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THE INFLUENCE OF SHANGHAI-HONG KONG STOCK CONNECT ON THE MAINLAND CHINA AND HONG KONG STOCK MARKETS

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ABSTRACT

China has been intensively launching opening-up policies since November 2014. Among these policies, the Shanghai-Hong Kong Stock Connect offers international investors an approach to investing directly in Mainland China stock markets. At the same time, Mainland China capital can gain access to overseas markets via Hong Kong. This study investigates the influence of the policy by using the Vector Autoregressive and Generalized Autoregressive Conditional Heteroscedastic framework. The results show that the new policy has different impacts on the Shanghai, Shenzhen, and Hong Kong stock markets due to their distinct market features and policy restrictions. The three markets also transmit the policy effects to one another due to their close linkages. It not only indicates that Mainland China financial centers (Shanghai and Shenzhen) integrate with one of international financial centers (Hong Kong), but also symbolizes the gradually increasing strength of Chinese policy effects on global capital markets.

JEL: G00, G10, G18

KEYWORDS: Chinese Stock Market, Policy and Regulation, Shanghai-Hong Kong Stock Connect, VAR, GARCH

INTRODUCTION

The Shanghai-Hong Kong Stock Connect program was officially implemented on November 17, 2014, after being formally announced on April 10, 2014. It permits hundreds of Shanghai-listed companies to be traded in Hong Kong and vice versa. In addition, since March 2015, investors have been allowed to short sell stocks using the program. Further, the limited daily quota for Mainland investors buying Hong Kong stocks ran out for the first time on April 8, 2015. With China's economic development, not only Mainland investors are eager to enter Hong Kong or even foreign stock markets, but also foreign investors are enthusiastic about exploring new access to Mainland China stock markets. The stock connect program plays a role in bridging the gap. Due to the close relationships in economy and trade between Mainland China and Hong Kong, the Shanghai, Shenzhen, and Hong Kong stock markets are highly integrated. Investors are able to take advantage of better investment and diversification opportunities. For example, Li *et al.* (2014) show that cointegration and error-correction mechanisms exist between A-share and H-share. They also propose a trading strategy of which the returns beat the market. Arouri *et al.* (2010) suggest that cross-border portfolio diversification seems greatly possible despite considerable interdependencies among markets. Hence, it is important to know whether and how the stock connect program will influence the coactions of the Mainland China stock markets and the Hong Kong stock market. In addition, the program facilitates reforms of the Chinese stock market, which is consistent with the argument of Shen *et al.* (2007). They argue that openness policies enhance the market efficiency. The program is also considered as a milestone of the Chinese government to relax its capital

controls. Furthermore, it bulks the Hong Kong CNH market and attracts more foreign capital flowing into the Chinese stock market, improving the liquidity of the stock markets. Therefore, how the stock markets of Mainland China and Hong Kong respond to the stock connect policy is a matter of importance.

In this study, we investigate how the Shanghai, Shenzhen, and Hong Kong stock markets respond to the implementation of the new stock connect program. We employ the Vector Autoregressive and Generalized Autoregressive Conditional heteroscedastic (VAR-GARCH) framework to evaluate the policy effects on the three markets in different stages. Markedly, it is found that the Shanghai-Hong Kong Stock Connect has effects on both market returns and volatility, and the power of the policy spreads through the comovements of the markets. The remainder of this paper is organized as follows. The next section presents the literature review, while the following section reports the data description along with the econometric methodology. Then, the next section presents the empirical findings and interprets the policy implications behind the structural changes in returns and volatility in the Shanghai, Shenzhen, and Hong Kong stock markets. The last section concludes the paper.

LITERATURE REVIEW

It is considered that government policies have significant effects on China's stock markets (Chen *et al.*, 2014; Tsai *et al.*, 2015). Policy uncertainty also makes the stock market fluctuates (Pastor and Veronesi, 2012; Antonakakis *et al.*, 2013; Liu and Zhang, 2015). In addition, investor sentiment embodies significant predictive power to stock returns (Dergiades, 2012). In other words, investor sentiment, affected by related policies and significant events, has tremendous impact on Mainland China stock markets (Chi *et al.*, 2012; Shan and Gong, 2012; Tsai *et al.*, 2016). Furthermore, China is opening up its financial market, and thus correlations between Chinese and foreign markets are increasing (Wang *et al.*, 2014; He *et al.*, 2015; Luo and Schinckus, 2015; Luo and Ye, 2015). For example, Luo and Schinckus (2015) confirm the increasing influence of the US market on the Chinese stock markets. Consistent with the argument of prior studies, comovements between stock markets are time varying (Dajcman *et al.*, 2012) and increase during certain periods (Dalkir, 2009).

