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Stock Liquidity and Cash Holdings: Evidence from Stock Buybacks

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Abstract: In view of the traditional view that stock liquidity reduces the cash holding level of listed companies by alleviating financing constraints and restraining agency costs, this paper starts from the company's stock repurchase motivation and finds that high stock liquidity may strengthen the company's stock repurchase motivation and thus promote the company to improve its cash holding level. Based on the empirical evidence of Chinese A-share listed companies from 2011 to 2021, it is shown that stock liquidity can significantly increase the company's cash holdings, and through the relaxation of the buyback policy in 2018 as an exogenous shock, it is verified by the differential difference method that after the relaxation of the policy, the company with high stock liquidity will increase more cash holdings than the company with low stock liquidity. Further research shows that the property rights of listed companies and the heterogeneity of the characteristics of senior executives will affect the promoting effect of stock liquidity on cash holdings.

Keywords: Stock liquidity, Cash holding, Stock buyback, Difference of difference.

1. Introduction

In March 2018, the shareholding pledge of Jia Yueting, the controlling shareholder of letV, exploded. Since then, the stock price has continued to decline, and the whole A-share market has also started A trend of collective liquidation. In order to solve the crisis of the stock mortgage collective explosion, Chinese regulatory authorities release positive signals, encourage and support listed companies to repurchase shares to stabilize the stock price, boost market confidence and save the stock market crisis. In 2018, the Company Law (2018 Amendment) amended the original Company Law, further improved the Company's share repurchase system, increased the circumstances allowing share repurchase, appropriately simplified the decision-making procedure for share repurchase, raised the upper limit of the number of shares held by the company, and extended the period of holding repurchased shares. At this point, our country started the buyback wave. In 2018, the number of repurchases of listed companies reached 853 times, and in 2019, the number of repurchases reached 1,492 times, with the amount of repurchases reaching 94.775 billion yuan. In 2020, the number of repurchases decreased slightly, but still maintained the level of thousands, with 1322 times of repurchases. In 2021, a total of 945 companies in Shanghai and Shenzhen bought back shares, with the amount already reaching 121.226 billion yuan. By November 2022, a total of 1,100 listed companies had followed the buyback trend, repurchasing a total of 158.9 billion yuan, an increase of 85.5% compared with the same period last year. Stock buyback has become a tool for Chinese listed companies to manage market value and boost market confidence. It also brings certain changes to companies' behavior and decision-making as well as the operation of the whole capital market.

2. theoretical Analysis and Hypothesis

First of all, according to the traditional view, stock liquidity can reduce the degree of information asymmetry to some extent and ease the financing constraints of companies by increasing the information content of stock prices and strengthening the constraints of external major shareholders on managers, thus weakening the precautionary motivation of companies to increase cash holdings.

However, the effect of stock liquidity on cash holdings may be reversed when stock buybacks are taken into account. When the listed company needs stock repurchase to carry out employee equity incentive or dividend distribution, the listed company needs to consider the cost of stock repurchase. For companies with low stock liquidity, the transaction cost is very high at this time, and the company's managers are not inclined to use stock repurchase. Moreover, such trading activities will further expand the bid-ask spread and increase the transaction cost of the stock, leading to a further decline in liquidity (Barclay and Smith, 1988). That can be hard for listed companies to swallow. On the other hand, when the listed companies with better stock liquidity conduct stock buyback, they can quickly complete the transaction at a smaller cost and have less impact on the subsequent stock price, so the companies are more likely to choose stock buyback.

Considering that listed companies face downward pressure on stock prices, listed companies are in urgent need of stock buybacks to raise stock prices and boost market confidence. Or when a public company thinks its share price does not fully reflect the value of the company. Peyer and Vermaelen (2009) argued that listed companies have the incentive to repurchase undervalued shares, because repurchase of undervalued shares is not only beneficial to shareholders, but also beneficial to managers. At this point, the higher the stock liquidity of the listed company, the more cash the company needs to buy back the stock. This is because if the stock repurchase is carried out to relieve the downward pressure on the stock and raise the stock price, when the stock liquidity of the listed company is larger, it means that the buyback transaction has less impact on the stock price, and more transactions are needed to raise the same stock price to achieve the goal, which means that the listed company needs more cash assets. So the first competing hypothesis is proposed:

H1a: Under certain other conditions, the higher the stock liquidity, the higher the cash holding level of the company.

