

An Empirical Study of Shanghai-Hong Kong Stock Connect Program and Financing Constraints under the Regulatory Effects

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Abstract. Shanghai-Hong Kong Stock Connect Program began on July 17th, 2014, aiming to strengthen the cooperation in capital markets and promote the opening of domestic companies to the outside world. Based on DID and PSM-DID method, the article analyzes data sample from 2010 to 2017, exploring the effects of the program on financing constraints. It shows that Shanghai-Hongkong Stock Connect Program alleviates financing constraints of underlying companies: If the institutional ownership is regarded as moderating variable, the financing constraints changes significantly; With the help of this program, enterprises with high investors attention and low tax rate are more likely to get rid of the dilemma of financing. According to the results, the government should keep promoting the development of capital markets and enterprises should learn from the outside world and constantly improve their management skills.

Keywords: Shanghai-Hong Kong Stock Connect Program; Financing Constrains; DID; PSM-DID.

1. Introduction

President Xi delivered important speeches in the Central Economic Working Conference, held in Beijing from December 8th to 10th in 2021. According to President Xi, Socialist Market Economy is a remarkable invention and inevitably contains various forms of capital, which are expected to contribute to economic development of China in the future. However, due to the fact that external financing is costly, enterprises often face the problems of financing constraints, impeding capitals to function as well as expected. Therefore, solving the financing problem has become the key to promote the development of capital market.

In November 2014, the implementation of the Shanghai-Hong Kong Stock Connect Program established an unprecedented cooperation mechanism, broadened the financing channels of Shanghai and Hong Kong, and encouraged international investors to enter mainland stock market, which had a great impact on macroscopic financial market. Li Qiao (2021) found that, the Program made contributions to opening mainland capital market further by establishing offshore RMB backflow channels, reducing the difference of exchange rate and strengthening the linkage between two sides of cross-Straits; Zhang Zuominyang (2020) proved that, the program could enhance the risk spillover effect in Shanghai and Hong Kong as well as promote the development of individual enterprises; Ma Yaming et al. (2021) found that the implementation of the program can urge enterprises to improve the quality of accounting information disclosed, thus improving the corporate governance. Xin Yingying et al. (2021) found that the investment efficiency of objected enterprises was much higher than those without being objected and therefore concluded that the investment efficiency can be highly improved by the implementation of the program.

Other researchers also found, the effects of this program on financial market can be partly explained by its effects on financing constraints. Shi Qian & Yao Qiuge (2018) took the KZ index as a measure of financing constraints and analyzed the impact of the launch of the program on variables such as analyst tracking and audit quality. They believed that the mechanism could reduce information asymmetry, alleviate agency problems, improve enterprise management and therefore reduce the risk of financing constraints; Yang Shenggang et al. (2020) found that the program reduced the financing constraints a lot especially on private enterprises, non-multinational enterprises and samples with high local judicial efficiency and marketization level; Zhou Fan (2016) proved that Shanghai-Hong Kong Stock Connect Program could encourage those enterprises to volunteer to disclose information, which would also reduce financing constraints.

The marginal contribution of this article is as follow: First, taking the establishment of Shanghai-Hong Kong Stock Connect as a starting point, it explores the effects of capital market opening on the financing constraints, which enriches the research on the influence factors of financing and guarantee the implementation of the opening-up policy theoretically. Second, it investigates whether institutional ownership has a moderating effect on the mechanism of the program affecting financing constraints, which provides a new perspective on researches for mechanism of financing constraints. During the process, SA indicator is used as measurement of the degree of financing constraints, for the purpose of relieving endogeneity problem.

2. Theoretical Framework and Hypothesis

The effects of Shanghai-Hong Kong Stock Connect Program on financing constraints can be divided into two categories:

On one hand, the program is able to attract more investors abroad, refine investor structure, broaden financing channels, and thereby ameliorate financing problems. Due to the fact that foreign investors usually ask highly for information quality and have a preference on international standards, domestic enterprises having to disclose high-quality information would attract more investors and capitals. Meanwhile, the policy could relieve information asymmetry, reducing moral hazard and adverse selection, for that investors would tend to invest more with those transparent and valuable information. The program also welcomes more advanced investment system and philosophy from abroad, because domestic enterprises can take its essence and apply those concepts to themselves, for example, giving some useful solutions to the financing dilemma.

