

## Research Article

# Does the Capital Market Opening Improve the Price Discovery Efficiency of Stock Market? An Empirical Research Based on Shanghai-Hong Kong Stock Connect

Xueyan Yu <sup>1</sup> and Yanbing Yu<sup>2</sup>

<sup>1</sup>School of Accounting, Shanghai Lixin University of Accounting and Finance, Shanghai 201620, China

<sup>2</sup>Binzhou Power Supply Company, State Grid, Binzhou, Shandong 256600, China

Correspondence should be addressed to Xueyan Yu; 20190010@lixin.edu.cn

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Whether capital market opening improves the price discovery efficiency of stock market is an important issue. Shanghai-Hong Kong Stock Connect (hereafter, SHKSC) is a milestone event in the opening up of China's capital market. Based on SHKSC, using the method of PSM + DID, we study the impact of capital market opening on the price discovery efficiency from two dimensions—stock price information content and price reaction speed to information. Our research shows that capital market opening did not increase stock price information content, but speed up the reaction of price to information. Therefore, capital market opening improves capital market's price discovery efficiency in terms of response speed of stock price to information. Further analysis shows that capital market opening affects stock price reaction speed through improving market information environment and reducing insider trading, but it has not yet had a substantial impact on listed companies' earnings quality, which is the main participant in the capital market, and therefore has failed to influence the stock price information content. In order to maximize the effectiveness of capital market opening, it is necessary to introduce more effective policies to improve the information disclosure quality of listed firms and reduce the level of insider trading.

## 1. Introduction

The main function of capital market is to optimize resource allocation [1]. The original intention of capital market opening is also to improve the resource allocation ability of capital market. Prior studies have shown that opening up capital market can promote economic development, reduce the capital cost of firms, improve corporate governance, and enhance stock market's resource allocation ability [2–4]. Under the wave of globalization, opening up capital market is also the general trend. Considering the special characteristics of socialist economy, China's capital market opening should follow a gradual and orderly strategy guided by government [5]. After joining WTO, China's capital market is being liberalized in stages in order to fulfill its commitments, and it is still in the exploratory stage.

On April 10, 2014, Premier Li Keqiang speak at Boao Forum for Asia and pointed out that China will actively establish interconnection mechanism between Shanghai and Hong Kong stock markets (“Shanghai-Hong Kong Stock Connect” for short, including “Shanghai Stock Connect” and “Hong Kong Stock Connect”), to further promote the two-way opening and healthy development of capital markets of China and Hong Kong. On November 17, 2014, SHKSC was officially implemented, marking the beginning of two-way opening of China's capital market. Under the SHKSC trading mechanism, the Shanghai Stock Exchange allows investors from Hong Kong to buy and sell stocks through Hong Kong Exchange, thus effectively circumventing foreign exchange. SHKSC requires investors follow local transaction rules. SHKSC will help attract foreign investors and foreign capital, thus leading to the change of

composition of domestic capital market investors. At the initial stage of implementation, the opening stocks of the Shanghai Stock Connect include the constituent stocks of the Shanghai Stock Exchange 180 Index and the Shanghai Stock Exchange 380 Index, as well as the stocks of A+H shares listed on the Shanghai Stock Exchange. The total quota is 300 billion yuan, and the daily quota is 13 billion yuan.

Stock price is the carrier of all information in the capital market and the most important decision-making basis for investors. What is the impact of capital market opening on stock's pricing efficiency and how it affects the pricing efficiency are topics worth studying. The pilot implementation of SHKSC provides a natural experimental platform for studying capital market opening. We use SHKSC pilot sample and matching sample to test the impact of SHKSC, a milestone event in China's capital market opening, on the stock pricing efficiency. It cleverly avoids the endogenous problem which is often encountered in the previous research of capital market opening.

The results show that the implementation of SHKSC did not improve the stock price information content as expected by the policy, but it reduced the stock price delay and increased the price's response speed to stock market information. In addition, we examine some possible paths for capital market opening to affect pricing efficiency: earnings quality of listed companies, market information transparency, and insider trading. We show that capital market opening does not improve the earnings quality of listed companies, but it can improve information transparency and inhibit insider trading, thereby effectively reducing price delays and improving the efficiency of stock price discovery.

There are less number of articles to study the effect of capital market opening on stock price discovery efficiency based on SHKSC. Zhong and Lu [6] examined the relationship between capital market opening and the information content of stock prices. They concluded that capital market opening had increased the information content of stock prices by influencing enterprise governance and improving its information disclosure quality. However, their index used to test the information content of stock price was constructed based on the synchronization of stock prices, reflecting the company-specific information and other information except the market public information. We focus on the inclusion of corporate earnings information in stock prices. Dong et al. [7] investigated the effect of SHKSC on stock price information content based on future earnings response model and showed that capital market opening reduced the content of stock prices information. We believe that they only used future earnings in the model and ignored the impact of current earnings on stock price, so it is incomplete. Moreover, they only examined the content of stock prices information and did not study economic consequences of opening of capital market in terms of stock price response speed to information.

The core contributions of our research are twofold. First, the paper considers stock price discovery efficiency from two dimensions-stock price information content and stock price delay, taking into account connotation and timeliness, and is

more referential; second, our paper provides empirical evidence for the economic consequences of capital market opening, which helps investors and policymakers to understand and evaluate capital market opening policies from microperspective.

The rest of our paper is arranged as follows. Section 2 explains literature review and research hypotheses development. Section 3 explains the research design, such as sample selection, variable introduction, and models used in the paper. Section 4 analyzes the main empirical results. Section 5 is the mechanism analysis. Section 6 tests the robustness of our research. Section 7 is the conclusion of the study.

## 2. Literature Review and Hypothesis Development

*2.1. Literature Review.* The paper mainly refers to two lines of literature: the economic consequences of capital market opening and the stock price discovery efficiency. We review them separately as follows.

*2.1.1. Research on the Economic Consequences of Capital Market Opening.* Since the 1990s, some developing countries began to open their capital markets due to their actual economic conditions or international pressure. The main purpose of capital market opening is to introduce foreign investors to trade on domestic capital market. The empirical research focuses on the economic consequences of capital market opening: whether the capital market opening improves the resource allocation efficiency of stock market. Bekaert et al. [3] found that capital market opening can drive the growth of physical investment. Mitton [8] found that capital market opening help firms growth faster, profit more, and leverage lower. Rejeb and Boughrara [9] indicated that the capital market opening does not only improve the efficiency of stock pricing but also reduces the probability of financial crises. Existing studies have shown that capital market opening has positive effects to stock market.

Inevitably, some scholars have also questioned the above positive effects of capital market opening. Itay and Alexander [10] pointed out that capital market opening lead to new manipulations and reduce the efficiency of stock market pricing, therefore reducing the resource allocation efficiency of capital market. Furthermore, Shangjin [11] found that if here are domestic financial distortions in developing countries, capital account opening may increase the crisis. Naghavi and Lau [12] indicated that only when the capital market meet institution development, the opening improves the pricing discovery efficiency of stock market and then improves the resource allocation efficiency of stock market.

