

R²: Information or Noise?

Yugang Yin*, Wei Chen, Fei Yu, Dongju Chen

School of Securities and Futures, Southwestern University of Finance and Economics, Sichuan, China

*Corresponding author: yugang_yin@hotmail.com

Abstract Whether lower stock price synchronicity reflects information or noise does not have a conclusive answer yet. From the perspective of analyst following in China, our empirical study reveals that, the stock price synchronicity which star analysts following is lower than that of non-star analysts, but star analysts do not own more private information about the stocks from the view of earnings forecast accuracy. Investors tend to overreact to the star analysts recommendations, and lower stock price synchronicity is due to noise but not private information revealed in these stocks. So the lower price synchronicity means noise.

Keywords: analyst following, stock price synchronicity, forecasts accuracy, cognition bias

Cite This Article: Yugang Yin, Wei Chen, Fei Yu, and Dongju Chen, "R²: Information or Noise?" *Journal of Finance and Economics*, vol. 4, no. 1 (2016): 21-29. doi: 10.12691/jfe-4-1-3.

1. Introduction

Most of the literatures researching the stock price synchronicity are based on the hypothesis that price synchronicity is a measure of either information or noise. Roll [1], a classical scholar of the school of information efficiency, who argues that lower stock price synchronicity is just due to the price containing more firm specific information. While the scholars of the school of irrational behavior insist that the cause of lower stock price synchronicity is that the price contains more noise rather than information. Chan and Hameed [2] and Feng et al. [3] hold the idea that lower price synchronicity meaning more firm specific information in stock price based on the assumption that stock price synchronicity can reflect information. The study of Xu et al. [4] show that in the stock market of China and U.S., R² is not the representation of efficiency, it is caused by the biased information processing of the investors. However, there are few articles to research the idea deeply whether stock price synchronicity reflects information or noise. Only remaining literatures by Lin et al. [5] and Zhang and Li [6] in China has researched this problem, they find that there is an inverse u curve between stock price synchronicity and firm specific information (or noise), while they do not discriminate the reason of lower stock price synchronicity - whether melting more firm specific information or more noise in stock price.

Under the background that there is not any reached agreement about what causes lower stock price synchronicity, and based on the research which studied by scholars such as Chan and Hameed [2], this paper endeavors to study the formation mechanism of stock price synchronicity based on the forecast of the analysts and the market reaction of investors. This paper holds the idea that if the information efficiency can be reflected by lower stock price synchronicity, then the investors can discern the firm specific information offered by the

analysts rationally and melt this information into stock price by trading behavior. The stocks sample we choose in this paper only contains those followed by the analysts, we divide the analysts into two parts in accordance with *the new fortune*, one part is star analysts, the other is non-star analysts, and to test those two hypothesis simultaneously. We find that there is a lower price synchronicity of the stocks which followed by the star analysts, while what causes this phenomenon is that the investors overreacting to the stocks followed by star analysts rather than the more firm specific information provided by them. That is, lower stock price synchronicity implies that stock price is blended with more noise. The contribution of this paper is that it is the first time when we figure out the view that lower stock price synchronicity does not mean that more firm specific information fitting into stock price, it is only caused by the biased selection of investors in the market, this paper also illustrates that there is a behavior of chasing star in Chinese market.

This paper is organized as below, in the second part, we review some relevant literatures and propose hypothesis of this paper, the third part is our research design, the fourth part is the empirical analysis of this paper, and the last part is our conclusion.

2. Literatures and Hypothesis

2.1. Literatures Reviewed

2.1.1. Information Efficiency and Stock Price Synchronicity

Scholars of the school of information efficiency hold the idea that stock price synchronicity is based on the phenomenon that stock price is a reaction of market, industry and the firm specific information. King [7] indicates that there is a homogeneous change between the price of the private stock and the revenue of the market

and industry, while Roll [1] uses the data of stock market from the US to illustrate that most of the volatilities of the stocks' revenue are not owed to the volatility of the revenue in the market and industry, it reflects that stock price containing large amount of firm specific information. Based on the study of Roll [1], it is the first time when Morck et al. [8] proposes the conception of stock price synchronicity, besides, he takes R^2 as the quantitative index of stock price synchronicity, that is, the lower the R^2 , the lower synchronicity of the volatility between stock price and the markets, and vice versa. Jin and Myers [9] confirm the view of Morck et al. [8] from another perspective that the difference in the transparency of companies in differing countries is the primary factor leading to the disparity in the vicissitudes of stock prices in different nations. Therefore, improvement in the regime protecting the individual investors is also of great influence to stock price synchronicity, and the more firm specific information fitted into the stock prices, the more efficient the market will be. Li et al. [10], however, from the point of the market exposure in the emerging market to explain stock price synchronicity, they find that with the improvement of the market exposure, stock price synchronicity in the security market will fall considerably. The interpretation they give to this phenomenon is that the market exposure can promote the arbitrage behavior of the informed trader, and lead the firm specific information melted into the stock prices. Wang et al. [11] use the data of stock market in China to study the relationship between stock price synchronicity and the information transparency, and the influence of the relationship which is caused by the shareholding ratio of the institutional investors, the result reflects that the lower firm transparency, the lower stock price synchronicity. From that point of view, we can find that stock price synchronicity in Chinese market can reflect the information efficiency of the stock market positively, and the institutional investors can improve this efficiency splendidly.