On the other hand, the program might worsen financing for the following reasons: First, when excessive capitals enter the market, business out of abnormal optimism would require much more money, causing related corporations to be stuck in financing constraints, which can be recognized as vicious cycle. Another reason is that it's expensive for investors to get valuable and credible information and thus, it is hard to trust those companies to operate well. Therefore, corporations cannot have sustainable and long-term economic support. Based on the above theories, H_{1a} and H_{1b} are proposed:

H_{1a} : The degree of financing constraints increases after Shanghai-Hong Kong Stock Connect Program.

H_{1b} : The degree of financing constraints decreases after Shanghai-Hong Kong Stock Connect Program.

Yu Junyu (2021) found, institutional ownership could reduce the risk of information asymmetry and therefore relieve financing constraints. Firstly, institutional investors are expert at searching for information and their participation means introducing professional information gathering team to the company, which could relieve information asymmetry. Secondly, institutional investors play the role of infomediary. Under this circumstance, outside investors would rely on the information institutional investors give to them, which is usually objective and useful. Hence, the evaluated project or company would be less risky and the risk premium would decline as well, which would further reduce the cost of external finance. Thirdly, a relatively large percentage of institutional ownership implies high transparency of the company, which would leave a good impression on outside investors, making it easier to raise money. Finally, institutional investors can play a good role as corporate supervisors. If institutional investors can become board members, they can monitor corporate management, thus alleviating the principal-agent problem. Based on the above theories, H_2 is proposed:

H_2 : Institutional investors play the moderating role in the relationship between Shanghai-Hong Kong Stock Connect Program and financing constraints.

3. Model, Data and Variable Description

3.1 Model Specification

Based on a quasi-natural experiment of Shanghai-Hong Kong Stock Connect Program, this article uses DID model to isolate the real impact of the policy, as follows:

$$SA_{i,t} = \alpha + \beta_1 \text{Treat*Post}_{i,t} + \beta_2 X_{i,t} + \text{Ind}_i + \text{Year}_t + \varepsilon_{i,t} \quad (1)$$

where i represents enterprise, t represents year. The explained variable SA is financing constraints; the core explanatory variable Treat*Post represents net effect of Shanghai-Hong Kong Stock Connect Program; X stands for a series of control variables; Ind denotes industry fixed effect; Year represents annual fixed effect; ε is a random disturbance term. β_1 is the coefficient we focus on: being positive indicating that the program relieves financing constraints; otherwise, the program worsens financing constraints.

3.2 Sample Selection and Data Sources

Take A-share listed companies in Shanghai and Shenzhen from 2010 to 2017 as the initial samples from CSMAR, and do the following treatments: (1) Eliminate financial companies; (2) Eliminate ST, *ST and PT companies; (3) Eliminate newly added or removed stocks of the Shanghai-Hong Kong Stock Connect Program after November 2014; (4) Eliminate the samples with missing financial data; (5) Winsorize continuous variables at 1% level on both sides to eliminate the impact of extreme values. Finally, 8518 samples are obtained.

3.3 Variables Selection

3.3.1 Explained Variables

Financing constraints. There has not been a unified measurement of enterprise financing constraints in the academic circle so far, while KZ index (Kaplan & Zingales, 1997), SA index (Hadlock & Pierce, 2010) and WW index (Whited & Wu, 2006) are widely used. In this article, SA index is utilized because of its exogeneity and timelessness. This index has also been used by Shi Xiaokun (2017), Wang Jin (2015) and Wu Na (2013). The computation formular of SA index is as follows:

$$SA = -0.737 \times \text{Size} + 0.043 \times \text{Size}^2 - 0.040 \times \text{Age} \quad (2)$$

where Size represents the natural logarithm of year-end assets (in million yuan), and Age represents company age. The computed SAs are all negative, which are consistent to the computation result of Wang Bin (2021), Li Lin (2021) and Wu Wenjie (2021). The greater the absolute value of SA index, the severer the problem of financing constraint.

3.3.2 Explanatory Variables

The core explanatory variable is Shanghai-Hong Kong Stock Connect Program (Treat*Post), a dummy variable. Treat is a dummy variable to identify whether a listed company is an objected company of the program or not. If it is, $\text{Treat}=1$; otherwise, $\text{Treat}=0$. Post is a dummy variable indicating the launch time of the program. The program began on November 17th, 2014. Thus, if the time is from 2015 to 2017, $\text{Post}=1$; otherwise, $\text{Post}=0$.

