

# The impact of stock price information content on the effect of equity incentives

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**Abstract:** After analyzing the related concepts and theories, this paper analyzes the information of the sample observation data of China's listed companies from 2017-2022 and establishes a regression model. After comprehensive analysis of the data and empirical verification of the analysis results based on the data, it provides some references for listed companies regarding the influence of share price information content on the effect of equity incentives.

## 1. Introduction

The stock market is an information market, which means that the information content from stock prices affects the rationalization of resource allocation. Further research on the relationship between equity incentive plans and stock price synchronization based on the perspective of the mediating effect of actual surplus management can study the influence mechanism of equity incentive plans on stock price synchronization in greater depth. In-depth study of the influence mechanism of equity incentive on share price synchronization has strong theoretical and practical significance for the development of China's capital market and equity incentive system[1].

## 2. Analysis of the theoretical research related to equity incentives and information content of stock price

### 2.1 Overview of the information content of stock prices

Capital markets function by allocating limited resources optimally through the share price mechanism. For this mechanism to work efficiently and provide returns, the stock price must reflect firm-level information. This prerequisite of high stock price information content enables the stock market share price to effectively direct resources for optimal allocation and fulfill its basic function in capital markets.

According to Campbell et al. the sources of information about share prices can be divided into three areas: the market, the industry and the firm, and Tobin found that the higher the information content of share prices of listed companies, the better the capital market is able to perform its basic functions. It can be seen that the information content of stock price is an important indicator to weigh the efficiency of stock market operation[2].

### 2.2 Measurement method of stock price information content

#### 2.2.1 Calculation method of indicators

The study by Roll (1988) and Durnev et al. (2003) concluded that the stock price level determines the market level, industry level, and firm level, while the firm returns can be explained by the fluctuations of market and industry returns. Therefore, it argues that the following model can be used to measure the information content of stock prices(1).

$$R_{i,j,t} = a + \beta_{i,m} R_{m,t} + \beta_{i,j} R_{j,t} + \epsilon_{i,j,t} \quad (1)$$

$R_{i,j,t}$  is the return of firm 1 on the  $t$ th trading day and  $R_{m,t}$  is the market return on the  $t$ th trading day during the study period<sup>3</sup> Where.  $R_{j,t}$  denotes the return of industry  $j$  on the  $t$ th trading day<sup>4</sup>.  $\epsilon_{i,j,t}$  represents the residual, when the level of the firm's return is not better explained by the change

in market and industry returns, the change in the firm's return is more reflected in the residual.  $R_{2i,t}$  is the coefficient of judgment in equation (3-1), which is economically significant as the fraction of the firm's return fluctuations that can be explained by the market and industry returns[3].

Roll proposes that 1-R stock price fluctuations can be represented by multiple asynchronous indices, and that firm-level factors also reflect the information content in stock prices. Asynchronous fluctuations lead to higher value indices and indicate a higher level of information content in listed companies. Conversely, synchronous fluctuations are represented by the correlation factor, which measures the level of synchronization in stock price movements. Many researchers use the synchronization index to measure the information content of stock prices, where a higher synchronization index implies a lower level of information content in the stock prices of listed companies[4].

### **2.2.2 Evaluation of the validity of indicators**

Academic literature presents two contrasting interpretations of price volatility, one of which is based on the presence of firm-level information while the other is attributed to noise bubbles in stock price fluctuations. Among scholars, the former interpretation has received greater acceptance. Durnev et al.'s empirical analysis of various industries indicates a positive relationship between asynchronous indices of stock price volatility and future accounting earnings, providing strong support for the first view. Similarly, Defond and Hung's study concludes that capital markets with high asynchrony of stock price volatility exhibit enhanced correlation between lagged firm earnings and management shifts, which can be attributed to the higher information content of stock prices in such markets, further supporting the first view[5].

Asynchronous stock price volatility has been debated to potentially reflect divergent investment styles, limited risk tolerance, and investor preferences. However, Veldkamp's empirical study suggests that higher levels of stock price volatility asynchrony indicators are associated with increased investor ability to uncover firm-level information, supporting the use of price volatility asynchrony as a measure of share price information content. Therefore, indicators of equity incentive price volatility asynchrony can reflect the information content of share prices at the firm level.

