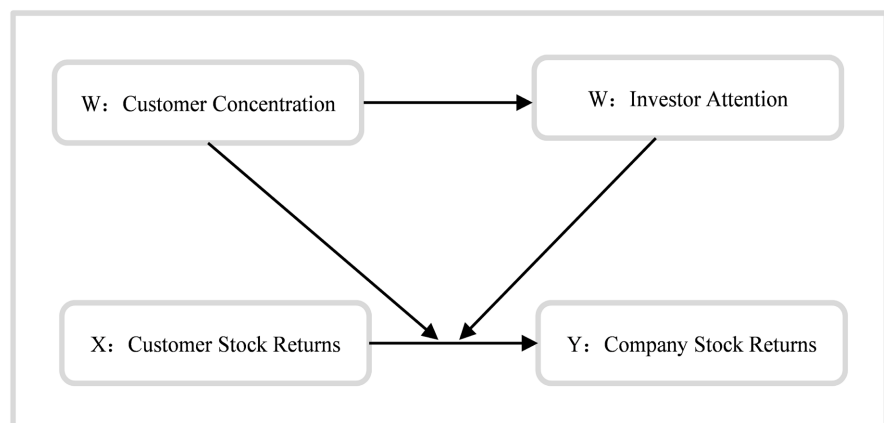


Figure 1. Mediated moderation model.

3. Materials and Methods

3.1. Sample Selection and Data Sources

Due to the relatively close upstream and downstream relationships in the manufacturing supply chain, this paper selects A-share manufacturing listed companies from 2017 to 2023 as the sample, and omits those with missing data, finally organizing 542 valid unbalanced panel data points from 273 companies. The initial sample covered all A-share manufacturing firms from 2017 to 2023. After excluding firms with incomplete financial or trading data, those without disclosed top five customers, and firms listed for less than three consecutive years, 273 firms were retained. The final dataset consists of 542 firm-year observations used for empirical analysis.

In the data collection process, company and customer stock trading data and

financial data were obtained from the CSMAR database, while investor attention data were manually collected and organized from the Baidu Index query website.

3.2. Variable Definitions

3.2.1. Dependent Variable

Company Stock Returns ($R_{i,t}$). Represents company i 's stock returns in period t . Aligning with previous research, this paper selects the company's annual excess returns to measure company stock returns (Aswani, Raghunandan, & Rajgopal, 2024; Allen et al., 2024), with the specific calculation formula as follows:

$$R_{i,t} = \prod_{t=0}^T (R_t + 1) - \prod_{t=0}^T (R_{mt} + 1) \quad (1)$$

where $R_{i,t}$ is the monthly return rate considering cash dividend reinvestment, and R_{mt} is the value-weighted average monthly composite market return rate considering cash dividend reinvestment. Since the deadline for annual report disclosure of Chinese listed companies is April 30 each year, the monthly return interval for calculating annual excess returns is taken from May of the current year to April of the following year.

3.2.2. Independent Variable

Customer Stock Returns ($CE_{i,t-1}$), represents the average stock performance of company i 's customers during period $t - 1$. Since a company may cooperate or trade goods with multiple different companies, and China encourages listed companies to disclose the names of their top 5 customers and their corresponding sales amounts, this paper selects the average stock return of customers among the company's top 5 customers that are listed companies as the measurement indicator for customer stock returns. Each customer's stock return is still measured by the annual excess return calculated according to model (1).

3.2.3. Moderating Variable

Customer Concentration ($W_{i,t}$). Considering that the relationship between customers and companies is mainly through sales transactions, this paper selects the sales ratio of the company's top five customers as the measurement indicator for customer concentration. Customer concentration reflects the extent to which a company relies on a small number of customers for its revenue, with higher values indicating greater dependency on a few key buyers.

