Research on the Influence of Shanghai-Hong Kong Stock Connect on the Degree and Speed of Underlying Stock Information Response

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Abstract: In order to study the impact of Shanghai-Hong Kong Stock Connect on the degree and speed of underlying stock information response, the information content index and the price adjustment delay of the price calculation based on the stock price synchronization are used as the measure of the degree and speed of the stock market information response in this paper. Select the SSE stock market stock day trading data before and after the implementation of the policy as a sample. This article uses the method of propensity score matching (PSM) and the difference-in-difference model (DID) to perform the empirical analysis. The results show that the launch of Shanghai-Hong Kong Stock Connect has a certain positive effect on the degree and speed of the underlying stock information response. Finally, based on the empirical conclusions, suggestions are made on how to promote the opening up of the securities market.

1. Introduction

Shanghai-Hong Kong Stock Connect's full name is the pilot of the interconnect mechanism between Shanghai and Hong Kong stock markets. It was first proposed on April 10, 2014 and officially opened on November 17, 2014.It is an innovative system approved by the China Securities Regulatory Commission and jointly launched by Shanghai Stock Exchange and Hong Kong Stock Exchange. Shanghai-Hong Kong Stock Connect has been running smoothly for more than four years now. Shanghai Stock Exchange has shown a net outflow to the Hong Kong stock market. What is the actual economic effect and whether it enhances the market effectiveness? This paper takes the stocks of Shanghai stocks as the research object and using the stock information response degree and speed like Saffi and Sigurdsson[1] as the entry points to analyze the economic effects of Shanghai-Hong Kong Stock Connect.

2. Review of Literature
2.1. Research on Stock Pricing Efficiency and Information Response Degree and Speed

The degree and speed of stock information response are two measures that reflect pricing efficiency. Fama's[2] efficient market hypothesis in 1970 believed that the change in the price of securities depends on the information change of the company's intrinsic value. Scholars then extended the value information to study pricing efficiency from the different degrees of reaction of stock prices to company-specific information and market public information. Morck[3] pointed out that the relative degree of capitalization of two kinds of information into stock prices determines the movement characteristics of stock prices in the market. When the stock price contains more market information and less enterprise information, the degree of stock synchronicity is higher, the signal function of the price-guided resource configuration is weaker. In terms of information response speed, Bris[4]through the research on the relationship between the current stock return rate and the one-off market return

rate, found that the higher the correlation between the two rates, the slower the price adjustment of the stock price and the lower the stock pricing efficiency. Isaka[5] studied the Japanese stock market and found that stocks subject to short selling have a lagging response to excess returns, thus confirming the effect of short selling on pricing efficiency through the speed of information response.

2.2. Research on Capital Market Opening and Stock Pricing Efficiency

There are two views on this issue. First, the opening of capital market can improve the efficiency of stock pricing. Schup-pli.M. and Bolhl.T[6] found that foreign institutional investors have the effects of stabilizing China's stock market and improving the effectiveness of the stock market by comparing the effectiveness of China's stock market before and after QFII's entering. Hu Zhenhua and Liu Peiyao[7] analyzed the impact of Shanghai-Hong Kong Stock Connect on the pricing efficiency of the stock market, and believed that the launch of Shanghai-Hong Kong Stock Connect has improved the pricing efficiency of stocks in some ways. Second, the opening of capital market has a negative impact on stock pricing efficiency. Goldstein and Guembel's[8] research pointed out that the opening of stock market may cause the stock market to form new manipulation of price behavior, thereby increasing the noise fluctuations in the stock market. Lu Dayong, Wan Xiaoyuan[9] used the double difference method and panel regression to explore the impact of Shanghai-Hong Kong Stock Connect on the pricing efficiency of the underlying stocks. They believed that Shanghai Stock Connect trade reduced the "information content" of the Shanghai Stock Exchange and improved the stock price synchronization.