To date, ties between the Mainland China and Hong Kong stock markets have been further strengthened as time passes by. Su *et al.* (2007) suggests that the stock prices of the Mainland China markets and the Hong Kong market have started to cointegrate as early as the launch of the Closer Economic Partnership Arrangement. Shi *et al.* (2011) propose that after the 2008 financial crisis, relationships between the Mainland China and Hong Kong stock markets transforms from one-way causation into two-way causation, and the influence of the mainland stock markets on the Hong Kong market, which is little in the past, becomes significant. Chang (2015) puts forward the evidence that the short-run comovements between the Shanghai, Shenzhen, and Hong Kong markets are intensified by the market contagion. Moreover, Chang *et al.* (2014) find that the Shanghai-Hong Kong Stock Connect considerably increases the effect of the Shanghai stock market on the Hong Kong stock market, which is vague before the launch of the stock connect policy.

Though there have been numerous studies on the influence of Chinese opening-up policies on the comovement of the Shanghai and Hong Kong stock markets, little investigation pertaining to the comovements of the Shanghai, Shenzhen, and Hong Kong stock markets exists. However, as the government considers loosening several restrictions and limitations of the Shanghai-Hong Kong Stock Connect in last six months and as the forthcoming Shenzhen-Hong Kong Stock Connect heats up, the linkages among the Shanghai, Shenzhen, and Hong Kong markets will further intensify. The importance of finding out policy influence on the comovements of the three stock markets becomes more and more prominent. Our study aims to bring investors a new sight into the interactions among the three stock markets, which will give them access to explore some novel investment opportunities. Meanwhile, it helps Chinese financial regulators to facilitate the reform and improvement of the Chinese stock markets.

DATA AND METHODOLOGY

Data Description

Data for major policy implementation or announcement are hand-collected from official news releases. Table 1 lists the different stages of the Shanghai-Hong Kong Stock Connect.

Table 1: Implementation of Shanghai-Hong Kong Stock Connect

Time	Significant Step	Potential Influence
2014.4.10	The program is first announced by Premier Li Keqiang	Promote the interconnection between the stock markets of Mainland China and Hong Kong
2014.11.17	The program is officially launched	Embody the next round Chinese financial reform
2014.12.9	Three Shanghai-Hong Kong Stock Connect ETF funds are issued	Spur capital inflows to the Hong Kong stock market
2015.3.2	Short selling is permitted	Help the stock markets smooth out and hedge risks
2015.3.27	Guidelines for public funds participating in the Shanghai-Hong Kong Stock Connect trading are enacted	Encourage mainland investors to enter the Hong Kong stock market
2015.4.8	Daily quota of the Hong Kong Stock Connect runs out for the first time	Mainland capital consistently flows into the Hong Kong stock market

This table presents different stages of the Shanghai-Hong Kong Stock Connect. The Shanghai-Hong Kong Stock Connect is considered as an approach that is under control for mutual market access between the Mainland China and Hong Kong by an array of investors. Qualified investors in Mainland China are able to trade qualified shares listed on the Hong Kong Stock Exchange by local brokers. Meanwhile, Hong Kong and international investors can trade eligible Shanghai-listed shares through local brokers as well.

Transaction-level data for stock indices and stock index futures are obtained from Wind. The data comprise daily closing prices of the Shanghai Composite Index, Shenzhen Component Index, and Hong Kong Hang Seng Index from January 1, 2014 to May 29, 2015. In addition, according to Yang *et al.* (2012), the issue of stock index futures affects the volatility of the stock index. Therefore, we further collect the daily closing prices of the short-term maturity of CSI 300 (Hang Seng) stock index futures contracts (one-month) of the same period.