3.2.4. Mediating Variable

Investor Attention ($M_{i,t}$). Investor attention refers to the degree of focus or cognitive resources that investors allocate to a particular company or set of companies when making investment decisions. Early empirical research on investor attention issues typically used the number of reports from news and mass media as measurement indicators (Barber & Terrance, 2008; Della Vigna, 2009). In recent years, with the popularization and development of the internet, some scholars have begun to use internet search indices to measure investor attention (Dimpfl & Jank,

2016; DeHaan, Lawrence, & Litjens, 2024). In China, Baidu company holds a monopoly position in search business, and Baidu's search volume data can well represent the internet search behavior of Chinese people (Tan et al., 2024). Based on this, in order to measure investor attention to customers as comprehensively as possible, this paper draws on the research of Shen et al. (2017), using the natural logarithm of the sum of the annual Baidu search index for customer-related keywords provided by Baidu to measure investor attention. The natural logarithm is applied to the Baidu Search Index to reduce skewness, control for extreme values, and improve the interpretability and stability of regression estimates. The customer keywords selected in this paper include customer stock codes, customer company names, and customer abbreviations.

The Baidu Index is constructed based on search frequencies of stock-related keywords for each listed firm. Following prior studies, the firm's stock short name and stock code were used as the search keywords. The daily search volume data were obtained from Baidu Index and then aggregated to the monthly level to match the frequency of financial variables. To mitigate noise and seasonal effects, the index was normalized within each year. No further de-trending was applied, as the normalization effectively captures relative changes in investor attention.

3.2.5. Control Variables

To control for the impact of other company-related characteristics on the dependent variable in the econometric model, this paper selected corresponding control variables with reference to previous research (Brennan, Chordia, & Subrahmanyam, 1998; Jegadeesh & Titman, 1993). And constructed dummy variables to control for changes in years and sub-industries. Although macroeconomic factors such as GDP growth and market index returns may also influence firm performance, the present analysis focuses on firm-level determinants. Future research could incorporate these aggregate controls to further address omitted-variable bias. The definitions and descriptions of the main variables are shown in Table 1.

Table 1. Variable definitions and measurements.

Variable Type	Variable Name	Symbol	Variable Measurement Method Definition
Dependent Variable	Company Stock Returns	$R_{i,t}$	Company's annual excess returns
Independent Variable	Customer Stock Returns	$CE_{i,t-1}$	The value-weighted annual excess returns of the company's top five customers in period $t-1$.
Moderating Variable	Customer Concentration	$W_{i,t}$	Company's top five customers' sales ratio
Mediating Variable	Investor Attention	$M_{i,t}$	Ln(Baidu Index)
Control Variables	Company Size	$Size_{i,t}$	Ln(Total Assets)
	Company Asset-Liability Ratio	$Lev_{i,t}$	Total Liabilities/Total Assets
	Company Growth Capability	$Grow_{i,t}$	Total Asset Growth Rate
	Company Market-to-Book Ratio	$BM_{i,t}$	Assets/Market Value
	Company Dividend Ratio	$Div_{i,t}$	Ordinary Stock Dividend Rate
	Company Profitability	$ROA_{i,t}$	Return on Assets

3.3. Model Design

To test the mediated moderation effect, this paper constructs models (2)-(5) based on the research of Preacher et al. (2007). Among them, model (2) is used to test the predictive effect of customer stock returns on company stock returns, verifying hypothesis H1; model (3) is used to test the moderating effect of customer concentration, that is, verifying hypothesis H2; models (4) and (5) are used to verify the mediating effect of investor attention, namely hypothesis H3.

$$R_{i,t} = \beta_0 + \beta_1 CE_{i,t-1} + \gamma Control_{i,t} + \varepsilon_{i,t} \quad (2)$$

$$R_{i,t} = \beta_0 + \beta_1 CE_{i,t-1} + \beta_2 W_{i,t} + \beta_3 W_{i,t} * CE_{i,t-1} + \gamma Control_{i,t} + \varepsilon_{i,t} \quad (3)$$

$$M_{i,t} = \beta_0 + \beta_1 W_{i,t} + \gamma Control_{i,t} + \varepsilon_{i,t} \quad (4)$$

$$R_{i,t} = \beta_0 + \beta_1 CE_{i,t-1} + \beta_2 W_{i,t} + \beta_3 W_{i,t} * CE_{i,t-1} + \beta_4 M_{i,t} + \beta_5 M_{i,t} * CE_{i,t-1} + \gamma Control_{i,t} + \varepsilon_{i,t} \quad (5)$$

