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Securities Analyst Attention and Idiosyncratic Volatility Effect: Empirical Research on China Stock Market

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Abstract In the A-share market, which is dominated by retail investors, most investors lack financial market expertise. Securities analysts' attention to listed companies has become a reference for investors' transactions. Based on the data of non-financial listed companies in Shanghai and Shenzhen A-share markets from 1997 to 2020, this paper empirically studies the influence of analyst attention on the idiosyncratic volatility effect by means of portfolio analysis and Fama-Macbeth regression analysis. The results show that: Firstly, A-share market has a significant idiosyncratic volatility effect, and it still exists after adding company, market, annual and industry variables; Secondly, Analyst attention will significantly reduce the idiosyncratic volatility effect, and it still exists significantly after adding company, market, annual, and industry control variables; the research conclusions provide practical guidance for explaining the idiosyncratic volatility effect and the forecast of analyst attention.

Keywords: *analyst attention, Idiosyncratic volatility, stock return, Idiosyncratic volatility effect*

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1. Introduction

According to the traditional asset pricing theory (CAPM), the allocation of assets in the form of asset portfolio can effectively solve the problem of stock idiosyncratic risks. Stock prices are only affected by systemic risks and have nothing to do with idiosyncratic risks. However, in the real market, the market portfolio contained in the CAPM model is difficult to measure by indicators, and it is not reliable to measure systemic risk through the beta value of market portfolio returns. In addition, investors will be affected by factors such as investor heterogeneity, transaction costs, short-selling mechanisms, and information asymmetry, making it impossible to achieve effective market portfolio investment. Investors cannot fully diversify the idiosyncratic risks of stocks, and they also hope to obtain a higher risk premium [1]. Therefore, idiosyncratic risks will affect the expected return of stocks.

Based on this, domestic and foreign scholars have conducted research on the relationship between idiosyncratic risks and expected stock returns. Reference [2] used Fama-French three-factor model to study the relationship between idiosyncratic volatility and the expected rate of return, and found a positive relationship between the two. Reference [3] used A-share data to use idiosyncratic volatility as a proxy variable for stock idiosyncratic risk, and their research showed that there is a positive correlation bet-ween idiosyncratic volatility and the expected return of stocks. Reference [4] analyzed the U.S. stock market and found that there is a significant negative correlation between the volatility of stock characteristics and the expected rate of return, and it controls the book-to-market ratio, transaction volume, turnover rate, and company. On the basis of variables such as scale, the results are still found to be significant. Reference [5] analyzed the stock market data of 23 developed countries, and the results showed anomaly still exists. This anomaly is contrary to the theory of risk-return trade-off, and is called the mystery of idiosyncratic volatility, which is called Idiosyncratic Volatility Effect (*IV-Effect*) in this article. In order to prove whether there is *IV-Effect* in the Chinese stock market, domestic scholars have also done relevant research. Reference [6] used my country's stock market data and found that the cross-sectional yield of stocks is negatively correlated with volatility of stock characteristics. Reference [7] analyzed the Chinese stock market and found that the individual stock volatility and individual skewness of the current period are negatively correlated with stock returns. Reference [8] used GARCH, EGARCH, and ARMA models to conduct research and found that China's share market has *IV-Effect*. Reference [9] analyzed China's share market data and proved that the A-share market has *IV-Effect*.

In addition, domestic and foreign scholars have also conducted relevant research on the reasons why the phenomenon of *IV-Effect* occurs. Reference [1] pointed out that under short-selling restrictions, the idiosyncratic volatility of stocks is negatively correlated with the

expected return of stocks. Reference [10] found that investors have an investment lottery preference effect, and this effect is positively correlated with trait volatility. Reference [11] found through research that corporate profitability is the cause of trait volatility effects. The theoretical basis is that investors' judgment on the future expectations of companies with poor profitability will lead to increased trading volume and trait volatility effects. Reference [12] found that the volatility effect of traits is caused by the reversal effect of the rate of return. Reference [8] studied A-share market and believed that when there are short-selling restrictions and investor heterogeneity, the expected decline in stock returns is because price of assets is overvalued, resulting in idiosyncratic volatility effects. Reference [13] used A-share market stocks as the research object and found that the reason for the idiosyncratic volatility effect is the existence of investor heterogeneous trust and investors' preference for lottery stocks. Most scholars explain the effect of trait volatility from the perspective of short-selling restrictions and heterogeneous beliefs. There are also scholars who study the effect of trait fluctuations from the company level. Reference [14] used a differential model to find that the quality of information disclosed in the financial reports of listed companies will reduce effect of heterogeneous beliefs on idiosyncratic volatility, that is, the higher the quality of information in the financial statements of listed companies, the weaker the idiosyncratic volatility effect. Reference [15] found that the stronger with the management ability of the CEO of a listed company will lead to the lower volatility of stock characteristics.