$P_{1,t}$, $P_{1,\,t-1}$ ($P_{2,t}$, $P_{2,\,t-1}$; $P_{3,t}$, $P_{3,\,t-1}$) denote the closing prices of the Shanghai Composite Index (Shenzhen Component Index; Hang Seng Index) in period *t*, *t*–1; $r_{1,t}$ ($r_{2,t}$; $r_{3,t}$) denotes the daily yield rate of the Shanghai Composite Index (Shenzhen Component Index; Hang Seng Index) in period *t*. We employ the natural logarithm (ln) of all daily index prices for calculation of r_t:

$$r_t = 100 \times (lnP_t - lnP_{t-1}) \quad (1)$$

Similarly, we can obtain f_t, the corresponding daily yield of the CSI 300 (Hang Seng) stock index futures in period *t*.

Table 2 shows the statistical characteristics of the stock indices. The findings are summarized as follows. First, the r_t of the Shanghai Composite Index has negative skewness and a spike. Second, the Jarque-Bera statistic shows that the r_t series is not a normal distribution and has fat tails. Hence, estimations in the later analyses use the Generalized Error Distribution (GED) to account for the innovation distribution with fat tails. Third, the r_t series passes the Augmented Dickey-Fuller unit root test and is stationary. Finally, the r_t series of the Shenzhen Component Index and Hang Seng Index present similar results.

Table 2: Summary Statistics

Statistical Characteristics	Shanghai Index	Shenzhen Index	Hang Seng Index
Mean	0.2367	0.1895	0.0594
Median	0.1683	0.1403	0.0652
Maxium	6.369	4.727	3.732
Minimum	–8.018	–6.835	–2.619
Std. Dev.	1.334	1.430	0.9261
Skewness	–0.4069	–0.0461	–0.0996
Kurtosis	9.699	5.242	3.923
Jarque-Bera	588.19	65.051	11.523
p-value for JB	<0.0001	<0.0001	0.0031
Augmented Dickey-Fuller	–17.654	–17.891	–16.568
p-value for ADF	<0.0001	<0.0001	<0.0001

This table presents summary and test statistics for the Shanghai Composite Index returns, Shenzhen Component Index returns, and Hong Kong Hang Seng Index returns, respectively. Under the null hypothesis of a normal distribution, the Jarque-Bera (JB) statistic has a chi-squared distribution with two degrees of freedom. Unit root test are conducted using the Augmented Dickey-Fuller (ADF) with trend and intercept.

Methodology

First, we utilize a VAR model to examine the comovements of daily returns of the Shanghai Composite Index, Shenzhen Component Index, and Hang Seng Index. The *s*th order VAR, VAR(*s*), for the endogenous relations between the three indices is specified as

$$r_t = \mathrm{C} + \sum_{j=1}^{s} \mathrm{B}_j r_{t-j} + \sum_{k=1}^{6} \aleph_k D_k + \epsilon_t \tag{2}$$

where B_j and $\aleph_k$ represent the coefficient matrices, which describe the comovement relations and the policy impact, respectively. Indicator variables, D_k, are used to examine the influence of policy announcement or implementation in different stages.

$$D_k = \begin{cases} 1 & After - annoucement \ \ (implementation) \\ 0 & Before - announcement \ \ (implementation) \end{cases} \tag{3}$$

Second, we employ the GARCH-in-Mean (GARCH-M) model to account for heteroscedastic variance and its effect on returns. The model captures the policy influence on both stock performance and volatility for each individual market *i*. The mean equation of the model is

$$r_{i,t} = c + \sum_{j=1}^{s} \beta_j r_{i,t-j} + \tau \sqrt{\sigma_{i,t}^2} + \epsilon_{i,t} \tag{4}$$

The variance equation of the GARCH(*p*,*q*)-M model is presented in the following form:

$$\sigma_{i,t}^2 = \omega + \sum_{m=1}^{p} \gamma_m \sigma_{i,t-m}^2 + \sum_{n=1}^{q} \pi_n \epsilon_{i,t-n}^2 + \sum_{k=1}^{6} \varphi_k D_k + \theta f_t \tag{5}$$

where γ_m and π_n are the parameters for the GARCH and ARCH terms; φ_k captures the effect of policy announcement or implementation (D_k) on volatility; and θ controls for the effect of the stock index futures (f_t). In the model selection process, we examine different kinds of commonly used combinations of VAR(*s*)- GARCH(*p*,*q*)-M models according to two most commonly used criteria, the Akaike Information Criterion (AIC) and the Bayesian Information Criterion (BIC). The results suggest the VAR(2)-GARCH(1,1)-M specification is an appropriate model. Namely, for each market the mean and variance equations of the model are