3.3.3 Moderating Variables

The term "institutional investor" refers to a legal entity that uses its own funds or funds raised from the dispersed public to invest in securities exclusively. Because they play an important role in financing activities, proportion of institutional ownership (Percent) can be used as a moderating

variable to influence the financing constraints of enterprises under the background Shanghai-Hong Kong Stock Connect Program.

3.3.4 Control Variables

Referring to the research of Shi Qian & Yao Qiuge (2018), a series of control variables are introduced, including Return on assets, Debt-to-assets ratio, Growth, Company size, Enterprise age, Employee compensation, Proportion of the largest shareholder, Board size, Proportion of independent directors, and Integration of two positions. In addition, year and industry fixed effects are controlled, as shown in Table 1.

Table 1. Variable Definition Table

Variable type	Variable name	Variable code	Variable definition
Explained variables	Financing constraints	SA	See (2) above.
Moderating variables	Institutional ownership	Percent	Proportion of shares held by institutional investors to total shares
Explanatory variables	Objected enterprises	Treat	Dummy variables, Treat=1 if it's objected. Otherwise, Treat=0.
	Establishment time point	Post	Dummy variables, Post=1 if it's after 2015. Otherwise, Post=0.
Control variables	Return on assets	Roa	Net income / Total assets
	Debt-to-assets ratio	Lev	Total debts / Total assets
	Growth	Growth	(Current operating income - Previous operating income) / Previous operating income
	Company size	Size	Ln total assets at the end of the period
	Enterprise age	Age	Ln age since the establishment of the Enterprise
	Employee compensation	Wage	Ln employee wage payables at the end of the period
	Proportion of the largest shareholder	Top1	Proportion of the shares held by the largest shareholder to the total shares at the end of the period
	Board size	Board	Ln the number of directors at the end of the period
	Proportion of independent directors	Indep	Proportion of independent directors to total directors
	Integration of two positions	Dual	Dummy variables, Dual=1 if the chairman and the general manager are the same. Otherwise, Dual=0.
Dummy variables	Year fixed effect	Year	Annual dummy variable
	Industry fixed effect	Ind	Industry dummy variable

3.4 Descriptive Statistical Analysis

Table 2. Descriptive Statistics of Main Variables

Variable	Full sample			Control			Treated		
	Obs	Mean	Std.Dev.	Obs	Mean	Std.Dev.	Obs	Mean	Std.Dev.
SA	8,518	-3.201	0.100	7,986	-3.201	0.099	532	-3.202	0.114
Roa	8,518	0.047	0.053	7,986	0.047	0.053	532	0.054	0.057
Lev	8,518	0.410	0.215	7,986	0.407	0.215	532	0.447	0.205
Growth	8,518	0.285	0.665	7,986	0.279	0.641	532	0.371	0.944
Size	8,518	8.224	1.170	7,986	8.200	1.168	532	8.590	1.133
Age	8,518	2.668	0.432	7,986	2.680	0.409	532	2.487	0.667
Wage	8,518	16.890	1.521	7,986	16.860	1.525	532	17.310	1.391
Top1	8,518	0.350	0.150	7,986	0.346	0.149	532	0.407	0.159
Board	8,518	2.130	0.190	7,986	2.130	0.190	532	2.120	0.191
Indep	8,518	0.374	0.054	7,986	0.374	0.054	532	0.373	0.050
Dual	8,518	0.288	0.453	7,986	0.292	0.455	532	0.227	0.420

Table 2 lists descriptive statistical results for the full sample, control group, and treatment group.

3.5 Correlation Analysis

Table 3 lists the correlation coefficients of the main variables. It can be seen that the absolute correlation coefficients of regression explanatory variables are all less than 0.6, so there is no serious multicollinearity between explanatory variables and control variables.