To correct the mutual causality problem between the dependent variable company stock returns and customer stock returns, this paper draws on the research of Handani and Schuler (Hadani & Schuler, 2013), using company stock returns as an independent variable to fit customer stock returns, and taking the fitted residual values as instrumental variables. This fitted residual captures the component of customer stock returns that is unrelated to firm stock returns, ensuring exogeneity. It is correlated with customer stock returns but uncorrelated with the error term in the firm return regression, thereby satisfying the requirements of a valid instrumental variable. This variable can well represent the part of customer stock returns that cannot be explained by company stock returns. Therefore, we use this residual value as a substitute variable for company stock returns in the regression.

4. Results

4.1. Regression Results and Analysis

To reduce the endogeneity problem of lagged dependent variables, this paper uses Stata software for system GMM regression, and performs mean-centering of interaction terms in all regression models to avoid potential multicollinearity problems. The regression results are shown in Table 2. The results in column (1) show that the coefficient of customer stock returns ($CE_{i,t-1}$) on company stock returns ($R_{i,t}$) is 8.8433, and is significant at the 1% level, supporting hypothesis H1, i.e. indicating a strong, positive, and statistically significant predictive relationship between customer and company stock returns. Otherwise meaning, when customers experience higher stock returns, their supplier firms tend to exhibit stronger subsequent returns. This result is consistent with the research conclusions of Cohen and Frazzini (2008), who demonstrate a return spillover effect through supply chain linkages. Among the control variables, company asset-liability ratio ($Lev_{i,t}$) and profitability ($ROA_{i,t}$) have a significant positive impact on company stock returns ($R_{i,t}$), indicating that within a manageable risk range, a higher asset-liability

bility ratio is beneficial for companies to use financial leverage to increase company stock returns. Return on assets represents a company's profitability, and companies with higher profitability usually also have better market performance. In this paper's research on listed manufacturing companies, companies with higher book-to-market ratios ($BM_{i,t}$) actually have lower stock returns, meaning that stock returns in the sample data do not exhibit a strong book-to-market ratio effect. The negative coefficient on lagged stock returns ($R_{i,t-1}$) indicates a short-term reversal effect, suggesting that stock prices tend to correct after prior movements rather than exhibit momentum. This implies that in the short term, stock prices in China's manufacturing sector revert toward a perceived equilibrium, reflecting market overreaction or noise rather than sustained directional trends.

Table 2. Company stock returns regression results.

	Column (1) $R_{i,t}$	Column (2) $R_{i,t}$	Column (3) $M_{i,t}$	Column (4) $R_{i,t}$
$CE_{i,t-1}$	8.8433*** [9.93]	6.8015*** [6.93]		4.2245*** [3.55]
$R_{i,t-1}$	-0.1308*** [-3.43]	-0.1542*** [-4.03]		-0.1401*** [-3.71]
$Size_{i,t}$	0.0533 [1.07]	0.0969** [2.08]	0.1478*** [13.20]	0.1153** [2.54]
$Lev_{i,t}$	0.7994*** [2.93]	0.5010* [1.88]	0.2436*** [3.50]	0.3068 [1.18]
$Grow_{i,t}$	0.0009 [0.60]	0.0008 [0.63]	0.0012 [0.42]	0.0008 [0.66]
$BM_{i,t}$	-0.9596*** [-5.91]	-0.9726*** [-6.16]	-0.8937*** [-13.11]	-0.9657*** [-6.20]
$Divi_{i,t}$	2.0821 [0.58]	0.0254 [0.01]	-4.7088*** [-3.63]	-1.3286 [-0.38]
$ROA_{i,t}$	1.3949*** [2.67]	1.019** [2.05]	0.9457*** [4.01]	0.7678 [1.55]
$M_{i,t}$				0.0319 [1.27]
$M_{i,t} * CE_{i,t-1}$				23.2444*** [3.70]
$W_{i,t}$		0.0050*** [2.72]	0.0106*** [30.70]	0.0031* [1.70]
$W_{i,t} * CE_{i,t-1}$		2.8608*** [4.53]		1.7295** [2.49]
<i>year</i>	yes	yes	yes	yes
<i>industry</i>	yes	yes	yes	yes