## **3. Empirical Study on Equity Incentives and Information Content of Share Price**

### **3.1 Research Design of Equity Incentives and Information Content of Stock Price**

#### **3.1.1 Theoretical Analysis and Hypothesis**

Academic opinions on the relationship between equity incentives and share price information content are divided. Some scholars argue that fair equity incentives can have a negative impact on corporate governance, as managers may prioritize their own interests over those of the company and manipulate accounting information, leading to a reduction in share price information content. Additionally, the long-term impact of equity incentives may be ineffective, as managers may focus on short-term performance to boost share prices. As a result, the effectiveness of equity incentives may be diminished, leading to a loss of share price information content[6].

Many scholars have confirmed that equity incentives can increase the long-term value of the company and promote the information content of share prices. However, inappropriate implementation of equity incentives can lead to profit management measures and reduce the information content of share prices. Therefore, if equity incentives are implemented properly, they can protect shareholders' interests and improve the information content of listed companies' value. Based on this, the paper proposes certain hypotheses[7].

H1: There is a significant positive relationship between equity incentives and information content of share price of listed companies.

#### **3.1.2 Sample selection and data sources**

This paper uses all A-share listed companies in China's Shanghai and Shenzhen stock markets

for a total of five years from 2017 to 2022 as the initial sample, and uses balanced panel data to conduct the empirical study to ensure the accuracy of the calculation of explanatory variables. In addition, the following principles were followed in selecting the research sample: (1) given that the industry characteristics of financial and insurance companies differ significantly from those of general companies, financial companies, insurance companies, and ST companies were excluded in order to make the sample data comparable; (2) listed companies with missing relevant data were excluded. This study finally obtains balanced panel data of 1802 A-share listed companies from 2017-2022, with a total of 10385 sample observations[8].

To process and empirically test the regression model, the financial data by year was Winsorized using Stata 12.0 data processing and analysis software at the 1% level before and after to eliminate the effect of extreme values. Additionally, the data of listed companies were obtained from the Guotaian database (CSMAR), while other macroeconomic indicators were obtained from the China Statistical Yearbook 2016 and relevant data published by the National Bureau of Statistics.

### 3.1.3 Selection of variables

#### 1) Measurement of equity incentive

Drawing on the research results of Bergstresser and Philippon, this paper considers the level of equity incentive as, the degree of equity incentive = the amount of salary corresponding to managers' acquisition of equity or options / the amount of total salary acquired by managers. This paper follows this method to calculate the level of equity incentive (Incent) implemented by listed companies to management, and the specific formula is shown in (2).

$$INCENT_{it} = \frac{0.0 \times STOCK - PPICE_{it} \times (MANAGESHARE_{it} + OPTIONSi_{it})}{0.01 \times STOCK - PRICE_{it} + OPTIONSi_{it} + MANAGE - GASHPAY_{it}} \quad (2)$$

Among them  $STOCK-PRICE_{it}$ ,  $t$  is the closing price of the shares of company  $i$  at the end of  $t$ ,  $MANAGESHARE_{it}$  and  $OPTIONSi_{it}$  represent the number of shares and options of listed companies held by the company 's management at the end of  $t$ ,  $MANAGE$  of  $CASHPAY_{it}$  to provide the total amount of various cash allocations obtained by managers at the end of  $t$ .

#### 2) Measurement of stock price information content

In this paper, based on the studies of Morck et al. and Lu, Yao and Shen, Xiaoli, and Hu, Huaxia, Hong, and Liu, Mengdie. The information content of share price is calculated through Fama-French's three-factor model specifically as shown in equation (3).

$$R_{it} - R_{ft} = \alpha_i + \beta_1 i (R_{mt} - R_{ft}) + \beta_2 i SMB_t + \beta_3 i HML_t + \epsilon_{it} \quad (3)$$

$R_{it}$  = monthly stock return of company 1 in month  $t$ , i.e. monthly individual stock return cooked considering cash dividend reinvestment  $R_{ft}$  = risk-free return in month  $t$ ;  $R_{mt}$  = monthly stock market return in month  $t$ , i.e. combined monthly market return considering cash dividend reinvestment; the stochastic error term of company  $ii$  in month  $t$ ;  $SMB_t$  = portfolio return of the market capitalization factor in month  $t$   $HML_t$  = book-to-market ratio in month  $t$  The portfolio returns of the factors  $\alpha_i, \beta_1 i, \beta_2 i, \beta_3 i$  are firm  $i$  specific parameters.