Table 3. Correlation Coefficient of Main Variables

	SA	Treat	Post	Roa	Leverage	Growth	Size	Age	Top1	Board	Indep	Dual
SA	1											
Treat	-0.001	1										
Post	-0.097***	0.062***	1									
Roa	-0.029***	0.044***	-0.020*	1								
Lev	-0.016	0.155***	-0.006	0.400***	1							
Growth	0.002	0.038***	0.035***	0.145***	0.063***	1						
Size	-0.095***	0.019*	0.261***	0.091***	0.512***	0.044***	1					
Age	-0.090***	0.081***	0.207***	0.188***	0.394***	0.014	0.287***	1				
Top1	-0.024**	0.114***	0.093***	0.063***	0.090***	0.003	0.145***	0.018*	1			
Board	-0.026**	-0.007	0.078***	0	0.114***	-0.037***	0.205***	0.146***	-0.020*	1		
Indep	0.054***	-0.008	0.030***	0.004	-0.027**	0.015	-0.007	-0.022**	0.031***	0.541***	1	
Dual	0.085***	0.087***	0.023**	0.062***	-0.124***	0.014	0.124***	0.215***	0.031***	0.153***	0.114***	1

Note: ***, **, * indicate the significance level of 1%, 5%, and 10% respectively.

4. Empirical Results and Analysis

4.1 Analysis of Multiple Regression Results

4.1.1 Results of Baseline Regression

The baseline regression results are shown in Column (1) and Column (2) of Table 4. The study in Column (1) does not control industry and year fixed effect, while in Column (2) it does. It can be seen that the both coefficients of Post*Treat are significantly positive, indicating that the program significantly relieves financing constraint, which verifies the hypothesis H_{1b}.

4.1.2 PSM-DID

Since the objected companies were not randomly selected, the individual characteristics of the treatment group and the control group may differ greatly before the program, which leads to sample selection bias. To reduce the impact of individual inherent differences between these two groups on the results, this paper adopts the nearest neighbor matching method to conduct 1:1 matching, and then DID regression is conducted. To realize it, Logit model is needed:

$$Y_i = \alpha_0 + \alpha_1 Roa_{i,t} + \alpha_2 Lev_{i,t} + \alpha_3 Growth_{i,t} + \alpha_4 Size_{i,t} + \alpha_5 Age_{i,t} + \alpha_6 Wage_{i,t} + \alpha_7 Top1_{i,t} + \alpha_8 Board_{i,t} + \alpha_9 Indep_{i,t} + \alpha_{10} Dual_{i,t} + \varepsilon_{i,t} \quad (3)$$

In the above model, the objected company (Y) is used as the explained variable. If it is objected, Y=1. Otherwise, Y=0. The explanatory variables are return on assets (Roa), debt-assets ratio (Lev), growth (Growth), company size (Size), enterprise age (Age), employee compensation (Wage), proportion of the largest shareholder (Top1), Board Size (Board), proportion of independent directors (Indep), and Integration of two positions (Dual) and other enterprise characteristic variables.

Table 5 reports the sample characteristics before and after matching. It can be seen that after matching, the biases of Roa, Lev, Growth, Size and other variables are less than 6% and the t value is not significant, indicating that the matching result is desired. Figure1 plots the Kernel Density Map, which shows that the propensity scores of the treatment group and the control group overlap in a large range. It can be seen that the PSM matching effect is desired and the therefore parallelism hypothesis is met from Table 5 and Figure 1.

Table 4. The Regression Results

Variable	DID		DID-PSM
	(1)	(2)	(3)
Treat*Post	0.0105*	0.0130**	0.0130**
	(-0.0056)	(-0.0056)	(0.0056)
Treat	-0.0011	-0.0028	-0.0027
	(-0.0041)	(-0.0041)	(0.0041)
Post	-0.0181***	-0.0335***	-0.0278***
	(-0.0020)	(-0.0041)	(0.0041)
Roa	-0.0687***	-0.0647***	-0.0616***
	(-0.0193)	(-0.0196)	(0.0193)
Lev	-0.0072	-0.0115**	-0.0110**
	(-0.0050)	(-0.0054)	(0.0054)
Growth	0.0015	0.0012	2.68e-06**
	(-0.0014)	(-0.0014)	(1.35e-06)
Wage	-0.0009	-0.0010	-0.0010
	(-0.0007)	(-0.0007)	(0.0007)
Top1	-0.0162***	-0.0236***	-0.0236***
	(-0.0061)	(-0.0063)	(0.0063)
Board	0.0054	0	-1.87E-05
	(-0.0058)	(-0.0059)	(-0.0059)
Indep	0.0842***	0.0640***	0.0638***
	(-0.0199)	(-0.0201)	(-0.0201)
Dual	0.0151***	0.0152***	0.0153***
	(-0.0020)	(-0.0020)	(-0.0020)
Constant	-3.2160***	-3.1980***	-3.1780***
	-0.0188	-0.0237	(0.0196)
Year fixed effect	No	Yes	Yes
Industry fixed effect	No	Yes	Yes
Observations	8518	8518	8518
R-squared	0.023	0.072	0.028

Note: Standard error in parentheses; ***, **, * indicate the significance level of 1%, 5%, and 10% respectively; Variables Size and Age are required to calculate SA index, which are no longer used in regression.