2.1.2. Irrational Behaviors and Stock Price Synchronicity

Every coin has two sides and stock price synchronicity is not an exception. While some scholars use information to explain this phenomenon, the others view it from the point of noise. Shiller is the representative of behavioral finance, he argues that the existence of the excessive volatility of the stock prices which can not be explained by the traditional finance is that the stock prices contain a lot of noises which are ignored. The conclusion is also confirmed by West [12], who finds that most of the private stocks' volatilities are not related to the fundamentals of the corporate, but with the noises of the market bubbles, the mood of the investors and so on. With the phenomenon that the lower synchronicity of the stock portfolio, the more notable inertia and contrarian strategy which are the representative of irrational "anomaly". Barberies [13], also hold the idea that stock price synchronicity is a reaction of noise rather than information.

Zhang and Li [6] in China find that there is an inverse u curve between stock price synchronicity and the firm specific information (or noise), while they do not discriminate the reason of lower stock price synchronicity—whether the capital melted more stock information or more noise about the firm.

2.1.3. Analysts Following and Relationship Between Stock Price Synchronicity

Based on the foundation of Morck et al. [8], it is the first time that Chan and Hameed [2] combine stock price synchronicity and analysts following to find that analysts act as one of the most important information producers in the market, they may provide the firm specific information in lower stock price synchronicity. From their study, we can find that the more concern the analysts follow, the higher price of the stocks will become. We argue that analysts offer more information about the private stocks, and illustrate that analysts always offer information about market and industry. There is a positive relationship between the synchronicity and analysts following in China, and it is consistent with the conclusion of Chan and Hameed [2].

2.2. Hypothesis

Jiang [15] confirms that the security analysts in China can offer some firm specific information and almost all of them come from the insider information. Can star analysts gain more firm specific information because of their reputation and influence in industry? Do investors apply this information to stocks price accurately to lead the stocks which they following lower price synchronicity of the stocks? We propose the first hypothesis.

H1: star analysts following lower stock price synchronicity

Generally, the precision of analysts' earnings forecast can reflect that whether analysts know more firm specific information. The higher precision of the analysts' forecast, the more firm specific information they know and they will deliver it to investors by the form of reports. Therefore, with the method testing and verifying the precision of analysts' earnings forecast to distinguish the firm specific information which analysts report, we propose the second hypothesis.

H2_1: the precision of analysts' earnings forecast of star analysts is superior to the non-star analysts observably.

H2_2: the precision of earnings forecast of star analysts is not significantly superior to the non-star analysts

Investors overreact to news events, with the analysts' reports are news events about the corporate, whether investors overreact to them? If the answer is yes, whether investors can treat different reports with different attitude? The study of Liu and Xiu [16] illustrate that investors believe that analysts' reports contain some valuable information so that they can make some adjustments about the expectation of future income and the optimal quantity of holdings. Li [17] find that investors react drastically to analysts' recommendation revision. Investors in the stocks market blindly believe analysts who have greater prestige than others. Based on this, we propose the third hypothesis.

H3_1: investors overreact to the stocks which are followed by star analysts.

H3_2: investors do not overreact to the stocks which are followed by star analysts.

With the empirical analysis, we find that if H1 is established, H2_1 and H3_2 will established together, it illustrates that stock price synchronicity can represent the information efficiency. While if H1 established, H2_2 and

H3_1 establish together, it illustrates that stock price synchronicity reflects noise. If others, however, we cannot make a conclusion that stock price synchronicity reflects noise or information.

3. Research Design

3.1. Data and Samples

The data of this paper we choose are from CSMAR database from 2005 to 2012. The stocks and market index that we choose consider the weekly and daily revenue about the reinvestment of cash bonus in Shanghai and Shenzhen A-share markets. We exclude the earnings forecast data of analysts in November because the selection of star analysts is in mid-to-end of November. Meanwhile, the earnings forecast data in December are matched with star analysts selected for the year; and the data in January to October are matched with star analysts selected for the last year. The scale of company is the logarithm of stocks liquid market at the beginning of each year, and kick out the financial stocks and stocks which exist in the listed company for the first four weeks, and kick out the samples which has defaults among all variables.

3.2. Measurement of Stock Price Synchronicity

Following Durnev et al. [18], we use the following regression model to measure stock price synchronicity:

$$R_{i,t} = \beta_0 + \beta_1 R_{m,t} + \beta_2 R_{I,t} + \varepsilon_{i,t} \quad (1)$$

where $R_{i,t}$ is the weekly return of stocks which consider about the reinvestment of cash bonus, $R_{m,t}$ is the weekly return of market (in this paper, it reflects the overall return of market weekly which consider the reinvestment of cash bonus in Shanghai and Shenzhen A-share markets, and is calculated in the way of averaging the circulation value), $R_{I,t}$ is the weekly weighting return of market value¹. We do that for the purpose of avoiding the questionable association between stock i and its industry.

$$r_{I,t} = \frac{\sum_{j \in I} \omega_{j,t} r_{j,t}}{\sum_{j \in I} \omega_{j,t}} \quad (2)$$

Following Morck et al. (2000), stock price synchronicity can be defined as

$$SYN = \log \left[R_i^2 / (1 - R_i^2) \right] \quad (3)$$

3.2. Regression Model and Definition of Variables

The analysts following and stock price synchronicity are influenced by factors simultaneously such as scale,

trading volume and so on. To reject the influence caused by the endogenous problems, we choose a two-stage regression method which is similar to Chan and Hammed [2].