Some scholars also study the effect of idiosyncratic volatility from the perspective of securities analysts. Reference [16] studied the impact of analyst forecast consistency on trait volatility. Research has shown that in a bull market, the inconsistency of forecasts will affect the trait volatility of value stocks. The higher with the inconsistency of forecasts and the greater with the volatility. China's A-share market, as a prominent financial market in developing countries, currently not only has market efficiency issues based on degree and speed of information reflected by prices, but also market fairness issues based on insider trading. The speed and extent of the information reflected by the price determines the effectiveness of the market, and this requires every investor to be able to quickly and accurately obtain and read relevant information. China's A-share market is dominated by retail investors. On the one hand, market investors lack professional investment knowledge and cannot make accurate judgments on information. On the other hand, they also lack access to effective information. As financial talents with professional knowledge, securities analysts are employed by various fund companies, investment companies, securities companies and other companies with information advantages. The research reports they issue on listed companies contain many value information [17]. Domestic scholars' research on analyst attention is mainly focused on the financial information of listed companies, corporate innovation, and corporate risk. The literature on trait volatility is less.

In view of this, this article selects China's A-share market as the research object, and studies the "the mystery of idiosyncratic volatility" from the perspective of the attention of securities analysts as the information carrier. Based on the analysis of the 562,543 monthly sample data of non-financial listed companies in the Shanghai and Shenzhen A-share markets from 1997 to 2020, this paper finds that: First, China's A-share market has significant idiosyncratic volatility effect, and it controls companies, markets, industries, and annual variables will remain significant in the future; Second, analyst attention has a significant impact on idiosyncratic volatility effects. The higher the analyst's attention, the smaller *IV-Effect*. That is, as analysts' attention increases, idiosyncratic risks and stock expectations. The reverse relationship of returns will weaken.

Compared with the existing research, the possible contributions of this article are as follows. First, this article once again verifies the existence of the idiosyncratic volatility mystery in the A-share market, and it is still significant after adding company, market, annual and industry variables. Research on the influencing factors of idiosyncratic volatility. Second, unlike most documents, this article studies the idiosyncratic volatility mystery from the perspective of analyst attention, using Fama-Macbeth regression to show the relationship between analyst attention and the effect of idiosyncratic volatility. This relationship enriches the research on the causes of volatility effects of stock idiosyncratic. Third, this article uses analyst attention to study stock market anomalies and deepens the research on the impact of analyst behavior on the market.

2. Research Hypothesis

It is proposed that China's A-share market is mainly dominated by retail investors. Many investors do not have professional market investment knowledge. Their ability to obtain market information and analysis of information is poor, and they cannot assess the financial information of listed companies. Other information affecting the stock price is screened, so they are more likely to look for indicators that contain the degree of information about the target company, such as analyst. Analysts have professional investment knowledge, wide channels of information acquisition, low cost of information acquisition, and the ability to identify risks, and they are often a team of analysts. Because their analysis of listed companies will be more professional and comprehensive, and investment decisions for investors make an impact. In the stock market, investors interpret analyst attention information and believe that companies with higher analyst attention have greater potential for future development. Reference [21] analyzed and studied the residual attention model and found that the stocks of companies with higher analyst attention will have higher returns than companies with low analyst attention. Therefore, this article believes that analyst attention will have a significant impact on the expected return of stocks.

Although analysts and their teams can make comprehensive analysis of the company, improve its

information transparency, and reduce degree of information asymmetry in the market, there are disadvantages to analyst forecasts, which are mainly reflected in two aspects. First, due to the existence of conflicts of interest, analysts' fore-casts tend to generate more positive information. Such a situation that is contrary to the actual situation will harm the development of the market. Reference [22] research shows that our country's securities companies use analyst reports to support the market. Reference [2] found that inconsistent results reported by analysts may cause stock prices to collapse, and conflict of interest will enhance the positive relationship between the two. Reference [23] research shows that securities analysts tend to issue earnings forecasts and stock ratings with optimistic biases. On the other hand, for personal benefit, such as money, reputation, etc., analysts publish analysis reports that are contrary to objective facts. Reference [24] found analysts will deliberately release error information and other behaviors to cater to investors' prior beliefs to improve their reputation. The above research shows that the inconsistency of analysts' forecasts will lead to violent fluctuations in stock prices and increased risks, thereby affecting investor sentiment and investment decisions, and affecting the stock's characteristic volatility.

The above content analyzes the effects of analyst attention on the market from both pros and cons. However, market investors lack the conditions for obtaining information, so they are more inclined to trust analysts' forecast reports. Reference [25] found that large investors pay more attention to the past performance of analysts than retail investors, and retail investors place higher trust in analyst ratings and earnings forecasts.

Based on the above analysis, this article puts forward the hypothesis: analyst attention will reduce the effect of trait fluctuations.

3. Empirical Design

3.1. Data Source and Processing

This paper studies A-share listed companies in Shanghai and Shenzhen stock exchanges from 1997 to 2020. In order to ensure the validity of the regression every month, this article excludes stocks that trade less than 15 days a month, and also excludes stocks in the financial industry. Through standardization, the sample size of effective listed companies is 562,543. The stock data of listed companies, such as monthly stock return, turnover rate, institutional shareholding, retail size, Fama-French three-factor data, etc., are all sourced from the China Stock Market & Accounting Research Database (CSMAR).