H1b: If other conditions are certain, the higher the stock liquidity, the lower the cash holding level of the company.

Before 2018, China Securities Regulatory Commission banned share repurchase in theory, but allowed it in practice. Therefore, before, due to the existence of laws and regulations, the motivation of stock buyback of Chinese listed companies was severely limited. However, after the stock buyback policy was relaxed, listed companies could carry out stock buyback more flexibly according to their own conditions, and the motivation of stock buyback was further released. Therefore, compared with listed companies with low stock liquidity, listed companies with high stock liquidity are more likely to use stock repurchase or need more funds in stock repurchase. In order to meet the stock buyback demand of listed companies, they need to reserve more cash assets in the current period. So the second hypothesis is proposed:

H2: Other things being equal, when the stock buyback rules are relaxed, companies with high stock liquidity increase their cash holdings more.

Chinese listed companies have some differences in property right nature and characteristics of senior management team. Therefore, heterogeneity analysis to distinguish these factors is an indispensable part of the research.

The political connections owned by state-owned enterprises will bring certain advantages to their operation. They can not only obtain more credit resources (Yu Minggui et al., 2008), but also the government has a "protective effect" on state-owned enterprises. Even if state-owned enterprises cannot repay loans, the government will help them (Xie Deren and Chen Yunsen, 2009). Lin Yifu (2004) found that state-owned companies and non-state-owned companies face different financing constraints. Therefore, there is a big gap between the financing ability of state-owned companies and non-state-owned companies in the market. Non-state companies find it harder to get loans from government-controlled banks or have to pay higher financing costs to get them. For state-owned enterprises, whether the government can directly intervene in the credit decisions of Chinese banks or the government's implicit guarantee, it can effectively reduce their financing costs. Therefore, when non-state-owned companies may face the opportunity of share repurchase in the future or need share repurchase, they need funds to repurchase shares. At this time, compared with the high financing cost of state-owned companies, they may need their own cash holdings.

The main advantages of the integration of the two positions are the lower communication cost and decision-making cost of the chairman and CEO, the greater power of the management, and the clearer leadership in listed companies. However, the separation of the two positions will lead to natural conflicts between the board of directors and the management and misunderstandings in conveying information. Therefore, when the positions of chairman and CEO of a listed company are combined, managers will have more say when they need to carry out share repurchase, and have a stronger influence on the outcome of decisions. Managers know that their share buy-back proposals are more likely to pass. At the same time, the integration of the two positions also reduces the communication cost of the board of directors and the CEO to a certain extent and improves the efficiency of decision-making, which makes it more advantageous to make decisions when faced with temporary opportunities. The market situation changes rapidly and the opportunity is fleeting. The managers of listed companies need to make reasonable decisions in a very short time, such as whether to carry out share repurchase, the number of share repurchase shares, the appropriate price and the timing of share repurchase, etc. The two-in-one system improves the efficiency of share repurchase decisions. Therefore, when the two roles are combined, managers are more likely to approve share repurchase decision proposals and have a stronger incentive to reserve cash assets for share repurchases in advance.