Among them, the calculation of  $SMB$ ,  $HML$  needs to consider the systematic risk, therefore, the book-to-market ratio ( $BM$ ) and firm size ( $Size$ ) are used as the grouping criteria to obtain six groupings of  $SG$ ,  $SN$ ,  $SV$ ,  $BG$ ,  $BN$ , and  $BV$  groups according to the specific practice of Lu, Yao, and Hu, et al. In turn, the  $SMB$  and  $HML$  values for each month are obtained, as shown in equations (4 and 5).

$$SM = 1/3 (SV + S + S) - 1/3 (BV + B + BG) \quad (4)$$

$$HML = 1/2 (SV + BV) - 1/2 (SG + BG) \quad (5)$$

The residuals from the regression of equation (6) to construct the equity non-systematic risk are defined as follows:

$$LNFO = \ln(\sum = 1 \epsilon) / (N - 1) \quad (6)$$

$LNFO$  denotes the unsystematic risk of a company in a given year, and  $N$  in equations 4-5

denotes the year corresponding to For the sake of uniformity of empirical research data, the calculated LNFO will also be converted into annual data, and the lower the unsystematic risk, the lower the information content of the stock price will be.

### 3) Measures of control variables

To ensure that the search results can be used directly to explain the intermediary effects between stock price information content, stock incentives, and information content, this paper emphasizes that the full-text regression model uses the same controls for the variables used in selecting the control variables. To ensure comprehensive control of variables, controls are chosen to cover variables for common financial and non-financial indicators. The final reference to relevant papers (e.g., dechow, Chen woo Chao, Sun Jian, etc., in addition to firm size and book-to-market value, describe the percentage of the level of information of the firm in the model, reflecting the concentration of shareholders' equity, reflecting the capital structure. All control variables in this paper rely on data delay to reduce the linearity problem between variables, as shown in Table 1.

Table 1: Definitions of variables used in Model 2-6.

Variable Symbols	Name of variable	Definition
SIZE	Company Size	LN (total assets), which is closely related to the motivation of surplus management behavior and subsequently affects the quality of accounting information
BM	Book-to-market ratio	Book value / market value, reflecting company growth
TURNOVER	Change of hands rate	reflecting the company-level information content given investor sentiment and the level of market trading
OWNERSHIP	Shareholding Concentration	Shareholding ratio of top ten shareholders
LEV	Gearing ratio	The higher the value, the greater the higher the information content of the company's share price
ROA	Total net asset margin	Ratio of net profit/total assets at the end of the year. Reflects profitability and determines whether to collect information about the company accordingly
OPR	Operating Margin	Reflects the company's short-term operating performance
CURRENT	Mobility ratio	which affects the direction of surplus management i.e. short-term solvency (Wenbing Xu)
MANAGER	Managerial overconfidence	Consumer sentiment aligns with managerial sentiment (Oliver)

### 4) Modeling

According to the research of this paper, the following model is developed.

$$LNFO_{i,t} = \gamma_0 + \gamma_1 INCENT_{i,t} + \sum_{k=2}^K \gamma_k CONTROLVariables_{i,t-1} + \epsilon_{i,t} \quad (7)$$

## 3.2 Empirical Results and Analysis of Equity Incentives and Information Content of Stock Price

### 3.2.1 Descriptive statistics of equity incentives

This section also uses management's equity incentives, and the above incentive power (percentage) represents the incentive level of management of listed companies. From 2015 to 2022, as shown in Table 2, the highest level of equity incentives is the primary industry (information transmission, software and it services) with 14.98% of management shares and an incentive strength of 0.3441, the lowest is D (electricity, heat, gas, water production and industrial supply) with an incentive strength of 0.037%, and the difference between them is very obvious, which indicates that

incentives of listed companies across industries in China is fair clear disparity. From an industry perspective, there is a huge gap between emerging industries such as information industry (1), construction (e), and scientific research and technical services (m) and traditional industries such as housing and catering, agriculture and forestry, livestock and fishery (a) and electricity (D). There is a large gap in the level of equity incentives, with the former having a significantly higher level of incentives than the latter[9].