3.2. Measurement of Variable

3.2.1. Dependent Variable

The research topic of this article is the influence of analyst attention on idiosyncratic volatility effects. Therefore, the dependent variable of this article is the expected return of stock (*Return*)on a monthly basis. It is the monthly return on stock considering the reinvestment of cash dividends.

3.2.2. Independent Variables

The independent variables in this article are analyst attention (*Analy*) and stock idiosyncratic volatility (*Iv*). *Analy* is the natural logarithm of the number of analysts' earnings forecast reports plus one. For the measurement of idiosyncratic volatility, this article uses the Fama-French three-factor model (1993) to calculate *Iv*. The Fama-French three-factor regression model is as follows:

$$R_{i,t} - r_{f,t} = \alpha_i + m_i MKT_t + s_i SMB_t + h_i HML_t + \varepsilon_{i,t} \quad (1)$$

where $R_{i,t}$ is daily stock return, $r_{f,t}$ is risk-free rate, MKT_t is market risk premium factor, SMB_t is market value factor, HML_t is book-to-market ratio factor, α_i is intercept; $\varepsilon_{i,t}$ is the residual.

In the equation (1), MKT_t , SMB_t , and HML_t correspond to the systematic return of stocks, and $\varepsilon_{i,t}$ corresponds to the unsystematic return of stocks, which are systemic risks unexplainable return part, so $\varepsilon_{i,t}$ can be used as a proxy variable for stock idiosyncratic risk. This article uses the adjusted standard deviation of $\varepsilon_{i,t}$ to represent the idiosyncratic volatility of stock i in month θ. The equation is as follows:

$$Iv_{i,\theta} = \sqrt{D_{i,\theta}}\, Std\left(\varepsilon_{i,t}\right) \quad (2)$$

where $Std\left(\varepsilon_{i,t}\right)$ is the standard deviation of the regression residuals of the three-factor model, $\sqrt{D_{i,\theta}}$ is the trading days of stock i in the θ month ($D_{i,\theta} \geq 15$), $Iv_{i,\theta}$ is used the model extracts the idiosyncratic volatility of stock i in month θ.

3.2.3. Control Variables

Draw on the research literature on stock idiosyncratic volatility such as [8,9,20]. This article mainly controls three types of variables that may have an impact on the expected return rate of stocks. The first is company variables (*Firm_control*), including debt-to-asset ratio (*Lev*) and return on total assets (*Roa*). The second is market variables (*Market_control*), including book-to-market value ratio (*Bm*), stock trading volume (*Vol*), turnover rate (*Tur*), size variables (*Size*), momentum (*Mom*), illiquidity index (*Illiqd*), institutional shareholding (*Insti*) and retail investors (*Retail*). The third is dummy variables, including annual (*Year*) and industry (*Industry*). When variate has only quarterly data, this article replaces monthly data with quarterly data. The symbols and specific definitions of the control variables are shown in Table 1.

3.3. Research Methods

This article uses two methods of portfolio analysis and Fama-Macbeth regression to verify whether there is idiosyncratic volatility effect (*IV-Effect*) in the A-share market.

Table 1. Definition and Measurement of Control Variables

Control Variables	Symbolic Representation	Variable Definitions
Debt-to-asset Ratio	*Lev*	$Lev = \frac{\text{total liability}}{\text{total assets}}$
Return on Total Assets	*Roa*	$Roa = \frac{\text{net profit}}{\text{total asset balance}}$
Book-to-market Ratio	*Bm*	$Bm = \frac{\text{total book assets}}{\text{total market value of stocks}}$
Stock Trading Volume	*Vol*	$Vol = \ln(\text{monthly trading shares})$
Turnover Rate	*Tur*	$Tur = \frac{\text{shares traded per month}}{\text{number of outstanding shares}}$
Scale Variable	*Size*	$Size = \text{The total number of shares} \times \text{closing price}$
Momentum	*Mom*	$Mom = \text{holding period earnings of previous month}$
Illiquidity Index	*Illiqd*	$Illiqd = average(\frac{\text{absolute daily rate of return}}{daily\ trading\ shares}) \times 10^6$
Institutional Shareholding	*Insti*	$Insti = \frac{shares\ held\ by\ institutional\ investors}{total\ number\ of\ shares}$
Retail Investors	*Retail*	$Retail = \frac{number\ of\ shareholders}{number\ of\ shareholders} \times 10^4$
Annual Dummy Variable	*Year*	Constructed 24 dummy variables to represent 1997-2020
Industry Dummy Variables	*Industry*	According to the China Securities Regulatory Commission's 2012 industry classification standards for listed companies, and the financial industry has been eliminated

3.3.1. Portfolio Analysis Method

This article uses *Iv* as a grouping variable. First, it is sorted according to the size of the sample *Iv* every month, and then the sample stocks are divided into 5 groups (Panel A) and 10 groups (Panel B). We hold according to 1/0/1 each group of stocks for one month, record and calculate the average weighted rate of return of each group, and obtain the time series average of the average weighted rate of return of each group. By studying the trend of *Return* of stocks in *Iv* high and low group, and the significance of T-tests between high and low groups. At the same time, considering the possible impact of systemic risk on *Return*, this article uses Fama-French three factors to adjust *Return*, eliminates systemic risk factors, and compares the difference in the constant term *Alpha* of the *Iv* high and low group to conducts a T-test observing its significance.