Huang Guoliang and Xu Jiawu (2016) found that the overseas background of most managers is mainly Europe or the United States. These managers have superior management skills, strong risk control ability, and can develop reasonable cash holdings and capital structure to reduce the bankruptcy probability of the company. At the same time, under the influence of overseas social culture, executives with overseas backgrounds tend to be more socially responsible and take the initiative to avoid risks, reduce the possibility of bankruptcy of the company, improve the utilization rate of corporate resources, so as to improve the company's earnings and reduce the principal-agent risks of creditors (Wen Wen et al., 2017). At the beginning, share buyback is prohibited in principle in our country. Domestic management personnel may not have a deep understanding of share buyback, and can not accurately evaluate the economic consequences of share buyback. In the United States, the share repurchase market was very developed in the last century. Therefore, management personnel with overseas background have a more comprehensive understanding of share repurchase and are more inclined to use share repurchase. At the same time, executives with overseas backgrounds have a stronger sense of risk aversion and a more conservative and prudent decision-making style. When facing the need for share repurchase in the future, they are more inclined to use the company's reserve cash assets rather than rely on external financing with high financing difficulty and cost. Therefore, when management personnel have overseas background, stock liquidity has a more significant impact on cash holdings of listed companies.

So here's a third hypothesis:

H3: Due to the differences in property rights, characteristics of senior executives and other factors, the impact of stock liquidity on cash holdings will vary.

3. Model Design and Variable Selection

(1) data

In order to better reflect the impact of stock liquidity on cash holdings of listed companies after the revision of the Company Law at the end of 2018, this paper selects Chinese companies listed in Shanghai and Shenzhen stock markets from 2011 to 2021 as research samples, and all relevant data are from the database of CSMAR database company. Samples are screened according to the following principles: First, samples of companies with missing relevant data are excluded. Second, the data related to companies in the financial sector in the industry classification of CSRC were excluded. The accounting systems and standards of financial industry companies differ greatly from those of companies in other industries, and the financial decisions of managers of financial industry companies also differ greatly from those of companies in other industries. Therefore, the removal of the

samples of financial industry companies has no significant impact on the research results of this paper. Thirdly, samples of companies with ST and ST* are excluded, because once a company is ST or ST*, it means that its business performance is poor and unstable, and it faces great risk of being delisted. The valuation and financial data of such companies have great fluctuations. Fourthly, the influence of extreme values is eliminated. After eliminating the above data, all retained data were indentified according to 1% and 99% quartile standards.

(2) Variable selection

(i) Cash variable

Referring to the research of Yang Xingquan, this paper decides to use the net cash holding ratio to measure the cash holding level of listed companies. Net cash holding ratio = (money funds + short-term investments (trading financial assets after 2007))/(Total assets - cash and cash equivalents).

(ii) Stock-liquidity variable

In this paper, Pastor's regression coefficient is chosen as the measure of stock liquidity. Pastor's regression coefficient is based on the fact that participants in the capital market are more likely to overreact to stocks with poorer stock liquidity. Therefore, Pastor and Stambaugh believe that the regression coefficient of the impact of stock turnover on excess returns can be used to describe the stock liquidity of this stock. In this paper, Pastor's regression coefficient index is obtained by estimating the following regression equation:

$$r^e_{i,t,d+1} = \theta_{i,t} + \varphi_{i,t} r_{i,t,d} \cdot sign\left(r^e_{i,t,d}\right) \cdot V_{i,t,d} + \varepsilon_{i,t,d+1}$$

(iii) Control variables

Based on the practice of Opler et al. (1999), this paper also uses company size, price-to-book ratio, leverage ratio, net working capital, cash dividend payment, capital expenditure, R&D input, price-to-book ratio, institutional shareholding ratio and operating cash flow as control variables. Other control variables in this paper include the age of the company, the systemic risk of the company, the shareholding proportion of top ten shareholders and the shareholding proportion of institutions. The age of the company may have a negative relationship with the cash holding level of the listed company, mainly because the younger companies have weaker correlation with their stakeholders such as customers, suppliers, employees and investors, and listed companies will need more cash holding. Listed companies will also be motivated by prevention. When the systemic risk of listed companies is greater, the cash holding level of listed companies will be higher. The shareholding ratio of top ten shareholders can be regarded as a measure of corporate governance. Better corporate governance can increase the value of cash held by companies, thus encouraging listed companies to hold more cash (Dittmar and Mahrt Smith,2007).