Continued

<i>constant</i>	-1.0833 [-1.10]	-2.023** [-2.19]	4.5796*** [23.20]	-2.4752*** [-2.82]
<i>number</i>	493	493	500	490
<i>waldchi2</i>	215.01	259.65	1295.83	291.47
<i>p</i>	0.0000	0.0000	0.0000	0.0000

Note: The numbers in brackets are t values, “***”, “**”, “*” represent significance at the 1%, 5%, and 10% levels respectively. The system-GMM estimation follows the standard two-step robust approach to ensure consistency and efficiency.

Column (2) in **Table 2** tests hypothesis H2, investigating the moderating effect of customer concentration. The regression coefficient of the interaction term between customer concentration and customer stock returns ($W_{i,t} * CE_{i,t-1}$) is 2.8608, and is significant at the 1% level, highlighting the significance of customer concentration in return predictability. According to the research of Aiken et al. (1991), whether the specific moderating effect conforms to the theoretical expectations of this research needs to be judged in conjunction with the interaction effect diagram drawn by the simple slope estimation. **Figure 2** is an interaction effect diagram of customer concentration moderating the relationship between customer stock returns and company stock returns. As can be seen from **Figure 2**, the linear regression slope of customer stock returns on company stock returns in the high concentration group is greater than that in the low concentration group. Combining the regression results in column (2) of **Table 2** and the interaction effect diagram in **Figure 2**, the following conclusion can be drawn: customer concentration has an enhancing moderating effect on the relationship between customer stock returns and company stock returns, i.e., the higher the customer concentration, the greater the predictive effect of customer stock returns on company stock returns, thus hypothesis H2 is supported.

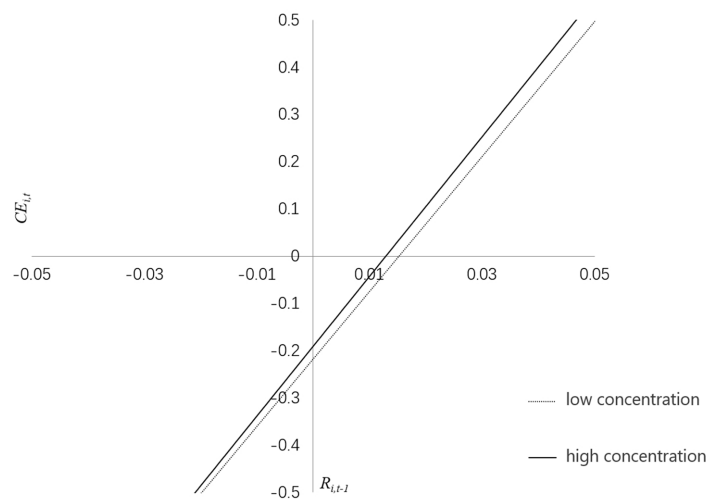
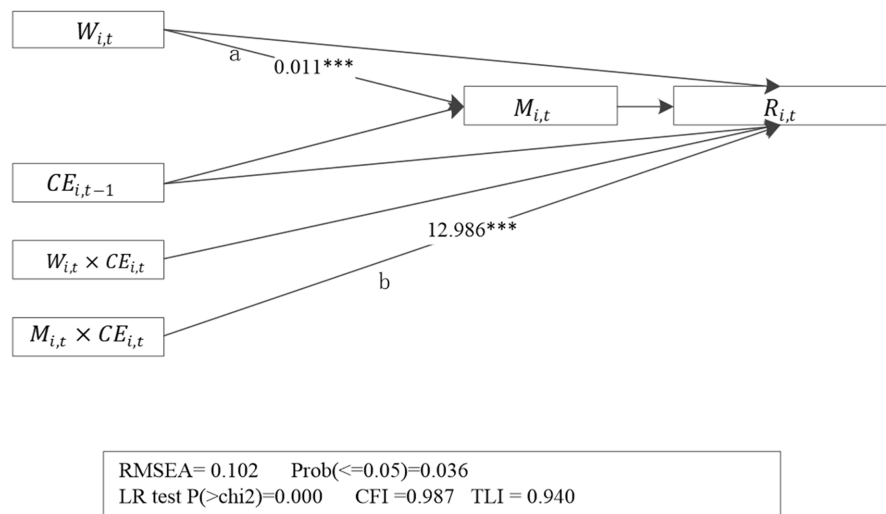