3. Analysis of the Influence Mechanism of the Degree and Speed of the Stock Information of Shanghai-Hong Kong Stock Connect

3.1. The Influence Mechanism of Shanghai-Hong Kong Stock Connect on the Degree of Reaction of Stock Information

Most foreign investors are professional fund management companies or investment banks. They have rich information resources and cutting-edge analytical techniques. These rational investors can earn excess returns due to price deviations caused by noise trading. The arbitrage behavior can effectively eliminate potential mispricing and promptly stock prices return to fundamental values, thereby increasing the degree of stock information response. In addition, foreign investors can also improve the quality of disclosure of private information by optimizing corporate governance mechanisms, reducing the difficulty and cost of obtaining company-level information, thereby indirectly improving the stock price information content. Shanghai-Hong Kong Stock Connect is a key project to promote the two-way opening of domestic and foreign capital markets. It introduces more international investors to the A-share market. Based on the above research, we speculate that the opening of Shanghai-Hong Kong Stock Connect will increase the degree of reaction of stock information in the local market.

3.2. The Influence Mechanism of Shanghai-Hong Kong Stock Connect on the Reaction Speed of Stock Information

The Hong Kong market implements a set of trading mechanisms which are in line with developed markets, such as T+0 trading and no up and down limits of price. From the international experience, no trading restrictions can provide higher liquidity and enhance market efficiency. Compared with the limited market environment, the stock information response speed has obvious advantages. Similarly, the information environment improvement and the optimization of corporate governance mechanism brought by foreign investors have a certain positive impact on improving the effectiveness of China's stock market, enhancing signal transmission and improving the speed of stock information response. However, the opening of stock market may also cause capital outflows, leading to a decrease in the liquidity of the domestic stock market, and forming new price manipulation behaviors, thereby reducing the reaction rate of the underlying stock information.

4. Selection of Research Variables and Model Setting
4.1. Variable Selection
4.1.1. The Explained Variable That Measures the Degree of Response to Stock Information
This paper using the stock price non-synchronization index to measure the company's fundamental information content in stock price. The return rate of the A-shares of the Shanghai Stock Exchange will be regressed to the Shanghai market return rate, and the stock price synchronization will be measured by the coefficient of determination R^2 of the regression equation 1. The larger the R^2, the greater the company's income volatility can be absorbed by the market and the industry, the higher the proportion of interpretation, that is, the lower the degree of reaction of stock price information, the part $(1-R^2)$ that is not explained by market fluctuations represents the company's fundamental information content reflected by the stock price.

$$r_{i,t}=\beta_0+\beta_1 r_{m,t}+\varepsilon_{i,t} \qquad (1)$$

In equation 1, $r_{i,t}$ and $r_{m,t}$ represent the return rate of stock i and market in the t period, respectively, and $\varepsilon_{i,t}$ is the residual.

Since the obtained R^2 is a value between 0 and 1, and does not obey the normal distribution, which brings difficulties to the empirical analysis. Therefore the following monotonous changes are made to R^2 to define RSQ.

$$RSQ=\log[(1-R^2)/R^2] \quad (2)$$

The larger the RSQ is, the smaller the R^2 is, which means that the smaller the proportion of individual stock returns can be explained by the market and the industry, the more company trait information reflected by the stock price, the higher the degree of stock information response.

4.1.2. The Explained Variable That Measures the Speed of Stock Information Response
This paper refers to the correlation coefficient between the current stock return rate and one-off market return rate adopted by Bris(2007). The absolute value of the research method to measure the reaction speed of individual stock information, the return rate of the A shares of the Shanghai Stock Exchange will be regressed with the return rate of one-off market like equation 3, the smaller the value of $\rho_{i,t}$, the lower correlation of individual stocks and market yields in the past, the faster the stock information response and the higher the pricing efficiency.

$$\rho_{i,t}=|Corr(r_{i,t},r_{m,t-1})| \qquad (3)$$

In equation 3, $r_{i,t}$ represents the yield of stock i in period t, and $r_{m,t-1}$ represents the rate of return of the market in the t-1 period.