$$\begin{aligned} SYN_{i,t} = & \alpha + \beta_1 * ANALYST_{i,t} + \beta_2 * SIZE_{i,t} \\ & + \beta_3 * VOLUME_{i,t} + \beta_4 * LEVEL_{i,t} \\ & + \beta_5 * BM_{i,t} + \beta_6 * AUDIT_{i,t} \end{aligned} \quad (4)$$

$$\begin{aligned} & + \sum_k \lambda_k * INDUSTRY_{i,k} + \sum_I \varphi_I * YEAR_{i,I} + \varepsilon_{i,t} \\ ANALYST_{i,t} = & \varphi + \gamma_1 * SIZE_{i,t} + \gamma_2 * VOLUME_{i,t} \\ & + \gamma_3 * LEVEL_{i,t} + \gamma_4 * BM_{i,t} + \gamma_5 * AUDIT_{i,t} \\ & + \gamma_6 * VOLATILIT_{i,t} + \gamma_7 * FLOAT_{i,t} \end{aligned} \quad (5)$$

$$\begin{aligned} & + \sum_k \lambda_k * INDUSTRY_{i,k} + \sum_I \varphi_I * YEAR_{i,I} + \mu_{i,t} \\ SYN_{i,t} = & \alpha + \beta_1 * STAR_{i,t} + \beta_2 * SIZE_{i,t} \\ & + \beta_3 * VOLUME_{i,t} + \beta_4 * LEVEL_{i,t} \\ & + \beta_5 * BM_{i,t} + \beta_6 * AUDIT_{i,t} \end{aligned} \quad (6)$$

$$\begin{aligned} & + \sum_k \lambda_k * INDUSTRY_{i,k} + \sum_I \varphi_I * YEAR_{i,I} + \varepsilon_{i,t} \\ STAR_{i,t} = & \varphi + \gamma_1 * SIZE_{i,t} + \gamma_2 * VOLUME_{i,t} \\ & + \gamma_3 * LEVEL_{i,t} + \gamma_4 * BM_{i,t} + \gamma_5 * AUDIT_{i,t} \\ & + \gamma_6 * VOLATILIT_{i,t} + \gamma_7 * FLOAT_{i,t} \end{aligned} \quad (7)$$

$$\begin{aligned} & + \sum_k \lambda_k * INDUSTRY_{i,k} + \sum_I \varphi_I * YEAR_{i,I} + \mu_{i,t} \\ SYN_{i,t} = & \alpha + \beta_1 * NOSTAR_{i,t} + \beta_2 * SIZE_{i,t} \\ & + \beta_3 * VOLUME_{i,t} + \beta_4 * LEVEL_{i,t} \\ & + \beta_5 * BM_{i,t} + \beta_6 * AUDIT_{i,t} \end{aligned} \quad (8)$$

$$\begin{aligned} & + \sum_k \lambda_k * INDUSTRY_{i,k} + \sum_I \varphi_I * YEAR_{i,I} + \varepsilon_{i,t} \\ NOSTAR_{i,t} = & \varphi + \gamma_1 * SIZE_{i,t} + \gamma_2 * VOLUME_{i,t} \\ & + \gamma_3 * LEVEL_{i,t} + \gamma_4 * BM_{i,t} + \gamma_5 * AUDIT_{i,t} \\ & + \gamma_6 * VOLATILIT_{i,t} + \gamma_7 * FLOAT_{i,t} \end{aligned} \quad (9)$$

$$\begin{aligned} & + \sum_k \lambda_k * INDUSTRY_{i,k} + \sum_I \varphi_I * YEAR_{i,I} + \mu_{i,t} \\ SYN_{i,t} = & \alpha + \beta_1 * DUMMY_{i,t} + \beta_2 * SIZE_{i,t} \\ & + \beta_3 * VOLUME_{i,t} + \beta_4 * LEVEL_{i,t} \\ & + \beta_5 * BM_{i,t} + \beta_6 * AUDIT_{i,t} \end{aligned} \quad (10)$$

$$\begin{aligned} & + \sum_k \lambda_k * INDUSTRY_{i,k} + \sum_I \varphi_I * YEAR_{i,I} + \varepsilon_{i,t} \end{aligned}$$

ANALYST is a natural logarithm of the sum of analysts plus one. Security analysts are one of the information transfer groups in market, the more analysts following that stock may offer more information. The previous scholars such as Chan and Hameed [2] finds that analysts following improves stock price synchronicity. While some

¹ Most previous scholars study the problem of stock price synchronicity are from Morck et al. [8]. Chan and Hameed [2] explain that it is difficult to distinguish revenue from industry and market for the reason that there are little industry types in the merging market counties. While for China, there are large amount of industries, and we can find that R^2 will improve observably if we add the factor of industry. For the lagged variable in the revenue of market and industry, we find that it almost has no influence on R^2 after our empirical research.

empirical analysis find that analysts following lowers stock price synchronicity. There is no uniform conclusion about the relationship between analysts following and stock price synchronicity. STAR and NOSTAR are the amount of star analysts and non-star analysts respectively, and the calculation is similar to ANALYST. DUMMY is a dummy variable of star analysts, it equals to 1 if a stock is followed by star analysts that year, otherwise, it equals to 0.

SIZE is a natural logarithm of the annual market value's scale of the company; VOLUME is a natural logarithm of the annual trading shares of stocks. LEVEL is the financial leverage of company at the end of the year, which is the ratio of total debts and total assets; BM is corporate growth, the higher the BM, the higher the risk, and it leads to the bigger volatility and lower stock price synchronicity, we expect there is a negative relationship between BM and stock price synchronicity; AUDIT is an audit dummy variable of Big Four accounting firms, it equals to 1 if the company is audited by the Big Four in that year, otherwise, it equals to 0; VOLATILITY is a volatility of stocks price which calculated by the daily data past year; FLOAT is the shareholding ratio of the 10 biggest shareholders, we use it in model as a proxy variable to solve the endogenous problem. YEAR and INDUSTRY is the control annual and industrial variable respectively.