(3) Model design

In order to verify that listed companies hold cash assets due to the motivation of stock repurchase, this paper adopts the differential research design, taking the relaxation of stock repurchase policy as a quasi-natural experiment, and divides listed companies into a group of high liquidity and a group of low liquidity according to the level of stock flow, and regards them as the control group and the treatment group. The differential model is as follows:

$$cash_{i,t} = \propto_0 + \propto_1 \times treat_{i,t} \times post_{i,t} + \beta \sum \varphi \times controls_{i,t} + \gamma_i + \mu_t + \varepsilon_{i,t}$$

At the same time, based on the difference-difference model, the heterogeneity of stock liquidity on cash holding level was investigated respectively by grouping the four variables in the above two aspects according to property rights nature, executive gender, whether the chairman and CEO are in combination, and whether the executives have overseas background.

4. Model Estimation and Analysis

(1) Descriptive statistics

Table 1 reports descriptive statistics for the main variables. As can be seen from the table, the mean value of cash holdings of Chinese listed companies is 0.29, the minimum value is -78.50, the maximum value is 116.01, and the standard deviation is 2.09. These data indicate that the cash holdings of Chinese listed companies vary greatly. The mean of the stock liquidity index is slightly close to 0, the minimum value is -0.56, the maximum is 0.19, and the standard deviation is 0.02, which indicates that there is some gap in the stock liquidity of listed companies in our country. Other control variables are within a reasonable range and will not be described here.

Table 1. Descriptive statistics

Name	N	Mean	Std.Dev.	Min.	Median	Max
Cash	10390	0.29	2.09	-78.5	0.017	116.01
Liqps	10390	-0.00	0.02	-0.56	-0.00	0.19
Wcash	10390	0.40	2.74	-67.26	0.29	195.20
Div	10390	0.18	0.35	0.00	0.10	16.00
Lev	10390	1.57	3.49	-25.48	1.10	219.03
Size	10390	22.49	1.36	16.16	22.28	28.64
Cf	10390	0.09	0.60	-29.66	0.07	21.96
Outc	10390	0.08	0.54	-38.66	0.06	19.10
Rdc	10390	0.04	0.22	-15.89	0.03	10.66
Beta2	10390	1.15	0.29	-0.08	1.15	2.98
Tenhold	10390	59.92	15.47	12.72	61.09	101.16
Insinvestor	10390	47.63	24.81	0.00	50.60	101.14
Bm	10390	1.12	1.31	0.03	0.73	24.48
Pb	10390	3.18	5.24	0.12	2.40	456.24
Fage	10390	2.68	0.50	0.69	2.71	3.47

Note: All continuous variables were indentured at the 1% and 99% levels.

(2) Regression results

Column (1) in Table 2 is the test result of hypothesis H1. The results show that the regression coefficient of liqps is -53.927 and significant at the 10% level, indicating that stock liquidity has a positive impact on cash holdings of listed companies, which verifies hypothesis H1.

Due to a certain degree of endogeneity between the cash holding level of listed companies and their stock liquidity, that is to say, the higher the cash holding level of listed companies, it may affect the value judgment of investors in the capital market for listed companies, and to some extent, its stock liquidity. Therefore, this paper decides to take Chinese regulatory government's revision of Company Law at the end of 2018 to relax the principle of share repurchase as an exogenous impact policy. By grouping listed companies based on stock liquidity, the group with low stock liquidity is taken as the control group, and the group with high stock liquidity is taken as the treatment group. The net effect between the control group and the treatment group was obtained by the difference-difference model, and the above hypothesis was further tested. In addition, in order to control the potential selectivity bias in the DID model, this paper drew on the practices of Lian Lishuai et al. (2019), Zhang Xueyong, Zhang Qiuyue (2018) and Li Chuntao et al. (2017), and used the propensity score matching method to re-select samples and construct a more scientific and reasonable control group.