$$r_t = c + \sum_{j=1}^{2} \beta_j r_{t-j} + \tau\sqrt{\sigma_t^2} + \tag{6}$$

$$\sigma_t^2 = \omega + \gamma\sigma_{t-1}^2 + \pi\epsilon_{t-1}^2 + \sum_{k=1}^{6} \varphi_k D_k + \theta f_t \tag{7}$$

where the parameters are as explained above. Among them, τ evaluates the volatility influence on returns. The total influence of information shocks, $\gamma + \pi$, measures the persistence of the market response to the changes in the past and recent information. π allows us to observe the market sensitivity to the new information. φ_k captures the policy influence.

RESULTS AND DISCUSSION

Impact on Stock Returns

We first observe features of the stock returns in the three stock markets. Table 3 shows that all the three stock market returns are affected by their own preceding returns. In addition, the Shanghai stock market

Table 3: Effects of Policy Implementation on Stock Returns

		Shanghai	Shenzhen	Hong Kong
	C	0.2227***	0.1758**	0.0358
		(0.0795)	(0.0856)	(0.0545)
Shanghai	SH_{t-1}	–0.0898	–0.1087	–0.0917†
		(0.1281)	(0.1379)	(0.0878)
	SH_{t-2}	–0.2468**	–0.1212†	–0.0604
		(0.1278)	(0.1376)	(0.0877)
Shenzhen	SZ_{t-1}	0.0737	0.0652	0.0165
		(0.1167)	(0.1257)	(0.0800)
	SZ_{t-2}	0.2318**	0.1873**	0.1000*
		(0.1166)	(0.1255)	(0.0799)
Hong Kong	HS_{t-1}	–0.0597	–0.0544	0.0817*
		(0.0930)	(0.1001)	(0.0638)
	HS_{t-2}	–0.0604	–0.0965†	–0.0036
		(0.0923)	(0.0994)	(0.0633)
Policy	Policy 1st	0.0919	0.1201	0.0534
		(0.1934)	(0.2068)	(0.1334)
	Policy 2nd	0.4806***	0.5224***	0.1118
		(0.1641)	(0.1756)	(0.1144)
	Policy 3rd	0.2634*	0.2376*	0.1366†
		(0.1702)	(0.1825)	(0.1174)
	Policy 4th	0.6638***	0.4777**	0.2925**
		(0.2354)	(0.2539)	(0.1633)
	Policy 5th	0.8771***	0.6867**	0.6863***
		(0.3249)	(0.3499)	(0.2229)
	Policy 6th	0.7785**	0.4104	0.7851***
		(0.3925)	(0.4223)	(0.2681)

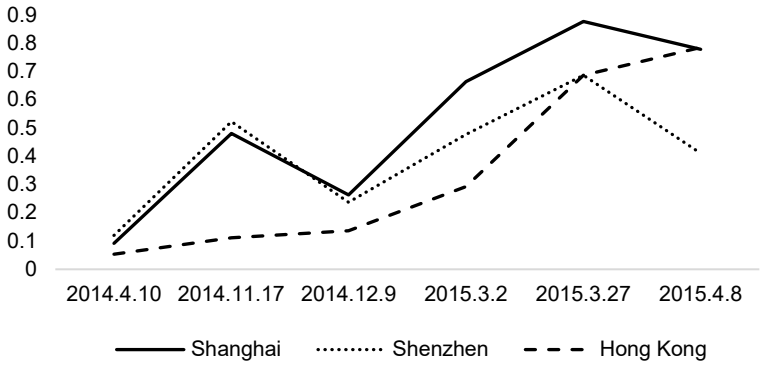
This table presents estimation results of the VAR model for the Shanghai, Shenzhen, and Hong Kong stock markets. The VAR model is as follows:

$$r_t = \mathrm{C} + \sum_{j=1}^{2} \mathrm{B}_j r_{t-j} + \sum_{k=1}^{6} \aleph_k D_k + \epsilon_t$$

*Standard errors are in parentheses. ***, **, *, and † represent statistical significance at the 1%, 5%, 10%, and 15% levels, respectively.*

interacts with the Shenzhen stock market, and the Shenzhen market is affected not only by the Shanghai market but also by the Hong Kong market. Furthermore, the Hong Kong market acts mutually with the Shanghai and Shenzhen markets. The results suggest that the comovements of the three stock markets exist. Then, we obtain the estimated responses of market returns to the policy announcement or implementation, which are detailed in Table 3 and are plotted in Figure 1, respectively. The results show general upward trends for the three stock markets. The three markets all give positive responses to the policy.