Model (4) and model (5) study the relationship between analysts following and stock price synchronicity, and we solve the endogenous problem by substituting the results of model (5) to model (4). Model (6) and model (7) research the relationship between star analysts following and stock price synchronicity; model (8) and model (9) research the relationship between non-star analysts following and stock price synchronicity; and model (10) study that whether the star analysts following lower stock price synchronicity².

4. Empirical Results

4.1. Analyst Following and Stock Price Synchronicity

Table 1 is a descriptive statistics of the sample company's related variables, we can see the mean synchronicity (SYN) is -0.4916, the maximum and minimum value is 2.0302 and -6.8403 respectively, it illustrates that the synchronicity of different stocks vary widely, which is much bigger than U.S. result. The minimum value of STAR which reflects the amount of star analysts is 0, and the maximum value of it is 2.0794, the mean value and standard deviation is 0.2859 and 0.4274 respectively, which illustrates that the amount of star analysts in different stocks also vary widely.

Column (1) and (2) of Table 2 is independent variables and regression results of model (4) respectively, which demonstrate that the more analysts following, the lower stock price synchronicity. While this model cannot consider the endogenous problem that the relationship

² To avoid the endogenous problem, we choose a two-phase regression method which is similar to Chan and Hammed [2], and we defined the dummy variable of star analysts to make the next test.

between analysts following and stock price synchronicity is influenced by the factors like trading amount and scale simultaneously. Column (3) of Table 2 is results of the two-stage regression of model (4) and (5), the first stage, which is the model (5), citing two control variables of the weekly return volatility and the shareholding ratio of the 10 biggest shareholders. The result of the second stage suggests that the more analysts following, the higher stock price synchronicity. This is similar to Chan and Hameed [2]. However, we do not make a conclusion immediately that the more analysts following merely offers more information about industries and markets³.

Column (4) of Table 2 is the two-stage results of sample stocks which followed by star analysts, the result suggests that it is not significant if the coefficient of the amount of star analysts following is below 10%, which illustrates that the star analysts following neither lower nor enhancing stock price synchronicity. Column (5) of Table 2 is the two-stage results of sample stocks which are followed by analysts, the result suggests that it will enhance stock price synchronicity observably if the general analysts following is under the level of 1%. From the comparison between column (4) and column (5) of Table 2 we can see that the star analysts follow lowers stock price synchronicity compared with the general analysts following. To demonstrate this conclusion, we cite the dummy variable of star analysts, and then we illustrate that the stock price synchronicity of the star analysts following is lower than others⁴.

Table 1. Description of variables

	MEAN	MIN	MAX	STD
SYN	-0.4916	-6.8403	2.0302	0.8586
ANALYST	1.6298	0.6931	3.6376	0.6909
STAR	0.2859	0.0000	2.0794	0.4274
SIZE	14.5935	11.7244	21.3329	1.2177
VOLUME	20.8885	17.5822	25.0955	1.0381
LEVEL	0.4771	0.0127	1.7361	0.1913
BM	0.3867	0.0007	1.7360	0.2450
AUDIT	0.0945	0.0000	1.0000	0.2925
VOLAT	0.0689	0.0193	0.2215	0.0213
FLOAT	22.7822	0.2680	97.8145	20.7418
OBSERVATION	6426	6426	6426	6426

4.2. Analysts Following and Forecast Accuracy

In this paper we choose EPS as the index of analysts' earnings forecast, and we comprise it with the actually EPS of the company to calculate the forecast accuracy. Every year, we choose the last time of the analysts yield forecast to compare it with the actual earnings to analysis the forecast accuracy⁵.

³ Their study is based on the hypothesis that the price synchronicity can reflects information, the reason of the phenomenon that the more analysts following leads the more synchronicity may be that the more market share of the stock which followed by the analysts, the more market volatility which caused by it.

⁴ In the regression of dummy variables, the coefficient is negative significantly suggested that the star analysts can lower stock price synchronicity.

⁵ For analysts, with full report is approaching, analysts who has comparative advantage get more insider information and the forecast accuracy will be higher. Therefore, we choose the last time forecast about company which made by analysts annually.