3.3.2. Fama-Macbeth Regression Analysis

This paper uses Fama-Macbeth cross-sectional regression to verify the relationship between *Iv* and the expected return rate of stocks, and to test whether this relationship can still be maintained after the control variables are added. The Fama-Macbeth regression equation is as follows:

$$\begin{aligned} Return_{i,t} &= \alpha_{i,t-1} + \beta_{t-1} Iv_{i,t-1} \\ &+ \sum_{j=1}^{2} \gamma_{j,t-1} Firm\_control_{i,t-1} \\ &+ \sum_{j=1}^{8} \delta_{j,t-1} Mark\_control_{i,t-1} \\ &+ \sum Year + \sum Industry + \varepsilon_{i,t} \end{aligned} \quad (3)$$

where $Return_{i,t}$ is the stock return rate of stock *i* in month *t*, $Iv_{i,t-1}$ is *Iv* of stock *i* in month *t-1*, $Firm\_control_{i,t-1}$ and $Market\_control_{i,t-1}$ is company and market control variables respectively, $\sum Year$ and $\sum Industry$ is annual and industry control variables respectively, $\alpha_{i,t-1}$ is intercept, and $\varepsilon_{i,t}$ is the residual.

3.4. Model Design

This paper use Fama-Macbeth regression method to prove the influence of *Analy* on the relationship between *Iv* and *Return*.

$$\begin{aligned} Return_{i,t} &= \alpha_{i,t-1} + \beta_{1,t-1} Iv_{i,t-1} + \beta_{2,t-1} Analy_{i,t-1} \\ &+ \beta_{3,t-1} Iv\_analy_{i,t-1} + \sum_{j=1}^{2} \gamma_{j,t-1} Firm\_control_{i,t-1} \\ &+ \sum_{j=1}^{8} \delta_{j,t-1} Market\_control_{i,t-1} \\ &+ \sum Year + \sum Industry + \varepsilon_{i,t} \end{aligned} \quad (4)$$

where $Analy_{i,t-1}$ is the analyst attention, $Iv\_analy_{i,t-1}$ is interaction terms of securities analyst attention and idiosyncratic volatility. Other variables are the same as those defined in equation (3). According to the hypothesis, the coefficient $\beta_{3,t-1}$ of $Iv\_analy_{i,t-1}$ should be significantly positive. In order to alleviate the endogenous problem of mutual causality between the dependent variable and the independent variable, this paper lags all independent variables and control variables by one period, and the stock return in period t is regarded as the expected return.

4. Empirical Analysis

4.1. Descriptive Statistics

Table 2 performs descriptive statistics on variables, and obtains the mean, standard deviation, minimum, 25% quantile, median, and 75% quantile of each variable and the maximum. First, the mean of *Return* is 0.012, the standard deviation is 0.136, and the minimum and maximum are -0.478 and 1.071 respectively. It shows that

the stock return rate fluctuates greatly. Second, the mean of *Iv* is 0.084, the median, P75, and maximum value are 0.075, 0.107, and 0.308 respectively. It shows that most of the data is below P75. Third, the mean of *Analy* is 0.395, and the standard deviation is 0.686, It shows that analysts' attention is volatile. Finally, the mean of the interaction term between analyst attention and idiosyncratic volatility (*Iv_analy*) is 0.034, the standard deviation is 0.068, and the P75 and maximum values are 0.048 and 2.703 respectively. It shows that most of the data of *Iv_analy* is concentrated below P75 and volatility is small.

Table 3 summarizes the Pearson coefficients among the main variables involved in this article. It can be found from the table that there is a negative correlation between *Return* and *Iv*, which verifies the phenomenon of idiosyncratic volatility. *Analy* has a positive relationship with *Return* and *Iv*, indicating that the increase in analyst attention can increase the stock yield and increase the idiosyncratic volatility. Further analysis, due to the negative correlation between *Return* and *Iv*, the effect of analyze on the stock expected return is greater than the effect of analyze on the idiosyncratic volatility. The correlation coefficients between *Lev* and *Roa* with *Return* are both positive, indicating that the increase in leverage and return on total assets can increase the company's future returns. At the same time, the correlation coefficient between *Lev* and *Roa* with *Iv* is negative, which violates the theory of matching risk and return. The correlation coefficient of market capitalization *Size* and *Return* is significantly negatively correlated, and also verified that there is a "small-market effect" in the Chinese A-share market. *Mom* and *Return* are significantly negatively correlated. It verifies the existence of a "reversal effect" in the stock market.