4.1.3. Explanatory Variables and Control Variables
In the explanatory variable, D_t is the time dummy variable, and the selected sample data is set to 0 before the start of the Shanghai-Hong Kong Stock Connect, and is 1 after the start; D_g is the group dummy variable, and set data to 1 if stock from the Shanghai-Hong Kong Stock Connect, non-Shanghai-Hong Kong Stock Connect is 0;DID is the cross dummy variable of D_t and D_g, which is used to reflect the marginal influence of opening of the Shanghai-Hong Kong Stock Connect policy to its underlying stocks. In order to reduce the potential impact of endogenous on the research results, based on the above explanatory variables, this paper takes seven indicators such as company size(SIZE**)**, market-to-book ratio(MB), auditor size(BIG4), total return on assets(ROA), listed company life(AGE), dividend payout ratio(DIVIDEND)and board number(BORADSIZE) as control variables.

4.2. Data Sources
This paper selects the A-share listed companies of the Shanghai Stock Exchange from January 2012 to December 2016 as research samples, which are divided into Shanghai-Hong Kong Stock Connect standard stocks and non-standard stocks, and excludes listed companies in the financial industry and stocks with missing variables. At the same time, to control the potential impact of outliers on regression results, making a tail-end treatment at the company level of continuous variables at the 1% level. Table 1 shows descriptive statistical indicators for each variable.

Table 1 Descriptive statistics

variable	N	Mean	Sd.	Min	Max	Median
RSQ	3541	1.362	1.665	-1.969	14.49	0.952
ρ	3541	0.141	0.112	0	1	0.111
SIZE	3541	22.69	1.044	20.40	28.19	22.56
AGE	3541	2.479	0.605	0	3.091	2.639
MB	3541	4.027	5.832	0.560	38.39	2.421
ROA	3541	0.013	0.824	-48.32	4.837	0.025
DIVIDEND	3541	0.257	0.294	0	1.845	0.283
BORADSIZE	3541	2.186	0.205	1.386	2.890	2.197
BIG4	3541	0.098	0.297	0	1	0

According to Table 1, between 2012 and 2016, the average of RSQ of the Shanghai Stock Exchange is 1.362, and the standard deviation is 1.665. The fluctuation is large, indicating that the company's trait information content contained in the stock price varies greatly among different companies. The stock price synchronicity of A shares in Shanghai stock market is relatively high; At the same time, stock information reaction delay rate, the mean of ρ value is 0.141, and the standard deviation is only 0.112, which indicates that there is not much difference in the information response speed between companies. The overall level is still determined by the market.

4.3. Model Setting

The purpose of this paper is to examine the impact of the Shanghai-Hong Kong Stock Connect policy on the extent and speed of the underlying stock information. Therefore, the construction of the measurement model is as follows:

$$RSQ_{i,t}=\alpha+\beta_1 D_t+\beta_2 D_g+\beta_3 DID+\gamma X+\varepsilon_{i,t} \quad (4)$$

$$\rho_{i,t}=\alpha+\beta_1 D_t+\beta_2 D_g+\beta_3 DID+\gamma X+\varepsilon_{i,t} \quad (5)$$

X is a series of control variables mentioned above, and $\varepsilon_{i,t}$ is a random interference term.

5. Empirical Results and Analysis

Due to the company's asset size, book-to-market ratio, total return on assets, and dividend payout ratio and many other aspects of financial indicators have obvious individual characteristics, in order to avoid the potential endogenous effects of these factors on the research results, this paper adds all the control variables in the model to the log it regression, uses the PSM model to make the one-to-one matching of the target and non-standard companies, and the control samples that eliminate the systematic differences of the company are the main research samples of this paper.