Table 2. Analyst following and stock price synchronicity

	OLS	2LS (Full Sample)		2LS (Star Analysts)		2LS (Non-Star Analysts)		Dummy Variables
		Stage 1	Stage 2	Stage 1	Stage 2	Stage 1	Stage 2	
INTERCEPT	-1.715*** (-7.141)	-0.249 (-1.287)	-1.562*** (-6.416)	0.784*** (5.729)	-2.959*** (-2.632)	-0.676*** (-3.010)	-0.892** (-2.218)	-1.691*** (-7.030)
ANALYST	-0.077*** (-4.979)		0.566*** (3.488)					
STAR					2.032 (1.518)			
NOSTAR							1.538*** (3.936)	
DUMMY								-0.053*** (-2.631)
SIZE	0.012 (0.877)	0.380*** (35.232)	-0.223*** (-3.692)	0.030*** (3.798)	-0.120*** (-2.926)	0.372*** (29.635)	-0.536*** (-3.735)	-0.011 (-0.886)
VOLUME	0.038*** (2.827)	-0.175*** (-15.216)	0.148*** (4.828)	-0.012 (-1.460)	0.098*** (3.587)	-0.160*** (-12.129)	0.274*** (4.241)	0.047*** (3.630)
LEVEL	-0.206*** (-3.948)	-0.120*** (-2.854)	-0.103* (-1.763)	0.032 (1.025)	-0.395*** (-4.191)	-0.167*** (-3.511)	0.174* (1.785)	-0.193*** (-3.704)
BM	1.093*** (22.633)	-0.463*** (-11.243)	1.376*** (15.993)	-0.098*** (-3.105)	1.406*** (9.302)	-0.448*** (-9.828)	1.741*** (9.796)	1.123*** (23.453)
AUDIT	-0.092*** (-2.798)	0.177*** (6.627)	-0.198*** (-4.670)	0.030* (1.671)	-0.150** (-2.368)	0.153*** (4.779)	-0.330*** (-4.605)	-0.103*** (-3.112)
VOLAT		-1.038* (-1.814)		-0.243 (-0.581)		-0.761 (-1.178)		
FLOAT		-0.003*** (-7.359)		0.030* (1.671)		-0.002*** (-3.217)		
OBSERVATION	6426	6426	6426	2166	2166	4260	4260	6426
INDUSTRY	YES	YES	YES	YES	YES	YES	YES	YES
YEAR	YES	YES	YES	YES	YES	YES	YES	YES
Adjusted R ²	0.2639	0.3006	0.3044	0.0850	0.3047	0.2863	0.3091	0.3038

Note: *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels respectively.

Following Lang and Lundholm [19] and Behn et al. [20]:

$$BIAS_{i,j,t} = \frac{|EPS_{i,j,t} - EPS_{j,t}|}{Price_{j,t}} \quad (11)$$

$EPS_{i,j,t}$ is the last time of yield forecast per share of company j in year t , which is followed by analyst i ; $EPS_{j,t}$ is the truly yield per year of company j in year t ; $Price_{j,t}$ is the stock's price of company j at the beginning of the year t ; $BIAS_{i,j,t}$ is the forecast error of company j in year t made by analyst i .

We set up the model as following⁶:

$$\begin{aligned} BLAS_{j,t} = & \alpha + \phi_1 * STARDUMMY_{j,t} + \phi_2 * SIZE_{j,t} \\ & + \phi_3 * STDROE_{j,t} + \phi_4 * ANALYST_{j,t} \\ & + \phi_5 * AUDIT_{j,t} + \phi_6 * CONTROL_{j,t} \\ & + \sum_{y=2005}^{2012} \lambda_y * YEAR_y + \sum_l k_l * I_l + v_{j,t} \end{aligned} \quad (12)$$

AUDIT is the dummy variable of Big Four; CONTROL is the corporate control variable; STDROE is the yield volatility of net assets per share for the quarter of the company past five years.

⁶ While studying the analysts forecast accuracy, Xu et al.(2013) do not reject more firm specific information. Based on the study of Feng and Li (2012), we control the firm specific variables which has influence on the analysts yield forecast error to further analyzing the difference of analysts forecast error.

Table 3 is the sample statistical description of the regression of forecast accuracy and related variables, the average scale of sample companies is 15.7017. The number of analysts following equals to the natural logarithm of the sum of real number and 1, the mean of it is 2.6920. The maximum and minimum number of analysts following from the sample companies we chose is 4.1897 and 0.6920 respectively, the maximum number of analysts following is at least 16 times of the minimum of it, and the standard deviation is 0.7391, it illustrates that there is a big difference between analysts of different companies. The maximum value of analysts forecast error is 2.1121, and it's too big for the cause of data collection. To avoid the influence of extreme value, we reject the extreme abnormal value of revenue forecast. With the mean value of audit dummy in Big Four is 0.1882, we can see that it is lower than 20% listed companies which entrusts Big Four or some accounting firms partnering with Big Four to audit them. The mean value of CONTROL is 0.7235 illustrated that 70% listed companies are state holding.

Table 3. Description of variables

	MEAN	MIN	MAX	STD
ABIAS	0.0153	0.0000	2.1121	0.0310
SIZE	15.7071	11.7244	21.1774	1.3091
STDROE	0.0807	0.0035	30.2648	0.3770
ANALYST	2.6920	0.6931	4.1897	0.7391
ADUIT	0.1882	0.0000	1.0000	0.3909
CONTROL	0.7235	0.0000	1.0000	0.4473

Table 4. Analyst forecast accuracy

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
INTERCEPT	0.0416*** (14.3149)	0.0374*** (33.9641)	0.0375*** (34.1084)	0.0228*** (24.2582)	0.0368*** (13.1525)	0.0379*** (35.0842)	0.0571*** (21.8683)
STARDUMMY	0.0001 (0.0410)	0.0001 (0.0213)	0.0001 (0.0062)	-0.0002 (-0.5861)	0.0001 (-0.0076)	0.0001 (-0.0177)	-0.0001 (-0.2515)
SIZE	-0.0003 (-1.5567)				0.0001 (0.3993)		-0.0020*** (-13.8582)
STDROE	0.0011*** (2.7469)	0.0011*** (2.7852)			0.0011*** (2.6991)		0.0014*** (3.6350)
ANLYST	-0.0054*** (-19.9828)	-0.0056*** (-24.9987)	-0.0057*** (-25.2686)		-0.0054*** (-19.8853)	-0.0054*** (-24.5579)	-0.0001*** (-6.1446)
TENTH	-0.0001*** (-4.9072)	-0.0001*** (-4.8391)	0.0000*** (-4.6320)	-0.0001*** (-7.0331)	0.0001*** (-3.8081)	0.0001*** (-3.6054)	
CONTROL	0.0009** (2.4193)	0.0008** (2.2846)	0.0008** (2.2575)	0.0007* (1.8301)			
AUDIT	0.0026*** (5.9201)	0.0024*** (5.7135)	0.0024*** (5.6796)	-0.0002 (-0.4991)			
INDUSTRY	YES	YES	YES	YES	YES	YES	YES
YEAR	YES	YES	YES	YES	YES	YES	YES
OBSERVATION	43055	43055	43055	43055	43055	43055	43055
Adjusted R ²	0.0540	0.0539	0.0538	0.0398	0.0531	0.0530	0.0444

Note: *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels respectively.