4.2. Verification of IV-Effect

4.2.1. Portfolio Analysis

Table 4 is the portfolio analysis. Panel A divides *Iv* into five groups from high to low. We can get the average time series of the average weighted return of each portfolio and the constant term Alpha obtained by adjusting the expected return rate of the stock by the Fama-French three factors. It can be seen from Panel A that with the increase in *Iv*, the expected return of stocks shows a linear downward trend, from 1.6% to 0.9%, and the difference in *Return* of high and low *Iv* is -0.7% with -3.03 of corresponding significance. This is obviously in contradiction with the traditional theory of matching risks and returns. At the same time, the intercept term after adjusting the systemic risk with the FF-3 factor model also decreases with the increase in *Iv*, from 0.5% to -0.3%. The difference in the intercept term between the high and low *Iv* groups is -0.8%, and the significance is -3.59. There is a significant negative relationship between the idiosyncratic volatility of the portfolio and the expected return rate of stocks.

Table 2. Descriptive Statistics of Main Variables

Variable	Sample	Mean	Std	Min	P25	Median	P75	Max
Return	457,842	0.012	0.136	-0.478	-0.069	0.000	0.081	1.071
Iv	457,842	0.084	0.042	0.014	0.052	0.075	0.107	0.308
Analy	457,842	0.395	0.686	0.000	0.000	0.000	0.693	4.111
Iv_analy	457,842	0.034	0.068	0.000	0.000	0.000	0.048	2.703
Lev	457,842	0.436	0.225	0.022	0.261	0.429	0.593	5.524
Roa	457,842	0.859	2.847	-66.730	0.180	0.820	1.760	13.010
Bm	457,842	0.533	0.261	0.038	0.324	0.505	0.718	1.307
Vol	457,842	18.385	1.230	13.343	17.560	18.399	19.225	22.574
Tur	457,842	0.559	0.596	0.011	0.182	0.357	0.711	5.570
Size	457,842	14.936	1.222	11.145	14.122	14.909	15.687	18.772
Mom	457,842	0.011	0.143	-0.508	-0.072	-0.002	0.079	2.859
Illiqd	457,842	0.948	1.804	0.009	0.190	0.429	1.006	45.584
Insti	457,842	0.353	0.257	0.000	0.100	0.340	0.570	0.920
Retail	457,842	0.825	0.507	0.089	0.450	0.718	1.089	4.212

Table 3. Correlation Analysis of Main Variables

Variable	*Return*	*Iv*	*Analy*	*Iv_analy*	*Lev*	*Roa*	*Bm*	*Vol*	*Tur*	*Size*	*Mom*	*Illiqd*	*Insti*	*Retail*
Return	1.000													
Iv	-0.038***	1.000												
Analy	0.014***	0.031***	1.000											
Iv_analy	0.021***	0.230***	0.888***	1.000										
Lev	0.015***	-0.006***	-0.032***	-0.042***	1.000									
Roa	0.023***	-0.011***	0.169***	0.154***	-0.253***	1.000								
Bm	-0.059***	-0.281***	-0.114***	-0.166***	0.373***	-0.153***	1.000							
Vol	-0.024***	0.303***	0.148***	0.163***	0.170***	-0.058***	0.123***	1.000						
Tur	-0.039***	0.595***	-0.074***	0.038***	-0.134***	0.012***	-0.311***	0.276***	1.000					
Size	-0.045***	-0.048***	0.399***	0.327***	0.067***	0.124***	0.008***	0.629***	-0.219***	1.000				
Mom	-0.008***	0.236***	0.062***	0.112***	0.009***	0.038***	-0.118***	0.174***	0.232***	0.071***	1.000			
Illiqd	-0.011***	-0.005***	-0.091***	-0.065***	-0.041***	0.006***	-0.072***	-0.588***	-0.087***	-0.433***	-0.085***	1.000		
Insti	0.008***	-0.054***	0.164***	0.118***	0.108***	0.066***	0.108***	0.200***	-0.153***	0.436***	0.012***	-0.199***	1.000	
Retail	-0.028***	0.090***	-0.253***	-0.202***	0.005***	-0.085***	-0.045***	-0.173***	0.274***	-0.425***	-0.025***	0.171***	-0.356***	1.000

Note: *** indicate the significance level of 1%.

Table 4. Portfolio Analysis Verifies the *IV-Effect*

Panel A: *Iv* is divided into 5 groups			
Rank	***Iv***	***Return***	***FF-3 alpha***
Iv_High	0.145	0.009	-0.003**
4	0.095	0.012	0.000
3	0.076	0.015	0.003**
2	0.061	0.016	0.004***
Iv_Low	0.043	0.016	0.005***
D (H – L)		-0.007*** (-3.03)	-0.008*** (-3.59)
Panel B: *Iv* is divided into 10 groups			
Rank	***Iv***	***Return***	***FF-3 alpha***
Iv_High	0.173	0.008	-0.004**
9	0.112	0.010	-0.002
8	0.101	0.012	-0.001
7	0.089	0.014	0.002
6	0.080	0.014	0.002*
5	0.072	0.015	0.003***
4	0.064	0.016	0.004***
3	0.057	0.016	0.004***
2	0.049	0.015	0.004***
Iv_Low	0.037	0.016	0.005***
D (H – L)		-0.008*** (-2.91)	-0.009*** (-3.40)

Note: ***, **, * indicate the significance level of 1%, 5%, and 10% respectively; The number in brackets is the t value.