5.1. The Impact of Shanghai-Hong Kong Stock Connect on the Degree of the Underlying Stock Information Response

The model (4) is subjected to regression estimation using the full sample and the sample after PSM matching, and the results are shown in Table 2.The first column is a full sample, in the full sample results, the core variable DID coefficient is 0.258, and the t-value is 3.51, which is significant at the statistical level of 1%.It shows that the opening of Shanghai-Hong Kong Stock Connect has a significant positive impact on the degree of response to the underlying stock information; In the PSM sample results, the DID coefficient is 0.234,although the coefficient of it is reduced relative to the full sample group, the value of it is reduced to 2.38, but it is still significant at the statistical level of 5%.Explain that after removing the difference between the Shanghai-Hong Kong Stock Connect -standard and non-standard stocks at the company level, the Shanghai-Hong Kong Stock Connect policy still has a significant positive marginal effect on improving the stock information response of listed companies.

Table 2 Information response degree

	Full sample	PSM sample
DID	0.258***	0.234**
	(3.51)	(2.38)
Dg	0.188***	0.227***
	(3.43)	(3.45)
Dt	-0.506***	-0.165*
	(-13.58)	(-1.95)
_cons	-0.250	3.605***
	(-0.64)	(5.47)
N	9376	2624
r2_a	0.268	0.263
F	163.706	48.068

5.2. The Impact of Shanghai-Hong Kong Stock Connect on the Speed of the Underlying Stock Information Response

Table 3 gives the regression results of the Shanghai-Hong Kong Stock Connect sample on model (5). In the full sample results, the regression coefficient of DID is -0.019, and the t value is -3.07, which is significant at the statistical level of 1%, indicating that the opening of Shanghai-Hong Kong Stock Connect can significantly reduce the information adjustment delay speed; Also in the PSM sample results, the DID coefficient is -0.018 and is significant at the 5% statistical level. It shows that after removing the systematic differences between the underlying and non-standard stocks, the Shanghai-Hong Kong Stock Connect policy still has a certain improvement effect on the response speed of the underlying stock information.

Table 3 Information response speed

	Full sample	PSM sample
DID	-0.019***	-0.018**
	(-3.07)	(-2.10)
Dg	-0.001	-0.004
	(-0.28)	(-0.75)
Dt	0.161***	0.149***
	(27.06)	(16.69)
_cons	0.017	0.053
	(0.35)	(0.94)
N	3541	2144
r2_a	0.322	0.264
F	89.158	47.636

6. Analysis Conclusions and Policy Suggestions

6.1. Analysis Conclusions

Based on the theory of effective market, this paper uses the propensity score matching method and the difference-in-difference model to empirically analyze the influence of the Shanghai-Hong Kong Stock Connect policy on the degree and speed of its target stock information reaction. The conclusions are as follows:

The Shanghai-Hong Kong Stock Connect policy can significantly improve the degree and speed of information reaction on the underlying stock. The launch of the Shanghai-Hong Kong Stock Connect policy will help promote more company-level specific information into stock prices, accelerate the company's fundamental information into stock prices and reduce stock price synchronicity, strengthen the signal mechanism of the stock price, thereby improving the efficiency of resource allocation in the capital market and enhancing market effectiveness.

6.2. Policy Suggestions

6.2.1. Vigorously Develop Institutional Investors and Promote Rational Transactions

We should actively promote the proportion of institutional investors and optimize the types of investment and investment methods, moderate deregulation and fostering diverse institutional

investors, optimize the structure of the capital market. For small and medium investors, there should be substantial promotion of investor education, improve the risk awareness and corresponding professional knowledge of small and medium investors, and guide them to conduct fundamental analysis and value investment, actively guide investors to rational transactions.

6.2.2. To Open the Stock Market Gradually

The opening of the stock market should be regarded as a long-term goal, on the basis of strictly controlling financial risks and improving the trading system of Shanghai-Hong Kong Stock Connect, gradually expand the scope of the underlying stock, and implement the open policy such as Shanghai-London Stock Connect in due course, strengthen the links and cooperation between China's stock market and developed markets in Europe and America, then continue to deepen the opening of the capital market. We should focus on financial cross-border cooperation and develop a new mode of cooperation based on the principle of mutual benefit and win-win.

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