Columns (2) and (3) in Table 2 separately reported the regression results of DID and PSM-DID. All regression results can be consistent with the conclusions of the above studies. After controlling the individual fixed effect and time effect of listed companies, the two results both found that the key explanatory variable ps2did was significantly positive at the 5% level, which indicated that compared with those companies with low stock liquidity, companies with high stock liquidity were more likely to increase their cash level after the CSRC relaxed the principle of share repurchase. Let's say H2 is verified.

Table 2. Reference regression

Cash	(1) OLS	(2) DID	(3) PSM-DID
Liqps	-53.927* (-1.69)		
Ps2did		0.021** (2.29)	0.021** (2.29)
-cons	-1.515** (-2.56)	-1.512** (-2.55)	-1.291** (-2.36)
Controls	Yes	Yes	Yes
Firm fixed effects	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes
Observations	10390	10390	10375
Adjusted R^2	0.189	0.190	0.424

Note: The t value is in brackets, where ***, ** and * are statistically significant at 1%, 5% and 10%, respectively.

(3) Analysis of heterogeneity

Properties of property rights and characteristics of senior executives of listed companies are different. Under the influence of these factors, the impact of stock liquidity on cash holdings will be different, so the benchmark regression is used for heterogeneity analysis. In this paper, a group test will be conducted based on the property rights nature of the company, the characteristics of the senior executives (the proportion of female executives, whether the chairman and CEO are in combination, and whether the senior executives have overseas background).

Column (1) in Table 3 is the heterogeneity analysis based on the nature of corporate property rights. The regression results are as follows. It is found that the regression coefficient of ps2did of non-state-owned enterprises is significantly positive, while that of state-owned enterprises is not significant, which may be because compared with state-owned enterprises, non-state-owned enterprises face more intense financing constraints. When funds are needed for stock repurchase in the future, the required funds cannot be timely borrowed at the minimum cost, so it is necessary to reserve certain cash assets in the current period.

In Table 3, column (2) is the heterogeneity analysis based on whether the chairman and CEO are in combination. In the samples of the two positions, the regression coefficient of the core explanatory variable is significantly positive, while in the samples of the two positions are not in combination, the regression coefficient of the core explanatory variable is negative and insignificant. This indicates that when the chairman and CEO of the listed company are the same natural person, the decision-making efficiency is higher, and it is easier to make a reasonable decision quickly when facing the stock repurchase, how much share to repurchase and at what price, and the motivation to reserve cash assets for stock repurchase is stronger.

In Table 3, column (3) is the heterogeneity analysis based on the overseas background of senior executives. In the samples with overseas background, the regression coefficient of core explanatory variable is significantly positive, while in the samples without overseas background, the regression coefficient of core explanatory variable is not significant, which indicates that senior executives with overseas background have stronger awareness of risk aversion and richer experience in stock repurchase. Listed companies also have greater incentives to buy back shares.

Table 3. Analysis of heterogeneity

Cash	(1) Nature of property right		(2) CEO duality		(3) overseas background	
	State-owned	Non-state owned	Unitary system	Binary system	Yes	No
Ps2did	0.017	0.018*	0.020**	-0.004	0.028*	0.005
	(1.50)	(1.71)	(1.97)	(-0.21)	(1.67)	(0.46)
-cons	-2.475***	1.370**	-0.484	-2.828	-0.539	-0.876
	(-3.52)	(1.99)	(-0.74)	(-1.56)	(-0.57)	(-1.08)
Firm fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Observations	6543	3557	7492	2608	3804	6296
Adjusted R^2	0.411	0.587	0.468	0.372	0.606	0.824

Note: The t value is in brackets, where ***, ** and * are statistically significant at 1%, 5% and 10%, respectively.