### 3.2.2 Descriptive statistics of stock price synchronization

From the results shown, it can be seen that the mean value of R2 is 0.4681, a level significantly higher than the mean value of 0.193 obtained by Piotroski et al. in their analysis and study of the development of the U.S. stock market. Therefore, it can be concluded that the synchronized stock prices in mature capital markets are relatively low compared to those in emerging capital markets, and using the RA index to measure the synchronized stock prices of listed companies can reflect price volatility. In the process of analysis and research, we obtained the sench index by logarithmic expansion, the average value of which is 0.1605, and the maximum and minimum values of which are 2.1644 and 5.9299, respectively, which shows that the data after the logarithmic processing of Rz is more widely used, and this data range is closer to the normal distribution, so it is more reasonable for subsequent data processing and research. It is reasonable for subsequent data processing and research, as shown in Table2.

Table 2: Overall distribution of stock price synchronicity variables.

Variable Symbols	average value	Median	Standard deviation	Maximum	Minimum
R2	0.4681	0.4741	0.1757	0.8970	0.0027
SYNCH	-0.1605	-0.0995	0.8234	2.1644	-5.9299

Table 3 Distribution of listed companies in each industry. We can conclude that the average synchronized share price is between 0.4 and 0.5 for most industries, but there are significant differences between industries. Two industries have an average synchronized share price above 0.5, g (transportation, storage and postal services) and K (real estate). The industry with the highest synchronized share price is K (real estate), with the highest synchronized share price of 0.5245. The industries with an average below 0.4 are x (residential, maintenance and other services) and x (health and social work), with share prices of 0.3997 and 0.3978, respectively. The lowest industry has a synchronized share of 0.3978 and the highest industry is (Real Estate) 0.5245, with a difference of 0.1267.

### 3.2.3 Correlation analysis of main variables

In this paper, the reliability and accuracy of the experimental analysis were improved by testing the correlations between the variables of interest and checking whether there was a linear multivariate model,as shown in Table 3.

Table 3: Correlation analysis of main variables.

	SYNCH	INCENT	DREM	Lev	Size	MB	SOE
SYNCH	1.000	0.124***	0.037**	-0.058**	0.165**	0.218**	0.109**
Incent	0.124	1.000	0.154	-0.259**	-0.117	-0.313**	-0.47**
DREM	0.037	0.154	1.000	0.259**	0.072**	0.254**	0.025*
Lev	0.058	-0.259	0.259	1.000**	0.438**	0.135**	0.042**
Size	-0.165	-0.117	0.072**	0.438**	1.000	0.586**	0.233**
MB	-0.218	-0.313	0.254**	0.135**	0.586**	1.000	0.253**
SOE	-0.109	-0.47	0.025	0.042**	0.233**	0.253**	1.000
First	-0.01	-0.084	-0.021	0.052***	0.177**	0.078**	0.17**

Note:\*\* indicates that the correlation is significant with a confidence level (two-sided) of 0.01  
 \* indicates that the correlation is significant at a confidence level (two-sided) of 0.05

#### 4. Conclusion

The implementation of equity incentives has gained popularity as a means of incentivizing listed companies. However, in China, there is a significant gap in the implementation of equity incentives compared to developed countries, and there are concerns about moral hazard and speculative behavior. Thus, it is crucial to study the impact of equity incentives on the development of listed companies in China from various perspectives[10]. Such a study can help improve the equity incentive mechanism, optimize the internal governance environment, and strengthen the internal governance of China's listed companies. This paper uses the fixed effect model to conduct multiple regression analysis on the balanced panel data of sample observations of listed companies in China from 2010 to 2020, and uses accrued earnings management as a measure of the quality of accounting information. This paper analyzes the relationship between equity incentive and stock price information content, equity incentive and accounting information quality, and the relationship between accounting information quality and stock price information content. It is found that the implementation of equity incentive can affect the stock price information content, and the implementation of equity incentive increases the degree of accounting information manipulation. Equity incentive can have a certain negative impact on stock price information content.

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