Panel B divides *Iv* into 10 groups from high to low. It can be seen from Panel B that with the increase in *Iv*, the expected return on stocks has shown a significant downward trend, from 1.6% to 0.8%. The difference between the expected return of high and low *Iv* is -0.8%, and the corresponding significance is -2.91. After adjusting for the systemic risk with the FF-3 factor model, the intercept term also decreases with the increase in *Iv*, from 0.5% to -0.4%. The difference in the intercept term between the high and low *Iv* groups is -0.9%, and the significance is -3.40. It can be proved there is a significant negative relationship between the idiosyncratic volatility of portfolio and the stock's expected return rate. There is *IV-Effect* in the A-share market.

4.2.2. Fama-Macbeth Regression Analysis

As shown in Table 5, in order to further verify the characteristic volatility effect, the paper uses the Fama-Macbeth regression method to verify relationship between *Iv* and cross-sectional expected return. In this paper, various control variables are added to equation (3) one by one, and four models are obtained. All of which use *Return* as the dependent variable. In Model 1, the only independent variable is *Iv*. In Model 2, the company control variables *Lev* and *Roa* are added. Model 3 adds market control variables on the basis of Model 2. Model 4 adds all control variables, including the annual dummy variable and the industry dummy variable.

In Model 1, *Iv* has a significant negative regression coefficient of -0.046 at the 5% statistical level, indicating that there is *IV-Effect* in the Chinese stock market. In Model 2, *Iv* has a significantly negative regression coefficient of -0.044 at the 10% statistical level. *Lev* (β=0.004, t=1.14) is not significant, *Roa* (β=0.002, t=3.15) is 1% with a positive level of significance, and the coefficient of Iv does not change much, indicating that *Lev* cannot explain the phenomenon of *Iv*. *Roa*, which represents the level of profitability, can explain *IV-Effect*. The result is consistent with the research results of [11]. In Model 3, by adding market variables, *Iv* has a non-significantly negative regression coefficient of -0.055, indicating that market-control can explain the phenomenon of reducing *Iv*, which provides a direction for explaining the reason for the effect of *Iv*. *Bm* (β=-0.033, t=-5.64), *Tur* (β = -0.027, t=-6.17), *Size* (β=-0.012, t=-5.33), *Retail* (β=-0.005, t=-3.43) are significantly negative at the 1% level, indicating that after controlling those variables, the idiosyncratic volatility effect does not exist significantly. This is inconsistent with the results of [4] on the US stock market. Ang found that there is a significant negative correlation between stock idiosyncratic volatility and expected return, and it still finds significant results on the basis of controlling variables such as book-to-market value ratio, trading volume, turnover rate, and company size. It shows that the reasons for the idiosyncratic volatility effect in the Chinese stock market and the U.S. stock market are different. *Vol* (β=0.007, t=3.71), *Mom* (β=0.030, t=3.80), *Insti* (β=0.013, t=3.46) are all significantly positive at the 1% level, indicating that trading volume, momentum and institutional share-holdings ratio can reduce the effect. In Model 3, we control *Year* and *Industry* to get Model 4. The absolute value of *Iv* coefficient becomes larger, but not significantly negative, indicating that the *Year* and *Industry* cannot explain the effect.

Table 5. Fama-Macbeth Regression Results

Variable	Dependent Variable: *Return*			
	Model 1	**Model 2**	**Model 3**	**Model 4**
Intercept	0.018*** (3.20)	0.014** (2.05)	0.092*** (3.73)	0.084** (2.50)
Iv	-0.046** (-2.29)	-0.044* (-1.75)	-0.055 (-1.60)	-0.060 (-1.38)
Lev		0.004 (1.14)	0.006** (2.21)	0.007** (2.30)
Roa		0.002*** (3.15)	0.003*** (6.49)	0.003*** (4.18)
Bm			-0.033*** (-5.64)	-0.033*** (-6.26)
Vol			0.007*** (3.71)	0.006*** (2.64)
Tur			-0.027*** (-6.17)	-0.018* (-1.71)
Size			-0.012*** (-5.33)	-0.010*** (-3.96)
Mom			0.030*** (3.80)	0.021** (2.13)
Illiqd			0.001 (1.57)	0.001 (1.15)
Insti			0.013*** (3.46)	0.014** (2.14)
Retail			-0.005*** (-3.43)	-0.004** (-2.05)
Year				yes
Industry				yes
Adjust R^2	0.017	0.044	0.136	0.165
Sample	562,543	502,667	457,842	457,842

Note: ***, **, * indicate the significance level of 1%, 5%, and 10% respectively; The number in brackets is the t value.