Figure 1: Response of Market Returns to Policy Implementation



This figure displays the evolution of the policy impact on stock returns.

Impact on Stock Volatility

Table 4 shows the effects of the policy implementation on stock volatility. The estimated effects are plotted in Figure 2. Interestingly, the Shanghai and Shenzhen stock markets react severely to the new policy, while the response of the Hong Kong market is lukewarm, except for one spike. These differences originate partly from the distinct market features of the Mainland China and Hong Kong stock markets. The Hong Kong market is dominated by institutional investors. Retail investors, by contrast, play the main role in the Mainland China stock markets. In addition, the Mainland China stock markets are generally considered as policy-oriented markets, in which the local investors are relatively more sensitive to new policies. Furthermore, in the initial phase the Chinese government gave certain advantages to the Shanghai stock market, in which the market access threshold is lower (e.g., no need to take a test or personally go to the security company to open the trading account). These reasons account for the instant volatility change in the Mainland China markets, and then, as time goes by, the markets gradually digest the spur of the policy and their volatility returns to the original level.

In contrast, Hong Kong has been an open market for several years, and its investors are far more rational than those in Mainland China. In addition, except for relatively more limitations on investing in the Hong Kong Stock Connect (e.g., investors are restricted to institutional investors and personal investors should have more than 500,000 yuan RMB in their accounts), Mainland investors hesitated to invest in the Hong Kong market due to less knowledge and preparation. Hence, the tepid response of the Hong Kong market is reasonable. However, the fifth step of the policy, which confirms the legitimacy of public funds participating in the Hong Kong Stock Connect trading, considerably stimulated the volatility change of the Hong Kong market due to large amount of capital inflow. Mainland retail investors are then able to invest in the Hong Kong stock market through public funds with a low entry threshold (the minimum required investment is only 100 yuan RMB). Meanwhile, Mainland China experienced a stock boom since the second half of 2014, and Mainland investors are prone to transfer their capital to the Hong Kong market, whose stocks are considered undervalued.

Table 4: Effects of Policy Implementation on Stock Volatility

Panel A: Shanghai					
Model	ω	γ	π	θ	τ
GARCH-M	0.8193***	0.2524***	0.0241***	0.1395***	7.899***
	(0.0364)	(0.0293)	(0.0067)	(0.0070)	(0.2140)
Policy Effects					
Policy 1st	0.0091*	Policy 3rd	0.0578***	Policy 5th	0.0472***
	(0.0068)		(0.0010)		(0.0035)
Policy 2nd	0.0610***	Policy 4th	0.0672***	Policy 6th	–0.0131
	(0.0106)		(0.0049)		(0.0145)
Panel B: Shenzhen					
Model	ω	γ	π	θ	τ
GARCH-M	0.7465***	0.5922***	0.2336***	0.5275***	2.335***
	(0.1403)	(0.0248)	(0.0368)	(0.0633)	(0.1149)
Policy Effects					
Policy 1st	–0.1179***	Policy 3rd	0.1883***	Policy 5th	–0.2686***
	(0.0331)		(0.0435)		(0.0542)
Policy 2nd	0.0997***	Policy 4th	0.0347	Policy 6th	–0.2805***
	(0.0439)		(0.0798)		(0.0694)
Panel C: Hong Kong					
Model	ω	γ	π	θ	τ
GARCH-M	0.1037***	0.0028	0.0027**	0.0205***	3.970***
	(0.0075)	(0.0053)	(0.0017)	(0.0021)	(0.2740)
Policy Effects					
Policy 1st	0.0008	Policy 3rd	–0.0003	Policy 5th	0.0381***
	(0.0010)		(0.0018)		(0.0094)
Policy 2nd	0.0007*	Policy 4th	0.0018*	Policy 6th	0.0045***
	(0.0005)		(0.0012)		(0.0007)