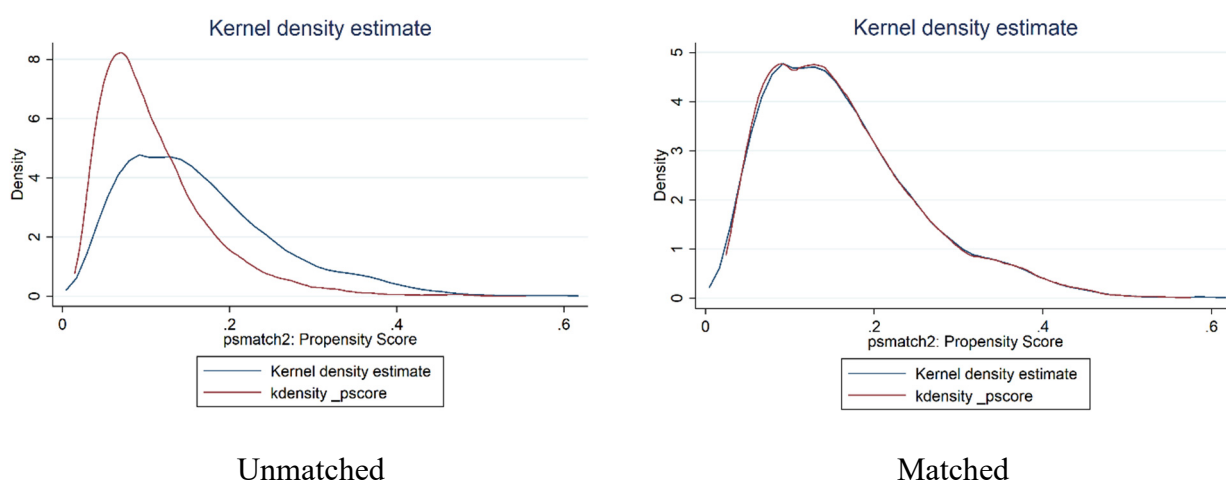


Figure 1. Comparison of propensity scores between treatment group and control group before and after PSM matching

Table 5. Comparison of Sample Features before and after Matching

Variable	Sample	Mean		% Bias	% Reduct bias	t
		Treated	Control			
Roa	Unmatched	0.04086	0.04802	-12.8	80.0	-4.03
	Matched	0.04086	0.03943	2.6		0.56
Lev	Unmatched	0.50045	0.39747	47.8	99.0	14.45
	Matched	0.50013	0.49908	0.5		0.11
Growth	Unmatched	8.09850	10.36200	-0.5	-11.3	-0.10
	Matched	8.10670	5.58780	0.5		0.44
Size	Unmatched	8.28510	8.21980	5.7	86.0	1.72
	Matched	8.28530	8.29440	-0.8		-0.18
Age	Unmatched	2.76440	2.65550	21.5	98.3	7.52
	Matched	2.76390	2.76210	0.4		0.08
Wage	Unmatched	16.81000	16.89800	-5.6	18.9	-1.71
	Matched	16.81400	16.88500	-4.5		-1.00
Top1	Unmatched	0.39635	0.34344	34.6	83.1	10.55
	Matched	0.39601	0.40493	-5.8		-1.28
Board	Unmatched	2.12580	2.13010	-2.2	-70.4	-0.67
	Matched	2.12640	2.11910	3.7		0.83
Indep	Unmatched	0.37227	0.37367	-2.6	15.1	-0.77
	Matched	0.37224	0.37106	2.2		0.52
Dual	Unmatched	0.18010	0.30281	-29.0	83.8	-8.10
	Matched	0.18028	0.20020	-4.7		-1.14

As shown in Column (3) of Table 4, regression is performed after PSM matching, year fixed effects and industry fixed effect being controlled. It is reported that the coefficient of the interaction is 0.013 and the significance level is 5%, which indicates that the program significantly relieves financing constraints of objected enterprises.