Some papers researched the economic consequences of capital market opening based on Shanghai-Hong Kong Connect. Jiang and Sohn [13] indicates that when foreign better informed investors (Hong Kong investors) can increase the price information content, then improve price discovery efficiency. Xu et al. [14] found that capital market opening leads to lower bid-ask spreads, higher market depth,

higher short-term volatility, and higher effective spreads, though improve market quality. But Hui and Chan [15] and Zhang et al. [16] pointed out that SHKSC widens the A-H premium, not narrow the A-H premium, so does not improve price discovery efficiency.

Overall, there are some debates about the effect of capital market opening.

*2.1.2. Research on the Efficiency of Stock Price Discovery.* The stock price discovery efficiency is the branch of the asset pricing field. We first review the theory of asset pricing.

Asset price and return is the core of financial theory. Sharpe et al. [17] proposed the Capital Asset Pricing Model (CAPM) on the basis of capital market and asset portfolio theory, which is the backbone of modern financial market price theory. The model is based on the “market efficiency theory” and believes that asset price is mainly affected by the beta coefficient of securities and stock market premiums. This model has inspired many scholars to conduct research on asset prices and continue to expand the model. The CAPM model assumes that investors are rational. With the development of behavioral finance, this assumption has been questioned by scholars. Shefrin and Statman [18] proposed a Behavioral Asset Pricing Model (BAPM) on the basis of CAPM. The model assumes that investors do not have the same rational beliefs and accordingly divide investors into information traders and noise traders. The CAPM model assumes that prices are affected by a single factor, and it is difficult to explain financial anomalies such as value effect and momentum effect. Fama and French [19] added the factor SMB to explain the market effect and the factor HML to explain the value effect on the basis of CAPM. In order to explain the momentum effect, Fama and French [19] expanded the RMW and CMA factors representing the company’s profitability and investment level to try to explain the momentum effect and other financial anomalies.

In an efficient market, asset pricing should be able to accurately reflect market-level information and individual stock-level information in a timely and accurate manner. The stock price discovery efficiency can be measured from two aspects: stock price information content and stock price response speed. The research of stock price information content and stock price response speed focuses on the influencing factors of the two. Existing studies have shown that the higher the level of corporate governance, the more reasonable the ownership structure, the higher the stock price information content, the faster the stock price response, and the lower the price delay [20–22]). Market intermediaries also have an impact on the efficiency of stock price discovery. The information search activities of securities analysts can increase the information content of stock prices, make them contain more information about company fundamentals, reduce the synchronization of stock prices, and thus enhance the information content of stock prices [23]. Institutional investors, in particular foreign institutional investors, have more investment experience, information processing

skills, and better professional knowledge, so they can promote faster response to corporate-level information in stock prices, and stock prices have higher information content [20–22, 24].

*2.1.3. Comments.* The studies on the economic consequences of capital market opening are mainly country studies with developing countries; therefore, there are strong endogenous problems. The research on the stock price discovery efficiency focuses on the enterprise itself, market intermediary, and market information environment. There is relatively less research on the effect of macroeconomic environment on the stock price discovery efficiency. Based on the partly pilot open characteristics of SHKSC, it can effectively avoid endogeneity and can test the impact of macropolicy on microvariables, which forms the research opportunity of this paper.

*2.2. Hypothesis Development.* The main purpose of capital market opening is to increase the price discovery efficiency in the capital market and make the market price full play the guidance of resource allocation efficiency. The market opening can effectively improve the stock market price discovery efficiency [25]. First, the capital market opening can effectively improve the information environment of open countries, increase information transparency, and reduce stock price synchronization [6, 26]. Secondly, the biggest impact of SHKSC on A-share market lies in the introduction of Hong Kong investors and even global investors. Foreign investors have more investment experience, information processing skills, and better professional knowledge, so they can promote faster reflection of corporate-level information to stock price and lead to higher stock price information content [22]. As an effective part of the external governance mechanism, foreign institutional investors can effectively improve corporate governance and therefore can protect the interests of medium and small shareholders from inhibiting large shareholders encroaching. The higher the governance level, the more transparent information disclosure. It can increase the proportion of informed transactions by external investors, thereby increasing the stock price’s response speed to market information [27]. With the increase of information transparency, external investors can obtain more incremental information about the company, and they can feedback the above information to the price of stock through market transaction and improve the stock pricing efficiency [28]. Third, if the company has an urgent need for overseas capital, in order to attract foreign investment, the company will disclose higher-quality accounting information in order to cater to foreign institutional investors, therefore improving the capital market information environment, lower the degree of firm’s information asymmetry, and also help increase the stock’s pricing efficiency.

Based on the foregoing discussions, we hypothesize that:

H1a: the opening of capital market can increase stock’s price discovery efficiency.

Since the implementation of the two-way opening of SHKSC, the southward funds (that is, the funds used by mainland investors to buy the pilot Hong-Kong stock) have been significantly more than the northward funds (that is, the funds used by Hong-Kong investors for buying the stocks of Shanghai Stock Exchange), and there has been a capital flight. Hong Kong's mature capital market has attracted high-quality investors from the mainland, leading to reduced market liquidity and indirectly reducing the stock price information content of the mainland capital market [7]. The investment of foreign investors adds international market risks into the A-share market, which can easily cause domestic small and medium investors to trade too frequently due to panic, increase market volatility, and reduce the price discovery efficiency of stock market [29]. About 80% of the A-share investors are individual traders. After the implementation of SHKSC, foreign institutional investors may use the characteristics of individual traders to conduct arbitrage transactions, thereby reducing the stock pricing efficiency.

Therefore, we propose the alternative hypothesis:

H1b: the initial stage of capital market opening did not improve the price discovery efficiency of stock market.

### 3. Research Design

**3.1. Sample Selection.** At the SHKSC's initial implementation stage, the target stocks of SHKSC include the constituent stocks of Shanghai Stock Exchange 380 Index (SSE 380) and Shanghai Stock Exchange 180 Index (SSE180) and A-H shares of Shanghai Stock Exchange. The SSE 380 Index and the SSE 180 Index are adjusted every six months, and the corresponding opening targets will also be adjusted. This paper filters samples based on the changes of the Shanghai Stock Connect/China Connect stock list announced on the Hong Kong Stock Exchange website in January 2020. The list contains all changes of the "Shanghai Stock Connect" stocks since the implementation of SHKSC on November 17, 2014.

We will examine the changes in the stock pricing efficiency of sample two years after being selected, so only companies that were selected as the target in 2014 and have not been adjusted within two years after being selected are selected as the sample. Excluding the following samples, the annual trading days are less than 100 days, ST companies, financial companies, and companies with missing financial data. We obtain a total of 6502 samples of annual-company samples. Our data are all from the database of CSMAR. To avoid the outliers' influence, this paper winsorize 1% and 99% tailings for all continuous variables.

**3.2. Stock Price Efficiency Index.** Asset pricing in efficient market should be able to accurately reflect market-level information and individual stock-level information in a timely and accurate manner. Therefore, this article examines stock price efficiency from two dimensions: stock price information content and stock price delay. The stock price information content, which is a connotation consideration,

reflects how much corporate characteristic information is contained in the stock price. The degree of stock price delay reflects the stock price response speed to comprehensive information in past. The higher the stock price information content, the lower the stock price delay, the higher the stock price efficiency. For the sake of rigor, exploring the efficiency of stock price information should also examine the stock price's market information content, that is, how much market information contained in the stock price, but the academic community is controversial about this indicator. Roll [30] believes that when the market information content in stock price is higher, the price linkage between different stocks is higher, and correspondingly the content of information reflecting individual stocks' characteristics in the stock price is lower. So, the market efficiency is lower [30].