Figure 2. The moderating effect of customer concentration.

Column (3) in **Table 2** shows that the impact coefficient of customer concentration ($W_{i,t}$) on investor attention ($M_{i,t}$) is 0.0106, with a significance level of 1%, meaning that when a company's customer concentration is high, it attracts more investor attention. This may be because firms with more concentrated customer structures attract greater investor scrutiny due to the higher perceived risk and informational transparency surrounding major customers. By adding the mediating variable and its interaction term with the explanatory variable into the moderation effect model, we obtain the regression results in column (4). Comparing it with the results in column (2), after adding the investor attention variable, the coefficient of the interaction term between investor attention and customer stock returns ($M_{i,t} * CE_{i,t-1}$) is positive and significant at the 1% level, while the coefficient of the interaction term between customer concentration and customer stock returns ($W_{i,t} * CE_{i,t-1}$) changes to 1.7295, with the coefficient decreasing and significance level dropping to 5%. The overall fit of the model is good, confirming that the mediated moderation model is valid.

4.2. Robustness Tests

While keeping the above models unchanged, we test the robustness of the conclusions by using structural equation modeling methods and changing the measurement methods of key variables.



Note: “***”, “**”, “*” represent significance at the 1%, 5%, and 10% levels respectively.

Figure 3. Structural equation model of the mediated moderation effect.

First, we use the structural equation modeling method for testing. Structural Equation Modeling (SEM) is a statistical method for exploring relationships and structures between theories and concepts, which can overcome the difficulties of generalized linear regression methods in fully and effectively explaining the structural relationships between elements. The structural equation modeling analysis results in **Figure 3** show that the coefficient (*a*) of customer concentration ($W_{i,t}$)

on investor attention ($M_{i,t}$) and the coefficient (b) of the interaction term between investor attention and customer stock returns ($M_{i,t} * CE_{i,t-1}$) on company stock returns ($R_{i,t}$) are both positive and statistically significant, with the former being 0.011 ($t = 4.27$) and the latter being 12.986 ($t = 3.33$). This means that customer concentration ($W_{i,t}$) significantly affects investor attention ($M_{i,t}$) and investor attention ($M_{i,t}$) and customer stock returns ($CE_{i,t-1}$) interactively affect company stock returns ($R_{i,t}$).

According to the research of Preacher et al. (2007), when the 95% confidence interval of $a \times b$ does not include zero, the mediated moderation effect is established. As can be seen from the confidence intervals of the indirect moderating effect given in Table 3, the 99% confidence interval is (0.003, 0.283), and the 95% confidence interval is (0.036, 0.249), neither of which includes 0. This confirms that the mediated moderation effect model is established, i.e., the moderating effect of customer concentration on the main effect can be explained by the mediating effect of investor attention.

Table 3. Confidence interval test.