4.2 Robustness Test

4.2.1 Parallel Trend Test

Parallel trend means that the treatment group and the control group must have the same trend before the policy. Otherwise, the differences we observe after the policy may not be completely caused by the establishment of the program but the two groups themselves. Hence, the premise of using DID method is to experience the parallel trend test.

In this article, the event study approach is used, and the coefficients of interaction terms reflect the differences between the treatment group and the control group in a particular year. To avoid the problem of perfect collinearity, the first year before the program is thrown. Reference to Bertrand & Mullainathan (2003), formula (4) is as follows:

$$SA_{i,t} = \alpha + \beta_1 \text{Before}_4 + \beta_2 \text{Before}_3 + \beta_3 \text{Before}_2 + \beta_4 \text{Before}_1 + \beta_5 \text{Current} + \beta_6 \text{After}_1 + \gamma X_{i,t} + \text{Ind}_i + \text{Year}_t + \varepsilon_{i,t} \quad (4)$$

where Before4, Before3, Before2, Before1, Current, and After1 are all dummy variables, representing whether the enterprise is in the first four years, three years, two years, one-year, current year and one year after the implementation of the Shanghai-Hong Kong Stock Connect Program respectively. Table 6 shows the parallel trend test results. The coefficients of Before4, Before3 and Before2 are not significant, indicating the differences between the treatment group and the control group have no significant impact on the experiment, and the results of the test support the hypothesis in this paper.

Table 6. Parallel Trend Test

Variable	SA
Before4	0.0063 (-0.0097)
Before3	0.0115 (-0.0091)
Before2	-0.0120 (-0.0089)
Current	-0.0063 (-0.0087)
After1	0.0043 (-0.0076)
Constant	0.0013 (-0.0069)
Year fixed effect	Yes
Industry fixed effect	Yes
Observations	8,518
R-squared	0.001

Note: Standard error in parentheses; ***, **, * indicate the significance level of 1%, 5%, and 10% respectively.

4.2.2 Variable Substitution

To test the robustness of the empirical results, the explained variable is substituted to KZ index to measure financing constraints, which was acquired by Lamont et al. (2001). They selected five financial variables, including net operating cash flow, dividends payable, cash, Tobin Q and debt-assets ratio to construct KZ index model by regressing an ordered Logistic model. Based on the result, 8189 samples of A-shares listed in Shanghai and Shenzhen are adopted to gain the following formula:

$$KZ = -9.156 \times CF - 6.883 \times DIV - 3.781 \times Cash + 4.912 \times LEV + 0.456 \times TobinQ \quad (5)$$

where CF represents net operating cash flow / total assets of previous period; DIV represents cash dividend / total assets of previous period; Cash represents cash / total assets of the previous period; LEV represents debt-assets ratio; TobinQ represents Tobin Q value. The larger the KZ index is, the heavier the financing constraints are. Column (1) of Table 7 shows the results of this regression. The coefficient of interaction is negative, so the interaction term is negatively correlated with KZ index, which is basically consistent with the baseline regression.

4.2.3 Endogenous Problems

In order to further test the robustness and endogeneity of the results, the explanatory variables will be delayed by one stage before regression. Column (2) of Table 7 shows the regression results. The coefficient of Treat*Post was -0.0083 and passed the test at the confidence level of 10%. Compared with Column (2) of Table 4, the result was basically unchanged, which supported the easing effect of Shanghai-Hong Kong Stock Connect Program on corporate financing constraints.

4.2.4 Placebo Test

In order to eliminate the possibility of random results, the article randomly selects 532 enterprises from 1396 original samples and sets them as the fake treatment group, and the remaining 864 enterprises as the fake control group to construct a fake dummy variable for placebo test according to the method of Cai et al. (2016). Figure 2 graphs the kernel density of the estimated coefficient and the corresponding T-value distribution for 500 times. It can be seen that the estimated coefficient and t value are all concentrated near zero for 500 times, implying that the relief of financing constraints is caused by the Shanghai-Hong Kong Stock Connect Program and the research result is robust.