Later, scholars' research developed along this line and believed that the content of the enterprise level information and the market level information in the stock price have a trade-off relationship. I think that this judgment is questionable and therefore does not examine stock price's market information content.

**3.2.1. Price Information Content.** Not the same as Zhong Qinlin and Lu Zhengfei [6]; Lian Lishuai et al. [31] constructing the information content of stock price according stock price synchronization, we construct the information content of stock price according to the model of Future Earnings Response Coefficient (FERC). Drawing on net present valuation model, we believe that the price information content refers to the degree to which the stock price reflects the fundamental information of the company now and in the future. The most important information of corporate characteristics is the earnings information. This paper examines the degree of stock prices response to corporate earnings information. Ball and Brown [32] first proposed the earnings response coefficient model. Lundholm and Myers [33] added future earnings information to propose a future earnings response model. The basic model is as follows:

$$r_{it} = \alpha_0 + \alpha_1 UE_{it} + \alpha_2 \Delta E_t(E_{i,t+1}) + \alpha_3 \Delta E_t(E_{i,t+2}) + \alpha_4 \Delta E_t(E_{i,t+3}) + \varepsilon_{it}, \quad (1)$$

where  $r_{it}$  represents firm  $i$ 's cumulative risk-adjusted return rate on the year  $t$ 's annual report disclosure day and the first day after disclosure.  $UE_{it}$  represents firm  $i$ 's unexpected surplus in year  $t$ , which is obtained by subtracting the expected surplus from current realized surplus, and the level of surplus expressed by net profit, adjusted by the initial asset scale. The most reasonable estimation of expected earnings is management earnings forecasts, but there are many missing data, so we use the earnings of lagging period to represent the expected earnings.  $\Delta E_t(E_{i,t+1})$ ,  $\Delta E_t(E_{i,t+2})$ , and  $\Delta E_t(E_{i,t+3})$  are the investor's earnings change expectations to year  $t+1$ ,  $t+2$  and  $t+3$ .  $\varepsilon_{it}$  is the error term. We perform regression year by year. The higher the stock price contains earnings information, the smaller the absolute value of the error  $|\varepsilon_{it}|$ . For the convenience of measurement, we perform logarithmic conversion:

$$\text{Price\_info}_{i,t} = \log\left(\frac{1 - |\varepsilon_{it}|}{|\varepsilon_{it}|}\right). \quad (2)$$

The smaller the above value, the greater the stock price information content. For convenience of explanation, we multiply the Price\_info value by (-1), that is, the larger the Price\_info value, the higher the stock price information content, and the more earnings information contained in the stock price.

**3.2.2. Price Delay.** The faster the stock price reacts to market information, compared to the lagging information, the larger the proportion of current market information in stock price, and the higher the price discovery efficiency of stock price. If the stock price cannot fully reflect the current market information timely, the information will inevitably be reflected in the subsequent price, causing the stock price to delay response to the information. Based on this idea, a model containing current market information and lagging market information can be constructed. If the lagging period information explains the stock price more, it means that the stock's response to information is slow, that is, there is delay in the information absorption by market price.

In order to compute the response speed of stock price to information, Hou and Moskowitz [34] proposed the following model to compute the respond speed of price to information, which has been widely used by scholars [34–36]:

$$r_{i,t} = \alpha + \beta_0 * r_{mk,t} + \beta_1 * r_{mk,t-1} + \beta_2 * r_{mk,t-2} + \beta_3 * r_{mk,t-3} + \beta_4 * r_{mk,t-4} + \varepsilon_{i,t}, \quad (3)$$

where  $r_{i,t}$  represents firm  $i$ 's cumulative risk-adjusted rate of return in year  $t$ ,  $r_{mk,t}$ ,  $r_{mk,t-1}$ ,  $r_{mk,t-2}$ ,  $r_{mk,t-3}$ , and  $r_{mk,t-4}$ , respectively, represent the market rate of return in year  $t$  and four lagging periods, and  $\varepsilon_{i,t}$  is the error term.

We can construct a price delay indicator based on the relative size of the current market information and the lagging market information coefficient in the model:

$$\text{Delay}_i = \frac{\sum_{n=1}^4 |\beta_{i,n}|}{|\beta_{i,1}| + \sum_{n=1}^4 |\beta_{i,n}|}. \quad (4)$$

Specifically, we first calculate the company's monthly price delay index and then calculate the annual average as the explanatory variable. The smaller the value, the higher the pricing efficiency.

**3.3. Empirical Model.** The paper uses the following model to test the pricing efficiency of SHKSC stocks and non-SHKSC stocks after opening.

$$\text{Efficiency}_{i,t} = \alpha_0 + \alpha_1 * \text{Open}_{i,t} + \sum \gamma * \text{control} + \varepsilon_{i,t}, \quad (5)$$

where Efficiency takes the values of Price\_info and Delay, respectively.  $\text{Open}_{i,t}$  is whether or not open. SHKSC stocks

take the value of 1, otherwise 0. In addition, referring to the existing literature, we control the following factors: corporate performance, ownership structure, corporate governance, and market level indexes that affect pricing efficiency. Both the concentration of ownership and the nature of ownership have a significant impact on the information content of stock price [37]. Reasonable corporate governance arrangements can increase the information content of stock price [38]. In the capital market dominated by emotion, corporate performance, and market level indexes inevitably influence price discovery efficiency.

Table 1 shows specific definitions and calculation methods. We expect  $\alpha_1$  to be positive, that is, the capital market opening improves the price discovery efficiency of the pilot stock.

The above test only examines the efficiency difference between the open sample and the nonopen sample after opening. Take into account the selection criteria of the target sample, it is possible that the selection criterion leads to the above result. In order to eliminate endogeneity, we use event research approach to examine the efficiency difference of open samples before and after opening to test whether the capital market opening has changed the pricing efficiency of open samples? The model is as follows.

$$\text{Efficiency}_{i,t} = \alpha_0 + \alpha_2 * \text{Post}_{i,t} + \sum \gamma * \text{control} + \varepsilon_{i,t}, \quad (6)$$

where  $\text{Post}_{i,t}$  is the variable of opening time. Considering the availability of data, we only examine the changes in the two years before and after opening. To ensure research and results' consistency, we delete samples of the opening year. The control sample is the same as the first model.