4.3. The Moderating Effect of Analy

This article studies whether the attention of securities analysts can affect *IV-Effect*. By adding the interaction terms of *Iv* and *Analy*, the Fama-Macbeth regression method is used to test the relationship between cross-sectional stock expected returns and interaction terms to prove that Analy is the cause of *IV-Effect*. The control variables are gradually added through equation (4), and Table 6 is obtained. Model 1 adds *Iv*, *Analy*, *Iv_analy*. Model 2 adds *Firm_control* variables on the basis of Model 1. Model 3 further adds *Market_control* variables. Model 4 adds *Year* and *Industry*.

Table 6. The Influence of the Attention of Analysts on the Effect of Idiosyncratic Volatility

Variable	Dependent Variable: *Return*			
	Model 1	Model 2	Model 3	Model 4
Intercept	0.020***	0.017**	0.093***	-0.066
	(3.59)	(2.57)	(3.64)	(-0.57)
Iv	-0.087***	-0.092***	-0.110***	-0.250*
	(-4.30)	(-3.67)	(-2.94)	(-1.78)
Analy	-0.004	-0.005*	-0.006	-0.022
	(-1.38)	(-1.85)	(-1.38)	(-1.26)
Iv_analy	0.135***	0.118***	0.106***	0.069*
	(4.63)	(4.35)	(3.93)	(1.92)
Lev		0.003	0.004	0.002
		(0.98)	(1.09)	(0.34)
Roa		0.002***	0.003***	0.003
		(3.20)	(4.58)	(1.27)
Bm			-0.031***	-0.040***
			(-4.64)	(-2.81)
Vol			0.009***	0.016***
			(4.56)	(2.61)
Tur			-0.033***	-0.057**
			(-5.50)	(-2.07)
Size			-0.014***	-0.010***
			(-5.69)	(-3.60)
Mom			0.028***	0.002
			(3.14)	(0.10)
Illiqd			0.001*	0.002**
			(1.94)	(1.98)
Insti			0.013*	0.014
			(1.81)	(0.62)
Retail			-0.005***	0.001
			(-2.95)	(0.20)
Year				yes
Industry				yes
Adjust R^2	0.028	0.056	0.143	0.165
Sample	562,543	502,667	457,842	457,842

Note: ***, **, * indicate the significance level of 1%, 5%, and 10% respectively; The number in brackets is the t value.

In Model 1, the interaction term has a significant positive regression coefficient of 0.135 at the 10% statistical level. The interaction term of Model 2 has a significant positive regression coefficient of 0.118 at the 1% statistical level. The interaction term of Model 3 has a significant positive regression coefficient of 0.106 at the 10% statistical level. It shows that *Analy* will reduce *IV-Effect*. Due to the analyst's ability to obtain market information and the ability to analyze information, they can screen the financial information disclosed by listed company and other information that affects stock prices. Therefore, this is consistent with the research results of [14]. He used the Difference-in-Difference to find that quality of information disclosed in the financial reports of listed companies will reduce effect of heterogeneous beliefs on idiosyncratic volatility. The higher of the information quality of listed companies' financial statements will weaken the idiosyncratic volatility effect. Model 4 controls the annual and industry variables on the basis of Model 3. The coefficient of *Iv_analy* decreased from 0.106 to 0.069, and significance level changed from 1% to 10%. Under the circumstances, the effect differs in different years and in different industries, which also illustrates the different roles of analysts in different industries. Because the quality of information disclosed in different industries is different, and the role of analysts is different.

4.4. Robustness

In this paper, FF-5 factor is used instead of FF-3 factor to adjust the systemic risk for the purpose of robustness test. The results are shown in Table 7.

Drawing on previous literature research, there are three measurement methods for analyst attention [19]. This article uses the number of analysts tracked and number of analysts reported tracked as indicators of analyst attention to conduct a robustness test. The results are shown in Table 8 and Table 9.

This article found the above robustness test results better support the hypothesis of this article. Due to space limitations, the robustness test results of the Fama-Macbeth regression of equation (4) are listed.

Table 7. Portfolio Analysis

Panel A: *Iv* is divided into 5 groups			
Rank	***Iv***	***return***	***FF-5 alpha***
Iv_High	0.145	0.009	-0.004**
4	0.095	0.012	0.000
3	0.076	0.015	0.002**
2	0.061	0.016	0.004***
Iv_Low	0.043	0.016	0.005***
D (H – L)		-0.007*** (-3.03)	-0.009*** (-3.94)
Panel B: *Iv* is divided into 10 groups			
Rank	***Iv***	***return***	***FF-5 alpha***
Iv_High	0.173	0.008	-0.005**
9	0.112	0.010	-0.002*
8	0.101	0.012	-0.001
7	0.089	0.014	0.002
6	0.080	0.014	0.002
5	0.072	0.015	0.003**
4	0.064	0.016	0.004***
3	0.057	0.016	0.004***
2	0.049	0.015	0.004***
Iv_Low	0.037	0.016	0.006***
D (H – L)		-0.008*** (-2.91)	-0.011*** (-3.81)

Note: ***, **, * indicate the significance level of 1%, 5%, and 10% respectively; The number in brackets is the t value.