Table 4 is the result of the regression of analysts' earnings forecast error, from the regression results of model (1) to model (7) we can see that the coefficient of dummy variable of star analysts is not significant, which demonstrates that the star analysts do not lower the earnings forecast error, that is, star analysts do not offer more firm specific information from the point of earnings forecast accuracy. The number of analysts following lowers earnings forecast error observably, which is consistent with the study of Chan and Hameed [2], and the marginal explanatory power of the number of analysts following to the earnings forecast error is 0.014. Historical earnings volatility improves the difficulty of earnings forecast observably, so the earnings forecast error is higher.

The proportion of top ten shareholders influences the error of earnings forecast observably, from the result we can see that the higher the proportion of top ten shareholders, the lower the error of analysts' earnings forecast. The reason may be that the higher the proportion of top ten shareholders, the equity balance makes the company operating changes narrower; therefore, analysts can forecast earnings better. The dummy variables of firm specific are positive and significantly, it illustrates that in company of state holding, the bigger the forecast difficulty, the more error of analysts' forecast. The reason may be that most of the managers in state-owned enterprises are nominated by state administration, which renders them the bigger autonomy in investment policy. Therefore, it produces agency cost to lead the forecast more difficulty. In other words, the star analysts do not lower the earnings forecast error, that is, star analysts do not offer more firm specific information.

4.3. Analysts Stock Recommendation and Market Reaction⁷

From above, we can see that star analysts following lowers stock price synchronicity, and this phenomenon is

⁷ The analyst have 5 ratings in total. In this paper, both Buy and Overweigh are considered to be the buy rating. The rest are all thought to be Sell rating. Because there seldom exists sell rating, the ratings of both Neutral and Outweigh contain implicit selling rating.

not for that star analysts offer more firm specific information. Whether the lower synchronicity for the reason that investors have overreaction about the stocks which are followed by star analysts? We can analyze this problem from two angles of quantity and price. From trading volume, it suggests that investors have overreaction if there is an abnormal turnover rate after star analysts make a report about the company which they followed; from the stock's price, it also suggests that investors have overreaction if there are abnormal earnings after star analysts make a report about the company which they followed. Previous scholars find that investors can have a differing reaction to information under different market circumstances. Therefore, this paper further categorize the market into two different market phases, bull market and bear market. And the robustness test is performed based on such a categorization.

Referring to the researches including Pagan and Sossounov [21], He and Zhou [22] and Wang et al. [23], both the bull market and bear market can be made up with several minor sub-sample phases. The sub-sample phases making up the bull market mainly include the periods from 2003.1 to 2003.4, from 2003.12 to 2004.3, from 2005.8 to 2007.10, from 2008.12 to 2009.12, from 2010.8 to 2011.4, from 2012.12 to 2013.5. The sub-sample phases constituting the bear market contain the periods from 2003.5 to 2003.11, from 2004.4 to 2005.7 from 2007.11 to 2008.11, from 2010.1 to 2010.7, from 2011.5 to 2012.12.

Depending on the method used by Della and Pollet [24] in calculating the abnormal trading volume, this paper has calculated the abnormal turnover rate to be the proxy variable representing the market reaction. And the calculation of the abnormal return is derived from calculating the abnormal turnover rate. But the data of daily return has been adjusted through FF three-factor regression. This kind of calculation can eliminate the impact on return by the size and book to market value. In the FF three-factor regression model, the estimated coefficients corresponding to the three risks in the trading day can be acquired by the regression of the daily data over the period from previous 270 days (-270) to previous 30 days (-30).

$$\Delta tr_{i,t}^{(0,1)} = \frac{1}{2} \sum_{u=0}^1 tr_{i,t}^u - \frac{1}{10} \sum_{u=-20}^{-11} tr_{i,t}^u \quad (13)$$

$$\Delta car_{i,t}^{0,1} = \frac{1}{2} \sum_{v=0}^i r_{i,t}^Y - \frac{1}{10} \sum_{v=20}^{-11} r_{i,t}^V \quad (14)$$

Table 5. Abnormal return and Abnormal turnover of analyst following

		N	MEAN	MIN	MAX	STD
Abnormal return	NON-STAR	108575	0.0128	-9.1275	8.6550	0.4684
	STAR	25014	0.0137	-9.1275	8.6550	0.4642
Abnormal turnover	NON-STAR	105415	3.9754	-296.1416	422.9661	21.5996
	STAR	24483	4.5226	-168.9248	431.8211	21.1476

Due to the existence of week effect in China's stock market (Tan [25]; Wang et al. [26]), we need to control the impact by the week effect on the abnormal turnover rate and abnormal return after star analyst issued his research report. Table 6 lists out the distribution of issued research reports in the past week. It shows that Saturday and Sunday witness the least research reports being issued.

Meanwhile, given the fact that the calculations of both abnormal return and abnormal turnover rate is based on the day when research report is issued and the day before the issuing day, we introduce the dummy variable *inaday*. When the day is Friday, Saturday or Sunday, *inaday*=0, otherwise *inaday*=1.