In order to further exclude endogeneity, we use the Propensity Score Matching (PSM) method to find matching samples from A-shares' unopened samples in the Shanghai Stock Exchange for each target sample. Use the financial characteristics of pilot sample to estimate the probability of entering the pilot range and do 1:1 match for the SHKSC sample. Referring to the method of Defond and Zhang [39], the paper uses the enterprise-level variables in the control variables to construct the logit model to calculate the propensity matching score. Using the method of no replacement and one-to-one nearest neighbor matching, we obtain the control sample and experimental samples. Then, use the following model to test.

$$\begin{aligned} \text{Efficiency}_{i,t} = & \alpha_0 + \alpha_1 * \text{Open}_{i,t} + \alpha_2 * \text{Post}_{i,t} \\ & + \alpha_3 * \text{Open}_{i,t} * \text{Post}_{i,t} + \sum \gamma * \text{control} + \varepsilon_{i,t}. \end{aligned} \quad (7)$$

The definition of the variable Efficiency, Post, Open, and control variables in model 7 is the same as those in models 5 and 6. We focus on the sign of the cross-multiplication term coefficient  $\alpha_3$ . If it is significantly positive, it means that the opening of capital market is conducive to the price discovery efficiency of stock.

The main variables in the research are defined in Table 1.

TABLE 1: Variable definitions.

Variable name		Definition	
Explained variables	Price_info	The index of stock price information content, measured by model 1 and 2	
	Delay	The index of price delay measured by model 3 and 4	
	Post	The dummy variable of opening time of capital market. The value equals 1 if after opening, otherwise 0.	
Explanatory variables	Open	The dummy variable whether SHKSC sample. The value equals 1 if it is, otherwise 0.	
	Size	Natural logarithm of the market value of net asset at the end of the fiscal year	
	Leverage	Ratio of total debts to total assets	
	ROA	Return of asset, equals the ratio of net income to total assets	
	Performance	Growth	The growth rate of firm's operating income, measured by the difference between this year and last year's operating income divided by last year's operating income
	Ownership structure	Firstholder	The ratio of number of shares held by the largest shareholder to total number of shares
Managershare		The ratio of number of shares held by management to total number of shares	
Boardsize		Board of directors' numbers	
Control variables	Corporate governance	Independ	The value equals the number of independent directors divided by the number of board
		SOE	Whether state-owned or not, when the ultimate controller is the state, agency or institution, the value is 1, otherwise 0
		Dual	Whether the chairman and manager are the same person, if so, the value is 1, otherwise 0
	Market-level variables	Big4	Whether the auditor is from Big Four, if so, the value is 1, otherwise 0
		Analyst	The number of analysts following
		Liquidity	A-share market's liquidity, equals the average of the ratio of the absolute value of the return to the transaction volume on the effective transaction date
	MB	Equals the value of market value divided by book value	
	Turnover	The ratio of trading volume to total number of shares issued in a certain period	
	Age	The years of listing in the market	

#### 4. Empirical Test and Result Analysis

*4.1. Descriptive Analysis.* Table 2 shows the descriptive statistics of the opening stocks, the nonopening stocks and the main variables of all samples before and after opening. We can see from the table that, after opening, the opening samples' information content is lower than that of non-opening samples. The stock price information content of opening stocks after opening is lower than that of before opening. So, capital market opening did not increase the stock price information content. The result is consistent with that of Dong Xiuliang et al.'s [7] research, but contrary to the results of Zhong Qinlin and Lu Zhengfei [6].

Regarding the stock price delay indicator, after opening, the price delay of opening samples is lower than that of nonopening samples, but higher than the opening stocks before opening, so further analysis is needed. The open dummy variable indicates that the open sample accounted for 29.2% after opening. From the variable of asset scale, leverage and return on assets, the opening stocks are better than nonopening stocks before and after opening, which further confirms the selection criteria of SHKSC: large scale, low debt, and high return. So, it is necessary to control the fundamental information in the multiple regression model. The shareholding ratio of the largest shareholder decreases after opening, reflecting the optimization of the company's ownership structure, but the opening stocks were higher than that of non-opening stocks.

Regardless before or after opening, the management holdings of nonopening stocks are far higher than that of opening stocks. The proportion of independent directors has increased after opening, and there is little difference between

opening stocks and nonopening stocks. The opening state-owned companies account for about 67%, which is higher than the proportion of state-owned companies in the nonopening sample.

Figure 1 describes all samples' annual trend of price information content and price delay between research years. From Figure 1, we can see that, for all samples, the price delay experiences ups and downs, and the price information content increases first and then decreases.

Table 3 shows the correlation coefficient between the main variables in our paper. The correlation coefficient between the information content of stock price and price delay is not significant, indicating that they are measuring different aspects of stock price efficiency, namely, connotation and efficiency. Therefore, compared to measuring stock price efficiency solely by stock price information content or price delay, it is more comprehensive using two index to measure stock price efficiency. The dummy variable Open is negatively correlated with the information content of the stock price at 1% confidence level, indicating that the capital market opening has reduced the content of the stock price information. The negative correlation between the variable Open and Price delay indicate that capital market opening reduces stock price delay, that is, improves stock pricing efficiency, but the correlation coefficient is not significant, so further test is needed.

Figure 2 describes the scatter plot of Price\_info and Delay. From Figure 2, we can see that the graph is very scatter. So, the variable Price\_info and Delay proxy different aspects of pricing discovery efficiency. And, it is necessary to use two variables to proxy pricing discovery efficiency.

TABLE 2: Descriptive analysis.

		Before opening			After opening		
		Opening stocks	Non-opening stocks	Full	Opening stocks	Nonopening stocks	Full
Price_info	Me	-4.791	-4.646	-4.676	-4.804	-4.646	-4.692
	Med	-4.634	-4.472	-4.511	-4.671	-4.513	-4.543
Delay	Me	0.795	0.795	0.795	0.799	0.802	0.801
	Med	0.795	0.795	0.795	0.8	0.803	0.803
Open	Me	1	0	0.21	1	0	0.292
	Med	1	0	0	1	0	0
Size	Me	16.044	15.037	15.247	16.726	16.015	16.223
	Med	15.882	14.91	15.089	16.641	15.908	16.083
Leverage	Me	0.522	0.431	0.45	0.505	0.432	0.453
	Med	0.526	0.422	0.453	0.502	0.416	0.444
Roa	Me	0.051	0.038	0.041	0.043	0.032	0.035
	Med	0.043	0.033	0.035	0.035	0.028	0.03
Growth	Me	0.155	0.145	0.147	0.107	0.141	0.131
	Med	0.112	0.084	0.094	0.052	0.042	0.046
Firstholder	Me	0.407	0.357	0.367	0.397	0.338	0.355
	Med	0.407	0.338	0.352	0.393	0.321	0.336
Managershare	Me	0.021	0.13	0.107	0.024	0.12	0.092
	Med	0	0	0	0	0.002	0
Boardsize	Me	9.485	8.747	8.902	9.256	8.464	8.695
	Med	9	9	9	9	9	9
Independ	Me	0.374	0.371	0.372	0.377	0.375	0.376
	Med	0.333	0.333	0.333	0.364	0.364	0.364
SOE	Me	0.689	0.392	0.454	0.666	0.398	0.476
	Med	1	0	0	1	0	0

Note. Me and Med, respectively, means the mean value and the median value.



FIGURE 1: Annual trend of Price\_info and delay.