Table 8. The Number of Analysts Tracked

Variable	Dependent Variable: *Return*			
	Model 1	**Model 2**	**Model 3**	**Model 4**
Intercept	0.022***	0.018**	0.121***	0.117***
	(3.05)	(2.43)	(4.74)	(3.70)
Iv	-0.115***	-0.106***	-0.048***	-0.014**
	(-4.78)	(-4.61)	(-3.10)	(-2.10)
Analy	-0.009	-0.011**	-0.009	-0.007
	(-1.56)	(-1.98)	(-1.34)	(-1.22)
Iv_analy	0.334***	0.285***	0.168**	0.104*
	(5.63)	(5.10)	(2.40)	(1.92)
Lev		0.004	0.005*	-0.000
		(1.23)	(1.92)	(-0.02)
Roa		0.002***	0.003***	0.002
		(2.98)	(5.55)	(1.62)
Bm			-0.032***	-0.031***
			(-5.29)	(-3.95)
Vol			0.009***	0.010***
			(5.10)	(4.25)
Tur			-0.037***	-0.041***
			(-6.39)	(-3.98)
Size			-0.017***	-0.017***
			(-8.06)	(-7.30)
Mom			0.028***	0.007
			(2.87)	(0.38)
Illiqd			0.001	0.001
			(1.43)	(1.26)
Insti			0.010*	0.001
			(1.67)	(0.12)
Retail			-0.003*	-0.003
			(-1.93)	(-1.25)
Year				yes
Industry				yes
Adjust R^2	0.048	0.066	0.156	0.167
Sample	514,497	501,912	457,842	457,842

Note: ***, **, * indicate the significance level of 1%, 5%, and 10% respectively; The number in brackets is the t value.

Table 9. The Number of Analysts Reported Tracked

Variable	Dependent Variable: *Return*			
	Model 1	**Model 2**	**Model 3**	**Model 4**
Intercept	0.021***	0.017**	0.129***	0.136***
	(2.93)	(2.34)	(4.65)	(3.76)
Iv	-0.109***	-0.101***	-0.039***	-0.012**
	(-4.51)	(-4.35)	(-2.98)	(-2.09)
Analy	-0.004	-0.006	-0.005	-0.005
	(-0.94)	(-1.39)	(-1.12)	(-0.63)
Iv_analy	0.247***	0.212***	0.156**	0.112*
	(5.02)	(4.70)	(2.22)	(1.91)
Lev		0.004	0.004	-0.001
		(1.21)	(1.24)	(-0.94)
Roa		0.002***	0.003***	-0.001
		(2.87)	(4.87)	(0.32)
Bm			-0.032***	-0.035**
			(-4.72)	(-2.53)
Vol			0.009***	0.011***
			(5.10)	(3.89)
Tur			-0.037***	-0.049***
			(-6.66)	(-3.41)
Size			-0.018***	-0.019***
			(-8.16)	(-7.34)
Mom			0.027***	-0.007
			(2.74)	(-0.25)
Illiqd			0.001	0.001
			(1.40)	(1.44)
Insti			0.009*	-0.008
			(1.77)	(-0.59)
Retail			-0.003*	-0.002
			(-1.69)	(-0.53)
Year				yes
Industry				yes
Adjust R^2	0.048	0.066	0.156	0.175
Sample	514,497	501,912	457,842	457,842

Note: ***, **, * indicate the significance level of 1%, 5%, and 10% respectively; The number in brackets is the t value.

5. Conclusions

In the A-share market dominated by retail investors, many investors do not have financial market expertise. They are always looking for indicators that can provide more information about listed companies. Analyst attention is one of them. Based on 1997-2020 A-share market data, this article studies the *IV-Effect* of the stock market from the perspective of analyst attention. First, this paper uses univariate portfolio analysis and Fama-Macbeth regression method to verify the effect of the A-share market. The results show that there is a significant idiosyncratic volatility effect in the A-share market, and the result is still significant after controlling a series of variables. Secondly, the Fama-Macbeth regression model is set by adding interaction terms to study the influence of analyst attention on the idiosyncratic volatility effect. The study found that the attention of securities analysts will reduce the effect of idiosyncratic volatility. As the attention of analysts increases, the effect of idiosyncratic volatility decreases. The hypothesis of this paper is proved. The research in this paper shows that analyst attention can reduce the effect of idiosyncratic volatility. Investors should fully consider the impact of analyst attention when choosing market indicators as the information carrier of listed companies. At the same time, the conclusion of this article shows that analyst attention has an effect on idiosyncratic volatility and stock return. This provides a feasible direction for further research on idiosyncratic volatility and enriches the theoretical analysis and empirical testing of asset pricing models.

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