Table 6. Week effect

Day	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday	Total
Obs	31239	31778	28876	27014	24483	3123	5936	152449
Prop.(%)	20.49	20.85	18.94	17.72	16.06	2.05	3.89	100

Table 7 is the regression analysis of the abnormal turnover rate. The regression model is

$$\Delta W_{i,t} = \alpha_i + \beta_i STAR_D_{i,t} + C_{i,t} + V_{i,t} \quad (15)$$

The regression results present in Table 7. Under the total sample, the coefficient of the dummy variable of star analysts is significantly positive, which indicates that there does exist an abnormal trading volume after the star analyst issues his research report. Moreover, such an abnormal trading volume becomes more apparent under the sub-sample. In the total sample and bear market, the

higher the holding percentage of top 10 shareholders is, the lower the abnormal turnover rate will be, which illustrates that increase in the holding percentage of the top 10 shareholders can reduce the abnormal turnover rate to some extent. However, this kind of phenomenon does not exist in bull market. The week effect becomes relatively significant in bear market, insignificant in bull market. The cross term indicates that the week effect has undermined the market's abnormal reaction caused by the star analyst's research report. While this function becomes insignificant in bear market.

Table 7. Abnormal turnover (0,1)

	Full Sample	Bull Market	Bear Market
INTERCEPT	26.4999*** (20.5563)	32.2609*** (14.4467)	21.4494*** (14.3087)
STAR_D	1.7177*** (5.5649)	2.5261*** (4.5510)	1.1697*** (3.3679)
INNDAY*STAR_D	-0.9562** (-2.4413)	-1.3501** (-1.9296)	-0.7223 (-1.6315)
INDDAY	-0.4957*** (-3.0374)	-0.3962 (-1.3594)	-0.5668*** (-3.0709)
SIZE	-1.3267*** (-18.4120)	-1.6445*** (-12.9652)	-1.0693*** (-12.9291)
BM	-0.1826 (-0.4791)	1.2298* (1.8057)	-1.1421** (-2.6245)
FLOAT	-0.0212*** (-5.6759)	-0.0012 (-0.1785)	-0.0341*** (-8.1507)
INDUSTRY	YES	YES	YES
OBSERVATION	90507	38726	51781
Adjusted R ²	0.0114	0.0111	0.0144

Note: *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels respectively.

Table 8 incorporates the regression model of the abnormal return on the day when research report is issued and the day after the issuing day⁸. The regression model is below:

$$\Delta car_{i,t} = \alpha_i + \beta_i STAR_D_{i,t} + C_{i,t} + V_{i,t} \quad (16)$$

⁸ This paper only calculates the abnormal return after the day of issuance and the day after the issuance day. If the calculating period is relatively long, then it is hard to avoid the impact imposed by other factors rather analyst's report.

According to the results of regression model, in total sample, the abnormal return becomes significant after the star analyst issues a buy rating while the abnormal return is insignificant after the sell rating is issued. In the bull market, the abnormal return after the issuance of buy rating while it is insignificant for the sell rating. In the bear market, the abnormal return is insignificant after the issuance of either buy rating or sell rating. The regression model implies that the existence of abnormal return of buy rating issued by the star analyst is mainly accredited to the

bull market. There is no an abnormal return corresponding to the sell rating issued by the star analyst.

Table 8. Abnormal return of analyst following

	Full Sample		Bull Market		Bear Market	
	Buy	Sell	Buy	Sell	Buy	Sell
INTERCEPT	0.0081*** (5.1118)	-0.0045 (-1.1974)	0.0085*** (3.3262)	-0.0061 (-1.0907)	0.0063*** (3.1520)	-0.0023 (-0.4547)
STARDUMMY	0.0007*** (3.2188)	-0.0004 (-0.6663)	0.0017*** (4.5263)	-0.0001 (-0.1065)	0.0000 (-0.0092)	-0.0008 (-0.8455)
SIZE	-0.0004*** (-4.1787)	0.0002 (0.8114)	-0.0003* (-1.8672)	0.0001 (0.4232)	-0.0003*** (-3.0367)	0.0001 (0.4886)
BM	0.0002 (0.3866)	0.0027*** (2.7418)	0.0003 (0.3573)	0.0030** (2.0268)	0.0002 (0.3567)	0.0028** (2.1711)
LEVEL	-0.0001 (-0.1005)	-0.0006 (-0.5148)	-0.0001 (-0.1370)	0.0014 (0.7527)	-0.0008 (-1.2748)	-0.0020 (-1.2149)
FLOAT	0.00002*** (4.9182)	0.0000 (0.6737)	0.00001 (0.8046)	0.00001 (0.7417)	0.00003*** (6.1873)	0.00000 (0.1645)
INDUSTRY	YES	YES	YES	YES	YES	YES
OBSERVATION	78119	13775	32569	6251	45550	7524
Adjusted R ²	0.0016	0.0026	0.0025	0.0052	0.0041	0.0035

Note: *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels respectively.

5. Conclusion

This paper finds that star analysts following can reduce stock price synchronicity. However, different from the previous literatures, this paper does not simply take this low synchronicity as the consequence of star analyst providing more specific information about the company or providing more market noise. From the perspective of combining the accuracy of analyst's forecast and market reaction, this paper has analyzed the cause leading to the low synchronicity.

This paper proves that the reason why star analyst following can lead to a low synchronicity is not that they provide more specific information about the company, but that the cognition bias of the investors. Investors put more confidence in star analysts and often overreact to the stock followed by the star analyst. Stock price synchronicity cannot reflect the information efficiency, but rather demonstrates the irrationality of the investors.