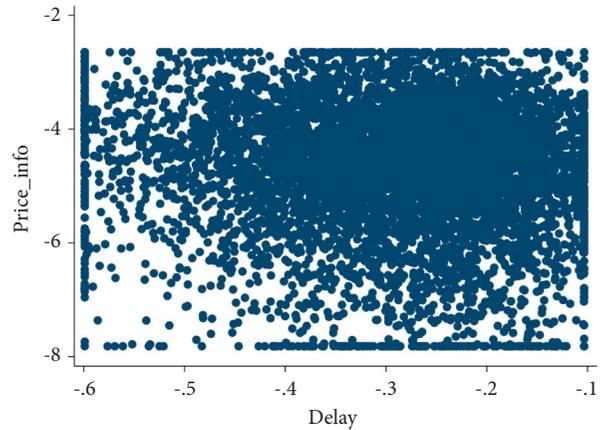


FIGURE 2: The correlation between Price\_info and delay.

TABLE 3: Correlation coefficient of main variables.

	Price_info	Delay	Open	Post
Price_info	1			
Delay	0.014	1		
Open	-0.0563***	-0.02	1	
Post	-0.007	0.2256***	0.0950***	1

Note: \*\*\* indicates significance at the 1% level, \*\* indicates significance at the 5% level, and \* indicates significance at the 10% level.

#### 4.2. Empirical Analysis

##### 4.2.1. Comparison of the Price Discovery Efficiency of Opening Stocks and Nonopening Stocks after Opening.

We first use

Model 5 to analyze the difference in price discovery efficiency between opening stocks and nonopening stocks after opening. The multivariate analysis' results are shown in Table 4.

From Table 4, we can get that when the explained variable is Price\_info, the coefficient of Open is negative, but not significant, indicating that the price information content of opening samples is not higher than the price information content of nonopening samples. Therefore, alternative hypothesis passed the test, that is, the price discovery efficiency of stock was not improved in the initial stage of capital market opening. The more significant variable among the control variables is liquidity. At the 5% confidence level, it is

TABLE 4: Comparison of the price discovery efficiency of opening stocks and nonopening stocks after opening.

	Price_info		Delay	
	Coefficient	T value	Coefficient	T value
Open	-0.065	-1.14	-0.002***	-2.79
Size	-0.064	-1.53	0.002***	4.93
Leverage	0.191	1.31	0	0.07
Roa	0.242	0.42	0.012*	1.72
Growth	0.066	1.06	-0.001	-1.22
Firstholder	-0.112	-0.66	0.006***	3.27
Managershare	-0.01	-0.06	0.007***	3.56
Boardsize	0.005	0.36	0.000**	-1.98
Independ	0.713	1.62	-0.003	-0.54
SOE	-0.019	-0.33	0.001	1.31
Dual	0.073	1.35	0	0.3
Big4	-0.037	-0.44	0.002*	1.73
Analyst	0.005	1.29	0	-0.09
Liquidity	49.718**	2.2	0.748**	2.42
MB	-0.176	-1.42	-0.007***	-4.57
Turnover	-0.01	-1.28	0.001***	13.97
Age	-0.004	-0.95	0	-0.88
Intercept	-3.600***	-4.79	0.751***	79.18
Industry	Yes		Yes	
Adj R2	0.022		0.119	
N	2733		2733	

Note: \*\*\* indicates significance at the 1% level, \*\* indicates significance at the 5% level, and \* indicates significance at the 10% level.

significantly positive, which indicates that the stronger the market liquidity, the higher the information content of stock price.

When the explained variable becomes Delay, at the 1% confidence level, its coefficient is significantly negative, indicating that the price delay of opening samples is lower than that of nonopening samples after opening, the stock price responds faster to market information, and the efficiency of stock pricing is higher. Therefore, hypothesis 1a passes the test, that is, the capital market opening can improve the stock price discovery efficiency. Among the control variables, Size, Roa, Firstholder, Managershare, Big4, Liquidity, and Turnover variables are significantly positive, indicating that when the scale becomes larger, the return on assets becomes higher, the shareholding ratio of the largest shareholder becomes greater, the management shareholding ratio becomes higher, the firms employ the Big 4 audits, the liquidity becomes higher, the turnover rate is higher, and the stock price delay becomes higher, that is, the price discovery efficiency becomes lower. The Boardsize and MB variables are significantly negative, indicating that when the size of the directors becomes larger, the market-to-book ratio becomes higher, the stock price delay becomes lower, that is, the price discovery efficiency becomes higher.

This section only compares the stock price discovery efficiency difference between the opening sample and the nonopening sample after opening. Although we control the variables related to the selection criteria, it is still difficult to eliminate endogeneity. So, it is necessary to compare the efficiency differences of opening samples' price discovery after and before opening.

4.2.2. *Comparison of the Opening Samples' Price Discovery Efficiency after and before Opening.* Table 5 shows the comparison of opening samples' price discovery efficiency after and before opening using Model 6.

From Table 5, we can get that when the explained variable is Price\_info, the coefficient of the Post variable is negative, but not significant, and the  $t$  value is close to 0. It shows that the opening has little impact on the stock price information content of the opening stocks, so hypothesis 1b is verified again, that is, the capital market opening does not improve the stock price discovery efficiency.

When the explained variable is Delay, the variable POST's coefficient is significantly negative at the 10% confidence level. It indicates that the stock price delay has been significantly reduced after opening, that is, the stock price discovery efficiency has improved. From the perspective of the speed of stock price response information, hypothesis 1a passes the test.

Combining the results of Model 5 and Model 6, we can draw the following conclusion: from the perspective of stock prices information content of individual stocks, the capital market opening has not improved the efficiency of stock price discovery. But, in terms of the speed at which stock prices reflect market information, the capital market opening has improved the price discovery efficiency in the stock market. To further test the robustness of the conclusion, we use the propensity score matching and difference-in-difference (PSM + DID) method for further test.

4.2.3. *PSM + DID Test.* Before do the PSM + DID test, we evaluate the matching effect first. Figure 3 describes the standardized deviation of the main variables. From it, we can see that the standardized deviation of all the main variables is smaller after matching.

Figure 4 describes the common range of propensity scores. Most observations are within the common value range (on support) after matching, so only small number of samples will be lost when matching.

Table 6 shows the results of PSM + DID analysis using Model 7.

From Table 6, we can get that, for the stock price information content, the coefficient of the cross-multiplication term Post \* Open is positive in full sample analysis but negative in PSM sample, and both are not significant.

It can be seen that the capital market opening has no effect on the stock price information content. Hypothesis 1b is verified. For the stock price delay, at the 1% confidence level, the coefficient of Post \* Open is significantly negative in full sample regression and PSM sample regression. It can be seen that the capital market opening has significantly reduced the stock price delay and improved the stock price discovery efficiency. Hypothesis 1a is verified.

The above results show that our conclusions based on model 5 and model 6 are robust, that is, the capital market opening has little impact on the information content of stock price, but it can significantly speed up the reflection speed of price to information and improve the price discovery efficiency of opening stocks.

TABLE 5: Comparison of the opening samples' price discovery efficiency after and before opening.