	Lower 0.5%	Lower 2.5%	Lower 5%	Estimate	Upper 5%	Upper 2.5%	Upper 0.5%
$a \times b$	0.003	0.036	0.053	0.143	0.232	0.249	0.283

Second, we change the measurement method of the explanatory variable customer stock returns ($CE_{i,t-1}$). The previous text used the average of the stock returns of listed companies among the top 5 customers to measure customer stock returns. In the robustness test section, the stock return of the largest listed company customer is used as the explanatory variable for the main effect, while other related variable measurement methods and model construction remain consistent with the previous text. The regression results after changing the variable measurement method are shown in Table 4. From Table 4, it can be seen that in the main effect regression, the regression coefficient of customer stock returns ($CE_{i,t-1}$) on company stock returns ($R_{i,t}$) is 15.6645, significant at the 1% level, meaning that customer stock returns can predict company stock returns, supporting hypothesis H1. In column (2), the regression coefficient of the interaction term between customer concentration and customer stock returns ($W_{i,t} * CE_{i,t-1}$) on company stock returns ($R_{i,t}$) is 0.8502, significant at the 1% level, indicating that customer concentration enhances the predictive effect of customer stock returns on company stock returns, supporting hypothesis H2. This result aligns with the idea that firms with higher customer concentration are more financially and operationally dependent on their key customers, which increases the economic linkage and informational relevance of customer stock returns for firm valuation. After adding the mediating variable, in column (4), the interaction term between investor attention and customer stock returns ($M_{i,t} * CE_{i,t-1}$) is significantly positive, and the coefficient of the interaction term between customer concentration and customer stock returns ($W_{i,t} * CE_{i,t-1}$) changes to 0.6766, significantly less than the coeffi-

cient of 0.8502 for the interaction term between customer concentration and customer stock returns ($W_{i,t} * CE_{i,t-1}$) in column (2). Overall, the results of this robustness test validate the core theoretical framework under an alternative operationalization of customer performance and confirm that investor attention continues to mediate the moderating role of customer concentration on return predictability, supporting hypothesis H3.

Table 4. Robustness test: company stock returns regression.

	Column (1) $R_{i,t}$	Column (2) $R_{i,t}$	Column (3) $M_{i,t}$	Column (4) $R_{i,t}$
$CE_{i,t-1}$	15.6645*** [12.59]	12.5560*** [8.40]		10.2233*** [5.10]
$R_{i,t-1}$	-0.1269*** [-3.58]	-0.1448*** [-4.07]		-0.1452*** [-4.10]
$Size_{i,t}$	0.0535 [1.12]	0.0901** [1.99]	0.1478*** [13.20]	0.1011** [2.30]
$Lev_{i,t}$	0.7805*** [3.03]	0.5564** [2.21]	0.2436*** [3.50]	0.3962 [1.59]
$Grow_{i,t}$	0.0019 [1.25]	0.0009 [0.71]	0.0012 [0.42]	0.0009 [0.76]
$BM_{i,t}$	-0.9314*** [-6.06]	-0.9830*** [-6.63]	-0.8937*** [-13.11]	-0.9453*** [-6.27]
$Divi_{i,t}$	-0.2821 [-0.09]	-1.7695 [-0.57]	-4.7088*** [-3.63]	-1.8667 [-0.59]
$ROA_{i,t}$	1.1773** [2.38]	0.9432** [2.01]	0.9457*** [4.01]	0.7704 [1.63]
$M_{i,t}$				0.0430* [1.83]
$M_{i,t} * CE_{i,t-1}$				3.3270* [1.65]
$W_{i,t}$		0.0038** [2.19]	0.0106*** [30.70]	0.0019 [1.07]
$W_{i,t} * CE_{i,t-1}$		0.8502*** [3.73]		0.6766*** [2.68]
<i>year</i>	yes	yes	yes	yes
<i>industry</i>	yes	yes	yes	yes
<i>constant</i>	-1.0286 [-1.08]	-1.8004** [-2.01]	4.5796*** [23.20]	-2.2439*** [-2.64]
<i>number</i>	493	493	500	493
<i>waldchi2</i>	321.15	359.75	1295.83	376.77
<i>p</i>	0.0000	0.0000	0.0000	0.0000

Note: The numbers in brackets are t values, “***”, “**”, “*” represent significance at the 1%, 5%, and 10% levels respectively.