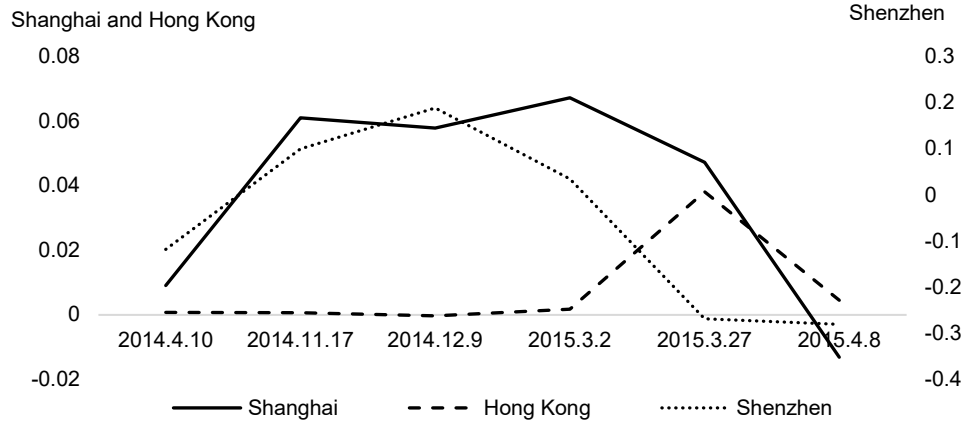
This table presents estimation results of the GARCH models for the Shanghai, Shenzhen, and Hong Kong stock markets in Panels A, B, and C, respectively. The GARCH models are as follows:

$$r_t = c + \sum_{j=1}^{2} \beta_j r_{t-j} + \tau\sqrt{\sigma_t^2} + \epsilon_t$$

$$\sigma_t^2 = \omega + \gamma\sigma_{t-1}^2 + \pi\epsilon_{t-1}^2 + \sum_{k=1}^{6} \varphi_k D_k + \theta f_t$$

*The estimation of the parameters is examined with the Generalized Error Distribution (GED) assumption for the innovations. Standard errors are in parentheses. ***, **, and * represent statistical significance at the 1%, 5%, and 10% levels, respectively.*

Figure 2: Response of Market Volatility to Policy Implementation



This figure shows the evolution of the policy impact on stock volatility.

Table 4 also provides the volatility influence on the mean equation, τ. The corresponding coefficients of the three markets are all statistically significant, suggesting that volatility affects stock returns. Combining the result with those in the previous discussion, the policy implementation has impacts on stock volatility, volatility affects stock returns, and returns of stock markets interact with each other. The overall results imply that the three markets pass on the effects of policy implementation to one another via their comovements. Regarding other coefficients in Table 4, the $\gamma + \pi$ and π in the Mainland China markets are higher than those in the Hong Kong market, suggesting not only that the influence of the shocks lasts longer in the Mainland China markets but also that Mainland investors are more sensitive to new information.

CONCLUDING COMMENTS

This study investigates the influence of the Shanghai-Hong Kong Stock Connect. The policy aims at establishing mutual stock access between the Mainland China and Hong Kong markets. Our results suggest that the policy affects these markets differently because of their distinct characteristics such as different investor structure, entry thresholds, and regulation requirements. In addition, these markets interact with each other and the power of the policy, therefore, spreads among the markets. Furthermore, this study implies that the implementation of the Shanghai-Hong Kong Stock Connect has laid the groundwork for the Shenzhen-Hong Kong Stock Connect. There are reasons to believe that the linkages of the Shanghai, Shenzhen, and Hong Kong stock markets will further intensify with subsequent opening-up policies being launched. It not only indicates that Mainland China financial centers (Shanghai and Shenzhen) integrate with one of international financial centers (Hong Kong), but also symbolizes the gradually increasing strength of Chinese policy effects on global capital markets.

Finally, our study only focuses on the policy impact of the Shanghai-Hong Kong Stock Connect. This study can be extended to a series of opening-up policies. In recent years, capital market internationalization has played an important role in China's reform agenda. Before the stock connect program, many policies have launched such as Qualified Foreign Institutional Investor (QFII) and Qualified Domestic Institutional Investor (QDII) programs. Future research can explore how these policies and forthcoming policies affect the Mainland China, Hong Kong, and other related markets.

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BIOGRAPHY

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