	Price_info		Delay	
	Coefficient	T value	Coefficient	T value
Post	-0.02	-0.25	-0.002*	-1.71
Size	0.001	0.02	0.003***	4.04
Leverage	0.13	0.57	0.003	1.02
Roa	2.126**	2.15	0.001	0.07
Growth	0.096	0.94	-0.002	-1.33
Firstholder	0.056	0.25	0.006**	2.31
Managershare	0.255	0.63	0.008*	1.8
Boardsize	0.009	0.54	0	-0.04
Independ	0.577	1.06	-0.003	-0.55
SOE	-0.016	-0.22	-0.001	-0.83
Dual	0.058	0.56	-0.001	-1.29
Big4	-0.084	-1.02	0	-0.42
Analyst	-0.001	-0.14	0.000*	-1.91
Liquidity	77.849	1.17	1.512*	1.91
MB	-0.216	-1.3	-0.005**	-2.56
Turnover	0.013	1.01	0.001***	9.66
Age	-0.003	-0.56	0.000**	-2.16
Intercept	-5.358***	-5.67	0.770***	73.42
Industry	Yes		Yes	
Adj R2	0.034		0.129	
N	1584		1781	

Note: \*\*\* indicates significance at the 1% level, \*\* indicates significance at the 5% level, and \* indicates significance at the 10% level.

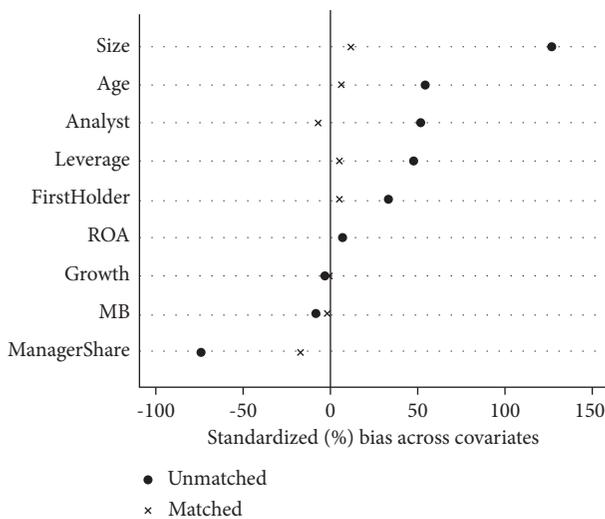


FIGURE 3: Graphical representation of the standardized deviation of the main variables.

### 5. Mechanism Analysis

The above results show that capital market opening has not improve stock price information content, but it has reduced price delay and increased the speed of market information to stock price. These results are inconsistent with that of Zhong and Lu [6] because of the different choices of proxy variables for stock price information content. Zhong and Lu [6] build stock price information content based on the price synchronization index. Although there are many studies using this proxy variable, we believe that this proxy variable's

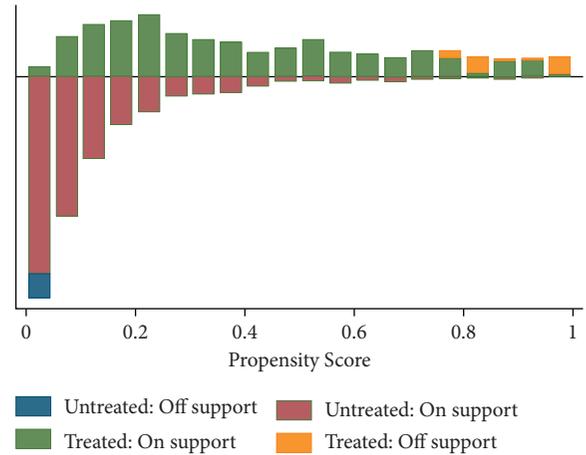


FIGURE 4: Common range of propensity scores.

measurement about the information characteristics of the company itself is noisy. Our paper focuses on the comprehensive performance of the company's operating-earnings and uses the future earnings response coefficient to measure it. Given that stocks are the financial assets of the company, the future earnings response model and the asset pricing model are inherently consistent, that is, the stock price is the discounted net value of future profit.

The question we need to think about is why the opening has not as expected improved the price information content? How does opening affect the response speed of stock price to market information? We analyze the above issues from the perspective of market participants in this section.

#### 5.1. Earnings Quality: The Listed Company Perspective.

The paper focuses on the issue of how much stock price reflect earnings information. The results show that the capital market opening has not been as expected increasing the stock price information content. The original intention of the policy is to introduce mature foreign investors, break through the Shanghai-Hong Kong market barriers, force domestic listed companies to optimize operations, improve governance, and increase the listed companies' earnings quality. After opening, in order to introduce foreign institutional investors, companies may cater to foreign institutional investors by improving the information disclosure quality.

From the signal perspective, in order to attract foreign institutional investors, companies with better performance may improve the information disclosure quality to distinguish themselves from companies with poor performance. Did listed companies take this opening opportunity to improve their earnings quality?

Companies with consistently smaller absolute values of accrued earnings are less likely to manipulate reported profits [26]. According to previous literature, the paper uses the absolute value of manipulable accruals to measure earnings quality, and manipulable accruals are calculated according to the modified Jones model. The model is as

TABLE 6: The results of PSM + DID.

	Full Sample				PSM Sample			
	Price_info		Delay		Price_info		Delay	
	Coefficient	T value						
Post	0.014	0.28	0.003***	-4.59	0.032	0.34	0.003***	2.66
Open	-0.041	-0.81	0	0.11	-0.036	-0.4	0.001	1.29
Post * Open	0.022	0.33	-0.002***	-3.15	-0.057	-0.6	-0.004***	-3.59
Size	-0.042	-1.51	0.002***	5.92	-0.007	-0.15	0.003***	5.06
Leverage	0.217**	2.35	0	0.32	0.193	1.29	0.002	1.02
Roa	0.943**	2.36	0.007	1.49	1.332*	1.76	-0.001	-0.08
Growth	0.123***	2.82	0	-0.88	0.114	1.17	0.001	0.48
Firstholder	-0.178	-1.62	0.002*	1.71	-0.042	-0.24	0.002	0.91
Managershare	0.210**	2.04	0.003***	2.76	0.394*	1.93	0.005**	2.27
Boardsize	-0.008	-0.79	0.000**	2	0.013	0.9	0	0.64
Independ	0.316	1.1	-0.001	-0.35	0.842**	1.99	-0.003	-0.71
SOE	0.022	0.58	0	0.1	0.058	1.03	0	0.28
Dual	0.041	1.12	0	0.54	0.112*	1.82	0	-0.69
Big4	-0.106*	-1.81	0	0.27	-0.122	-1.6	-0.001	-0.7
Analyst	0.002	0.77	0	-0.62	0.001	0.33	0.000**	-2.46
Liquidity	21.214	1.17	0.429*	1.94	32.584	0.83	1.077**	2.28
MB	-0.332***	-4.26	-0.002**	-2.16	-0.413***	-3.33	-0.005***	-3.32
Turnover	-0.011*	-1.75	0.001***	12.77	-0.001	-0.07	0.001***	8.22
Age	-0.001	-0.44	0.000**	-2.36	-0.004	-0.77	0.000***	-2.94
Intercept	-3.617***	-7.9	0.763***	139.97	-4.672***	-6.81	0.754***	85.23
Industry	Yes		Yes		Yes		Yes	
Adj R2	0.022		0.1		0.037		0.119	
N	6501		6501		2518		2518	