Table 7. Robustness Test

Variable	KZ	L.SA
	(1)	(2)
Treat*Post	-0.9100*	-0.0083*
	(0.4830)	(-0.0048)
Treat	0.6240*	0.0072**
	(0.3550)	(-0.0036)
Post	0.6290*	0.0144***
	(0.3650)	(-0.0029)
Roa	-1.0740	0.0808***
	(1.7270)	(-0.0168)
Lev	8.4830***	0.0463***
	(0.5170)	(-0.0048)
Growth	-3.1550***	-0.0218***
	(0.1210)	(-0.0025)
Size	-0.409***	
	(0.1120)	
Age	-0.1460	
	(0.2260)	
Wage	-0.2160***	0.0022***
	(0.0697)	(-0.0006)
Top1	-1.9120***	0.0117**
	(0.5460)	(-0.0057)
Board	-0.3670	0.0199***
	(0.5130)	(-0.0062)
Indep	0.2240	-0.0080
	(1.7290)	(-0.0195)
Dual	0.1020	-0.0106***
	(0.1760)	(-0.0017)
Constant	13.0600***	3.1060***
	(-2.4910)	(-0.0227)
control year	Yes	Yes
control industry	Yes	Yes
Observations	8,189	7,059
R-squared	0.1228	0.118

Note: Standard error in parentheses; ***, **, * indicate the significance level of 1%, 5%, and 10% respectively; Variables Size and Age are required to calculate SA index, which are no longer used in regression.

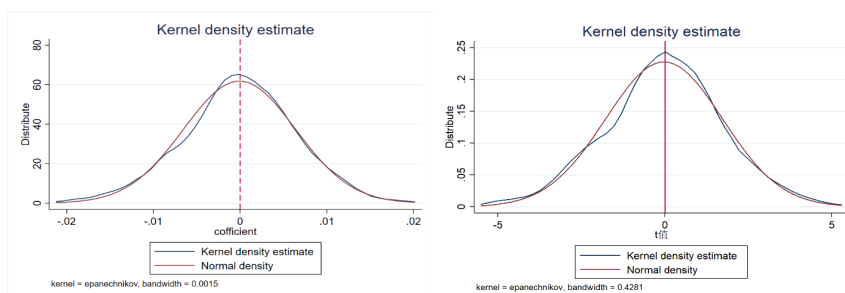


Figure 2. Estimated Coefficients after Randomization

5. Regulatory Effects Test

As mentioned in Part 2, institutional investors can help to relieve the financing constraints by reducing the risk of information asymmetry. Therefore, institutional ownership is selected as the potential moderating variable in this article, and its model is as follows:

$$SA_{i,t} = \alpha + \beta_1 \text{Treat} * \text{Post}_{i,t} \times \text{Percent}_{i,t} + \beta_2 \text{Treat} * \text{Post}_{i,t} + \beta_3 \text{Percent}_{i,t} + \gamma X_{i,t} + \text{Year}_t + \text{Ind}_i + \varepsilon_{i,t} \quad (6)$$

In the above formula, Percent represents institutional ownership. Table 8 shows the results of the moderating effect, where column (1) controls the industry fixed effect and year fixed effect, and column (2) does not. The result shows that the coefficient of the interaction term Treat*Post*Percent is positive and significant at 1%, which proves that institutional ownership has a positive moderating effect on the relationship between Shanghai-Hong Kong Stock Connect Program and financing constraints. Therefore, H₂ is verified, that is, the higher the shareholding of institutional investors, the less likely enterprises are constrained by financing.

Table 8. Regulatory Effect Test

Variable	SA	
	(1)	(2)
Treat*Post*Percent	0.080***	0.001***
	(-0.019)	(-0.001)
Treat*Post	-0.007	0
	(-0.005)	(-0.005)
Percent	-0.007*	-0**
	(-0.004)	(0)
Constant	-3.200***	-3.203***
	(-0.002)	(-0.016)
Year fixed effect	Yes	No
Industry fixed effect	Yes	No
Observations	6,996	6,996
R-squared	0.003	0.067

Note: Standard error in parentheses; ***, **, * indicate the significance level of 1%, 5%, and 10% respectively.

6. Heterogeneity Test

6.1 Analysis of Difference in Investor Attention

Investors' attention can influence the enterprise financing constraints, which can be explained by the following points. Firstly, when investors increase their attention, they are willing to take the initiative to know about the company, such as the state of operation and the management structure. With extra information, the problem of information asymmetry can be alleviated resulting in cost saving as well as less financing constraints. Secondly, more investors' attention usually means a boost in investment sentiment. In that case, investors tend to be overconfident in the projects they value and are willing to invest more, thus easing the financing constraints of enterprises. Lastly, the non-public information obtained by investors may be transmitted among a few people. They are willing to pay a higher price than the market price to obtain extra returns, which can ultimately alleviate corporate financing constraints.