This paper also provides the following inspiration for China's investors. Analysts, as a media of transmission of the information, have been playing an important role in the capital market. By reading the research reports issued by analysts, investor can acquire the crucial information concerning industry and companies, saving the costs involved in collecting information on his own. However, when investing according to the suggestions from the analyst, the investors should bear in mind that star analyst does not enjoy more information than the non-star analyst. Investors should avoid unnecessary loss caused by blindly following the star analyst. The cognition bias of the investors offer an alternative strategy for the investor's decision making. The investors can buy the stocks recommended by the star analyst, being aware that this temporary return is caused by the noises and has nothing to do with the future gains brought by the company itself.

This paper also provides a clue to the policy makers in China. The policy makers have an irreplaceable function in regulating and maintaining the order of the capital market. However, the education on the investors should never be overlooked. When it is found that there exists a tendency of worship towards the star analyst, the

regulators should actively educate the investors, letting the investors be clear whether their action is rational or not.

References

- Roll, R. "R²". *Journal of Finance*, 43:541-566. 1988.
- Chan, K., and Hameed A. "Stock Price Synchronicity and Analyst Coverage in Emerging Markets." *Journal of Accounting Research*, 80:115-147. 2006.
- Feng, Y., Dong, Y., Yuan, Z., and Yang R. "Private Information Arbitrage in Chinese Stock Market: A Study Based on R²." *Economic Research Journal*, 8:50-59. 2009. (in Chinese).
- Xu, N., Chan, K., Jiang, X., and Yi, Z. "Do Star Analysts Know More Firm specific Information? Evidence from China." *Journal of Banking & Finance*, 37:89-102. 2013.
- Lin, Z., Han, L. and Li, W. "Stock Price Nonsynchronicity: Information or Noise?" *Journal of Management Sciences in China*, 6:68-81. 2012. (in Chinese).
- Zhang, Y. and Li, X. "R² and Measurement of Informativeness of Stock Prices." *Journal of Management Sciences in China*, 13:82-90. 2010. (in Chinese).
- King B. F. "Market and Industry Factors in Stock Price Behavior." *Journal of Business*, 39:139-190. 1966.
- Morck, R., Bernard Y., and Wayne Y. "The Information Content of Stock Markets: Why do Emerging Markets Have Synchronous Stock Price Movements?" *Journal of Financial Economics*, 58:215-260. 2000.
- Jin, L. and Myers, S. "R² Around the World: New Theory and New Tests." *Journal of Financial Economics*, 79: 257-292. 2006.
- Li, L. "Are Superior Analysts Elected by 'New Fortune' Reliable?" *Review of Investment Studies*, 7:54-64. 2011. (in Chinese).
- Wang, Y., Liu, H., and Wu, L. "Information Transparency, Institutional Investors and Stock Price Synchronicity." *Journal of Financial Research*, 12:162-174. 2009.
- West, K. "Dividend Innovations and Stock Price Volatility." *Econometrica*, 56:37-61. 1988.
- Barberis, N., Shleifer, A., and Wurgler, J. "Comovement." *Journal of Financial Economics*, 75:283-317. 2005.
- Jiang, C. "Financial Analysts, Insider Information and Efficiency of Capital Markets: Evidence from Relative Amount of the Firm-Specific Information Impounded into Stock Prices in China' A-Share Market." *China Economic Quarterly*, 2:429-452. 2013. (in Chinese).
- Liu, X. and Xiu, S. "Analysts Earnings and the Amount of Information in Invest Advices." *Statistical Research*, 10:103-108. 2008.
- Li, Y. and Wang, C. "The Influencing Factors of Chinese Security Analysts' Earnings Forecast Accuracy: Evidence From Chinese Stock Markets." *Journal of Shan Xi Finance and Economics University*, 11:19-25. 2011. (in Chinese).

- [17] Durnev, A., Morck, R., and Yeung, B. "Value-Enhancing Capital Budgeting and Firm-Specific Stock Return Variation." *The Journal of Finance*, 59: 65-105. 2004.
- [18] Lang, M., Russell, and Lundholm, J. "Corporate Disclosure Policy and Analyst Behavior." *Accounting Review*, 71: 467-492. 1996.
- [19] Bruce, K., Behn, J., Hag, C., and Kang, T. "Audit Quality and Properties of Analyst Earnings Forecasts." *The Accounting Review*, 83:327-349. 2008.
- [20] Pagan, A., and Sossounov, K. "A Simple Framework for Analyzing Bull and Bear Markets." *Journal of Applied Econometrics*, 18: 23-46. 2003.
- [21] He, X., and Zhou, K., "Synergy between the Cycle of Bull and Bear Market and the Cycle of Stock Markets." *Journal of Financial Research*, 4:35-40. 2006. (in Chinese).
- [22] Wang, Y., Xiao, B., and Li, X. "Determinants of Analyst Following-Empirical Evidence From China." *South China Journal of Economics*, 10:88-100. 2012. (in Chinese).
- [23] DellaVigna, S., and Pollet J. "Investor Inattention, Firm Reaction, and Friday Earnings Announcements." *National Bureau of Economic Research*. 2005.
- [24] Tan, W. "Study of 'Day of Week Effect' and 'Effect of Concentrated Issue Notice' in Chinese Markets' Earnings Announcements." *Journal of Financial Research*, 2:152-167. 2008. (in Chinese).
- [25] Wang, L., Ye, Z., Kong, D., and Zhang, S. "Monday Effect of Investors' Concerning and the Earnings Announcements." *Journal of Financial Research*, 11:193-206. 2012. (in Chinese).