Note: \*\*\*indicates significance at the 1% level, \*\*indicates significance at the 5% level, and \*indicates significance at the 10% level.

$$\frac{TA_{i,t}}{Asset_{i,t-1}} = \frac{\alpha_1}{Asset_{i,t-1}} + \alpha_2 \frac{\Delta REV_{i,t} - \Delta REC_{i,t}}{Asset_{i,t-1}} + \alpha_3 \frac{PPE_{i,t}}{Asset_{i,t-1}} + \varepsilon_t, \quad (8)$$

where  $TA_{i,t}$  represents the total accrual profit in year  $t$ , which is the difference between the income after deducting nonrecurring gains and losses and the operating cash flow.  $\Delta REV_{i,t}$  is the change in sales revenue,  $\Delta REC_{i,t}$  is the change of net receivable accounts,  $PPE_{i,t}$  is total fixed assets, and  $Asset_{i,t-1}$  is the total assets in year  $t-1$ . This model regresses the sample by industry and year, and the estimated residual error is the manipulable accrued profit. For the convenience of explanation, the absolute value of the residual is multiplied by  $(-1)$  and recorded as  $DACC$ . The larger the value, the higher the earnings quality.

The paper uses the following model to test whether the capital market opening forces listed companies to provide higher-quality earnings:

$$DACC_{i,t} = \alpha_0 + \alpha_1 * Open_{i,t} + \alpha_2 * Post_{i,t} + \alpha_3 * Open_{i,t} * Post_{i,t} + \sum \gamma * control + \varepsilon_{i,t}. \quad (9)$$

The variable definition is the same as that of Model 7. If the coefficient of  $\alpha_3$  is positive, the capital market opening will prompt listed companies to provide higher-quality earnings; otherwise, there will be no impact. Table 7 shows the main results of the multivariate analysis.

From Table 7, we can get that both in the full sample and the PSM sample, the coefficient of  $Post * Open$  is not

significant, which shows that the capital market opening has not improved listed companies' earnings quality. Considering we use two years samples before and after capital market opening for testing, the capital market is still in the early stage of development. So, listed companies' behavior is inertial. To effectively change listed companies' behavior, in addition to reforms, we must give listed companies time to adjust. During the study period, listed companies have not really improved the quality of earnings, and the level of earnings quality is the basis for stock price information content. Therefore, the study believe that the reason for the failure of capital market opening to improve stock price information content may be that capital market opening is still in its early stages and fails to promote the corporate earnings quality. The ultimate goal of capital market reform is to improve the resource allocation efficiency, and as the microparticipant of resource allocation-listed companies, its earnings play an important guiding role. Therefore, it is necessary to examine the effect of capital market opening on the earnings quality of listed companies.

*5.2. Information Transparency: The Perspective of Capital Market Environment.* Although the capital market opening did not improve stock price information content, it effectively speed up the reflection of price to information and improved the stock price discovery efficiency. What is the mechanism of capital market opening to reduce stock price delay?

The capital market opening can improve the market environment, increase information transparency, and accelerate the speed of capital market information transmission. Foreign

TABLE 7: Capital market opening and earnings quality.

	Full sample		PSM sample	
	Coefficient	T value	Coefficient	T value
Post	-0.002	-0.53	-0.001	-0.13
Open	0.012***	3.26	0.012*	1.65
Post * Open	0.003	0.54	-0.005	-0.62
Size	-0.008***	-3.84	-0.004	-1.16
Leverage	0.004	0.53	0.005	0.42
Roa	-0.498***	-13.04	-0.532***	-8.22
Growth	0.002	0.33	0.004	0.72
Firstholder	0.021**	2.31	0.000**	1.97
Managershare	-0.018**	-2.36	0	-1.05
Boardsize	0	0.26	0	-0.08
Independ	0.01	0.42	0.052	1.6
SOE	-0.001	-0.38	-0.010**	-2.11
Dual	0	0.11	-0.004	-0.81
Big4	0.022***	5.23	0.018***	3.31
Analyst	0	-0.74	0	-0.74
Liquidity	-2.012	-1.23	-2.047	-0.82
MB	-0.044***	-7	-0.047***	-4.79
Turnover	-0.001	-1.1	0	-0.31
Age	0	-1.21	0	-0.79
Intercept	0.161***	3.9	0.107*	1.9
Industry	Yes		Yes	
Adj R2	0.087		0.096	
N	6491		2514	

Note: \*\*\* indicates significance at the 1% level, \*\* indicates significance at the 5% level, and \* indicates significance at the 10% level.

investors have more investment experience and better information processing skills, so they can promote faster reflection of corporate-level information to the stock price [22, 40]. As an effective part of the external governance mechanism, foreign investors can effectively improve corporate governance [2] and inhibit large shareholders from encroaching on the interests of medium and small shareholders. The higher the governance level, the more transparent information disclosure. Therefore, we choose foreign institutional investors as the proxy variable for information transparency. The higher the proportion of foreign institutional investors holdings, the more transparent the information.

In order to verify that capital market opening can reduce stock price delay by improving market information transparency, the sample is divided into two groups: low information transparency and high information transparency based on the open annual data. Relative to the high information transparency group, if the result of the low information transparency group is significant, we can draw the indication that the capital market opening reduces stock price delay and improves the efficiency of stock price discovery by improving information transparency of the low transparency group.

We only use PSM samples for testing, and the full sample results are consistent with PSM samples, so we will not repeat them. Table 8 shows the results of multiple regression.

From Table 8, we can see that the coefficient of Post \* Open is significantly negative in the group of low information transparency, but is not significant in the group of high information transparency. It indicates that the opening of capital market has significantly reduced

stock price delay of samples with low information transparency, which confirms that the capital market opening reduces stock price delay by improving information transparency and improves the stock price discovery efficiency.

*5.3. Insider Trading: The Perspective from Executive.* The above discussion analyzes the listed companies' behavior and capital market's information environment. Next, we analyze from the perspective of insider trading, the opposite side of market efficiency.

Insider trading has seriously damaged the resource allocation efficiency in the capital market. Can the capital market opening inhibit the insider trading of corporate executives, thereby reducing the dependence of stock prices on lagging market information and improving the price discovery efficiency? The paper learns from the methods of Chae [41] and Cai et al.: the 30-day average turnover rate during the window period (-40, -11) before the annual report is used as the benchmark turnover rate, and the excess turnover rate in the 5-day window (-2, 2) before and after the quarterly report released is used as the indicator of insider trading [41, 42]. The smaller the indicator, the smaller the trading volume when the annual report is published, the more serious the insider trading. Figure 5 describes the change of insider trading of open sample and matching sample before and after opening. Figure 5 show that insider trading increases after opening, but the opening sample increases less than matching sample.

According to the median number of insider trading, we divide the sample into high insider trading group and low insider trading group. If the results of the high insider trading group are more significant than the low insider trading group, it indicates that the capital market can affect the stock price discovery efficiency by inhibiting insider trading. The results of multiple regression are shown in Table 9.