Through the above robustness tests, it can be seen that after replacing statistical analysis methods and key variable measurement methods respectively, the empirical test results are basically consistent with the previous article, indicating that the article's conclusions are robust.

5. Discussion

This paper focuses on the relationship between companies and customers in the supply chain, discussing the moderating role of customer concentration in the process of customer stock returns predicting company stock returns, as well as the mediating effect of investor attention behavior as an information transmission channel. A mediated moderation model is constructed to study the impact mechanism of the above variables. The research results show: First, customer stock returns have a significant predictive effect on company stock returns. This research confirms that the higher the customer's stock returns in the previous year, the higher the company's stock returns in the current year usually are, corroborating the view in existing literature that customer stock returns have a predictive effect on company stock returns (Chen, Zhang, & Zhang, 2016). Second, customer concentration plays a moderating role in the prediction of customer stock returns on company stock returns. When a company's customer concentration is higher, the predictive effect of customer stock returns on company stock returns is stronger. Third, investor attention mediates the moderating effect of customer concentration on the main effect. Due to the limited nature of investor attention, the information transmission process in the stock market is gradual, that is, investor attention shapes how quickly and strongly customer-related signals are reflected in company stock prices, thereby having an important impact on the stock return prediction process. Fourth, after changing the statistical analysis method and replacing the measurement method of key variables, the empirical test results remain robust and reliable, supporting the generalizability of the findings. Moreover, corporate executives should pay greater attention to investor communication strategies in the digital information era. By proactively disclosing customer-related developments, production progress, and cooperation outcomes through official websites, investor briefings, and social media platforms, firms can enhance transparency and attract investor attention more effectively. Improved investor communication not only helps correct information asymmetry but also strengthens market confidence, thereby improving the firm's market valuation.

This research also provides the following practical implications: First, with economic globalization and professional division of labor, companies' economic dependence on customers is becoming increasingly intense, and customers' influence on companies is also growing. Therefore, company managers should build healthy supply chain relationships when engaging in supply chain cooperation, closely monitor the performance of important customers, and assess their influence on firm market value and business risk to adjust management decisions in a timely manner. Second, when investing in the securities market, investors usually

focus on the company's own financial information, ignoring important non-financial stakeholders such as the company's customers. As cooperation between companies and customers' influence on companies increase, investors should strengthen their attention to the customer relationships of target companies to more accurately and quickly predict companies' market performance and optimize investment strategies. Third, China's securities market is still inefficient, and advancing market-oriented reforms requires further improvement of market systems. The conclusions of this research also demonstrate the inadequacy of the current level of information disclosure and speed of information response in China's securities market. To protect the interests of companies and investors and enhance market transparency, regulatory authorities should strengthen requirements for companies' customer information disclosure, enabling investors to conveniently obtain more complete information and improve market efficiency.

In addition, the findings provide valuable implications for multinational corporations operating in China's manufacturing sector. These firms often rely heavily on local suppliers and customers within Chinese supply chains, making them subject to similar information and attention dynamics observed in this study. Understanding how customer stock performance and investor attention interact can help MNCs better evaluate market signals, anticipate supply chain risks, and adjust their local investment or partnership strategies. Furthermore, enhancing transparency in supply chain relationships and communicating effectively with investors can improve market confidence and facilitate sustainable operations in China's complex manufacturing environment.

This study has several limitations that should be addressed in future research. First, our sample size is constrained because China's requirements for supply chain information disclosure are relatively recent, and many companies still withhold the names of their key customers. Expanding the sample size in future studies would yield more robust results. Second, while we focused on customer concentration as a moderating factor, other customer characteristics—such as ownership structure, bargaining power, and relationship duration—may also influence the predictive relationship between customer and company stock returns. These additional factors warrant further investigation. Third, our analysis was limited to manufacturing companies due to their typically higher dependence on customers. Future research should extend this investigation to other industries to determine whether similar mechanisms exist across different supply chain contexts.

Acknowledgements

The paper is supported by The National Social Science Fund of China [No. 24BGL015].

Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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