Based on the study of Tang Xiaodong, Lin Yongjian and Xiao Qi (2021), the annual turnover rate are used as the measure of investors' attention. The median annual turnover rate is 500.2513%,

regarded as a threshold. Enterprises with higher turnover rate indicate higher investors' attention, and the remaining enterprises are with lower investors' attention. Columns (1) and (2) of Table 9 report the regression results of sub-sample. It can be seen that enterprises with high investors' attention are significant at 1% level, while others are not, indicating that after the implementation of Shanghai-Hong Kong Stock Connect Program, enterprises with high investors' attention are faced with less financing constraints.

6.2 Analysis of Differences in Effective Tax Rate

The effective tax rate would also affect financing constraints. With lower tax rate, the retained earnings of the enterprise will be higher. In that case, instead of borrowing capitals from outside, low-taxed companies can largely finance with their retained earnings. Conversely, those corporates paying more taxes have to raise from the outside and it's more likely to get struggled with financing constraints. To verify the rationality above, Columns (3) and (4) of Table 9 list the regression results, which divided the samples into enterprises with high and low tax rate according to the median effective tax rate of full samples. It shows that the coefficient of interaction term is significantly positive in the regression of enterprises with low tax rate, while the other is not. It indicates that the establishment of the Shanghai-Hong Kong Stock Connect Program significantly solves the problem of external financing for low-tax enterprises.

Table 9. Heterogeneity Test

Variable	SA			
	Enterprises with high investors' attention	Enterprises with low investors' attention	Enterprises with high tax rate	Enterprises with low tax rate
	(1)	(2)	(3)	(4)
Treat*Post	0.0194***	-0.000158	0.009	0.028***
	-0.00696	-0.0085	-0.010	-0.010
Treat	-0.00485	0.00723	0.004	-0.020***
	-0.0056	-0.00567	-0.007	-0.007
Post	-0.0146***	-0.0247***	-0.007	-0.050***
	-0.00489	-0.00728	-0.007	-0.007
Constant	-3.024***	-3.395***	-3.232***	-3.185***
	-0.03	-0.0352	-0.043	-0.015
Control	Yes	Yes	Yes	Yes
Year fixed effect	Yes	Yes	Yes	Yes
Industry fixed effect	Yes	Yes	Yes	Yes
Observations	5,823	2,695	4,088	4,088
AdjR-squared	0.0657	0.0789	0.0513	0.0615

Note: Standard error in parentheses; ***, **, * indicate the significance level of 1%, 5%, and 10% respectively.

7. Conclusion and Implication

With data from A-share listed companies in Shanghai and Shenzhen from 2010 to 2017 and SA index as the measurement of financing constraints, this paper takes the Shanghai-Hong Kong Stock Connect Program as a quasi-natural experiment and investigates the impact of the implementation of Shanghai-Hong Kong Stock Connect Program on corporates' financing constraints, using DID model and PSM method. The result shows that the establishment of the program alleviates the corporate financing constraints. This remains true after robustness tests including parallel trend tests, variable substitutions, endogeneity problems, and placebo tests. Further research shows that institutional

ownership has a positive moderating effect on the relationship between the program and financing constraints, which should be paid attention by companies. In addition, with regard to the heterogeneity test, it is found that under the background of Shanghai-Hong Kong Stock Connect Program, enterprises with higher investors' attention benefit more from the program. Also, the lower the effective tax rate is, the less likely it is to be constrained by corporate financing.

Considering the above analysis, several suggestions are made. First, government should carry out further policies to help the opening up of the domestic capital market so that inland enterprises would have more opportunities to learn advanced management experience from outside world and update their own cognitive competence; Second, the administration needs to reduce the burden on enterprises. For example, the tax payment should be properly reduced for companies to be more motivated to improve their operation with retained earnings. Third, enterprises should optimize their governance structure. For example, companies should widely introduce institutional investors into their management team, because they can supervise the businesses of enterprises and transmit positive signals to the outside world, which is conducive to, for instance, corporate image building and financing loans. Last but not least, companies should take the initiative to disclose relevant information and improve the transparency of the entities, which could reduce the risk of market information asymmetry, weaken the principal-agent risk, and most importantly, facilitate financing.

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