From Table 9, we can see that the coefficient of Post \* Open is significantly negative at the 1% confidence level in the high insider trading group, while the coefficient in the low insider trading group is negative at the 5% significance level. The significance and absolute value of the coefficients of the high insider trading group are higher than those of the low insider trading group, which indicates that the capital market opening has significantly reduced the stock price delay with high insider trading samples, which confirms that the capital market opening reduces stock price delay by restraining insider trading.

## 6. Robustness Test and Limitation

In the process of empirical test, this paper has carried out progressive tests, and the results are robust. To make the results more convincing, the paper uses several methods for robustness test.

- (1) Referring to Xiao and Gao [43], we use the earnings on the annual report announcement day and the day

TABLE 8: The results grouped by information transparency.

	Low transparency		High transparency	
	Coefficient	T value	Coefficient	T value
Post	0.003**	2.44	0	0.12
Open	0.001	0.98	0	0.2
Post * Open	-0.005***	-3.81	0	0.07
Size	0.003***	4.69	0.001	1.11
Leverage	0.003	1.62	-0.005	-1.15
Roa	0.002	0.2	-0.017	-1.13
Growth	0	-0.43	0.002	1.03
Firstholder	0	0.09	0.000**	2.46
Managershare	0.000**	2.16	0	0.75
Boardsize	0	-0.1	0	0.86
Independ	-0.002	-0.35	-0.006	-0.59
SOE	0.001	1.06	-0.002	-1.05
Dual	0	-0.53	-0.002	-1.01
Big4	-0.003*	-1.78	0.002	1.16
Analyst	0.000***	-2.56	0	0.24
Liquidity	0.602	1.58	0.45	0.5
MB	-0.004**	-2.15	-0.009***	-2.93
Turnover	0.001***	6.42	0.001***	5.49
Age	0.000***	-3.05	0	-0.32
Intercept	0.749***	68.18	0.778***	48.12
Industry	Yes		Yes	
Adj R2	0.122		0.134	
N	1873		626	

Note: \*\*\* indicates significance at the 1% level, \*\* indicates significance at the 5% level, and \* indicates significance at the 10% level.

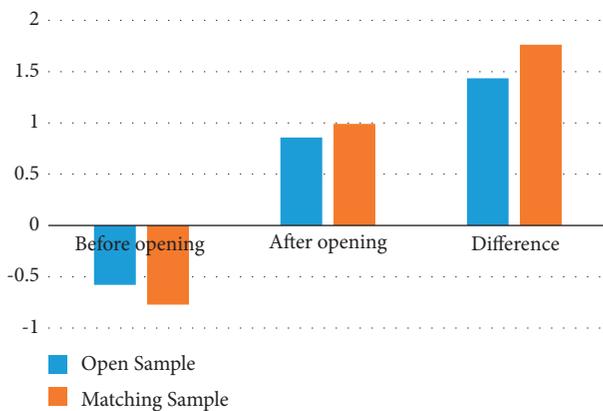


FIGURE 5: The insider trading of open sample and matching sample.

after announcement to represent unexpected earnings information [43]. The sensitivity of unexpected earnings and stock price drift after the announcement represents the stock price information content. By examining capital market opening's sensitivity to the above index to judge the effect of capital market opening on stock price information content, the conclusion has not changed.

- (2) Expand the sample size: in order to effectively match and eliminate the interference of Shenzhen-Hong Kong Stock Connect, we only use the 2014 opening sample for testing. To test our results' robustness, we expand our sample to include firms opened in year 2015 and 2016 and the opening firms of Shenzhen-

TABLE 9: The results grouped by insider trading.

	Low insider trading		High insider trading	
	Coefficient	T value	Coefficient	T value
Post	0.003	1.6	0.005***	2.68
Open	0.001	0.76	0	0.29
Post * Open	-0.004**	-1.99	-0.005***	-2.88
Size	0.002**	2.53	0.002***	2.92
Leverage	0.002	0.74	0.002	0.64
Roa	0.014	1.14	-0.008	-0.69
Growth	0.001	0.75	0	-0.09
Firstholder	0	0.04	0	0.51
Managershare	0.000**	2.23	0	0.1
Boardsize	0	-0.42	0	0.7
Independ	-0.006	-0.72	0.002	0.31
SOE	0	-0.22	0	0.25
Dual	-0.002	-1.4	0	-0.13
Big4	-0.001	-0.51	-0.002	-1.12
Analyst	0.000***	-2.95	0	-0.1
Liquidity	-0.135	-0.23	0.914*	1.68
MB	-0.004*	-1.72	-0.005**	-2.34
Turnover	0.001***	5.47	0.001***	4.84
Age	0	-1.41	0.000**	-2.4
Intercept	0.762***	58.08	0.760***	58.39
Year/industry	Yes		Yes	
Adj R2	0.136		0.115	
N	1061		1197	

Note: \*\*\* indicates significance at the 1% level, \*\* indicates significance at the 5% level, and \* indicates significance at the 10% level.

Hong Kong Stock Connect to test price discovery efficiency. The results remained unchanged.

- (3) Based on the  $R^2$  of the Hou and Moskowitz [34]'s stock price delay model and the new  $R'^2$  that limits  $\beta_1$  to  $\beta_4$  to zero, we construct a new price delay indicator:  $\text{Delay}_i = 1 - (R_i'^2/R_i^2)$  [34]. Then, we use the samples of the paper to rerun multiple regression, and the conclusions remain robust.

Although the robustness test shows our results are robust, there are some limitations in our research. First, it is only the results in the context of China. Whether the result apply to other developing countries remains to be further verified. Second, this study does not give a clear path how the capital market opening improve the stock price information content. Finally, to eliminate the impact of Shenzheng-Hong Kong Connect, we only use the sample of two years after and before opening. If the year-window lengthened, the result would be more convincing.

## 7. Conclusions and Recommendations

With the deepening of globalization, the capital market opening has been focus in academic field in recent years. The paper uses the natural experimental platform provided by SHKSC to study the effect of capital market opening on the price discovery efficiency proxy by price information content and price delay. Our research results indicate that the implementation of SHKSC has not improved the stock price information content as expected, but it has reduced price delay and increased the speed of stock prices' response to market information.

Stock price information content is an important aspect of the price discovery efficiency. The core function of capital market is to allocate resources, and stock price is a comprehensive reflection of various information in the capital market. Whether stock price responds adequately to corporate-level information, especially earnings information, directly determines the capital market resource allocation efficiency. Further research shows that capital market opening failed to fundamentally change the earnings quality of companies. Therefore, the next step for policy making is how to truly affect corporate operations and improve earnings quality through capital market opening.

During our research period, the successful experience of capital market opening is that it effectively restrained insider trading, improved market information environment, and made capital market information transmission faster, thus protecting the interests of small and medium investors. However, a problem that cannot be ignored is that since opening, there has been a net outflow of funds of the mainland capital market. Therefore, it is still necessary to summarize successful experiences on the basis of opening, continue to explore new ways of opening up. In order to maximize the effectiveness of capital market opening and improve the efficiency of stock price discovery, it is necessary to introduce more effective policies to improve the quality of listed companies' information disclosure and stricter regulatory policies and deepen the opening up of capital market.

## Data Availability

The data used to support the findings of this study are available from the corresponding author upon request.

## Conflicts of Interest

The authors declare no conflicts of interest.

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