(4) Robustness test

(i) Parallel trend test

The parallel trend assumption is one of the preconditions for the use of the differential model. In the use of the differential model, it is necessary to ensure that there is no significant systematic difference between the samples of the control group and the treatment group before China Securities Regulatory Commission relaxes the principle of share repurchase, and there is a significant difference after the relaxation of the principle of share repurchase. Therefore, based on the practice of beck et al. (2010), this paper constructs the following model to test whether the assumption of parallel trends is satisfied:

$$cash_{i,t} = \propto + \prod_{t=\pm1,-2,-3} \beta_{i,t} \times treat_{i,t} \times post_{i,t} + \pi \sum controls_{i,t} + \gamma_i + \mu_t + \varepsilon_{i,t}$$

Where t takes the value -3, -2, and -1 respectively represents three years, two years, and one year before the Chinese Securities Regulatory Commission relaxed the principle of share repurchase, while t takes the value 1 indicates the first year after the Chinese Securities Regulatory Commission relaxed the principle of share repurchase. This model mainly focuses on the coefficient of η, which mainly measures the dynamic effect on the cash holding level of listed companies after China Securities Regulatory Commission relaxes the principle of share repurchase. In this paper, the period when China Securities Regulatory Commission relaxed the principle of share repurchase is taken as the base period, and the regression results show that when t takes the value -1, -2 and -3, the coefficient η is not significant, which indicates that listed companies with high stock liquidity and listed companies with low stock liquidity have the same change trend before the relaxation of the principle of share repurchase, but when t=1, The estimated coefficient is significantly positive at the 10% level, indicating that after the principle of share repurchase is relaxed, the cash held by listed companies with high stock liquidity increases more. Therefore, the conclusion can prove that the equilibrium trend test is valid, and the different-difference model can be used.

Table 4. Results of parallel trend test

	(1) cash
treated*2016	0.006
	(0.29)
treated *2017	-0.133
	(-0.78)
treated *2018	-0.117
	(-1.04)
treated *2020	0.033***
	(2.76)
Controls	Yes
Firm fixed effects	Yes
Year fixed effects	Yes
Observations	10390

Note: The t value is in brackets, where ***, ** and * are statistically significant at 1%, 5% and 10%, respectively.

(ii) Placebo test

In order to prevent other policies from having a certain impact on the above regression results from 2011 to 2021, this paper selected one year, two years and three years before China Securities Regulatory Commission relaxed the principle of share repurchase as the assumed policy impact time points, and combined the new virtual policy treatment year with the original policy treatment group. The new policy processing variables are reconstructed, and then the differential model is estimated in turn. Table 5-11 shows the regression results. The results show that the interaction coefficients of the three virtual policy impact times are not significant at the confidence level of 10%. The above results show that, before the real policy impact, there is no interference of other policies affecting the cash holding level of listed companies, that is, the change of cash holding level of listed companies is due to the relaxation of the stock buyback principle. Therefore, the above regression results are robust and credible.

Table 5. Placebo test

Cash	(1)2016	(2)2017	(3)2018
Ps2did	0.008	0.0004	-0.005
	(-0.83)	(0.05)	(-0.77)
-cons	-1.519**	-1.520**	-1.266**
	(-2.57)	(-2.57)	(-2.10)
Controls	Yes	Yes	Yes
Firm fixed effects	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes
Observations	10390	10390	10110
Adjusted R^2	0.190	0.190	0.411

Note: The t value is in brackets, where ***, ** and * are statistically significant at 1%, 5% and 10%, respectively.

5. Conclusion and Suggestion

Based on the sample data of Chinese listed companies from 2011 to 2022, this paper studies how stock liquidity affects the cash holding decisions of listed companies, considering their stock buyback motives, and explains a possible motive for cash holding of listed companies to a certain extent. This paper finds that: (1) when other variables are controlled, the higher the stock liquidity, the higher the cash holding level of listed companies. (2) Taking the Opinions on Supporting Share repurchase of Listed Companies jointly issued by China Securities Regulatory Commission, Ministry of Finance and SASAC in 2018 as an exogenous impact, this paper finds that listed companies with high stock liquidity are more inclined to increase their cash holdings after the implementation of the policy. (3) In terms of property right structure, the promoting effect of stock liquidity on cash holding is particularly obvious in non-state-owned listed companies. In terms of the characteristics of senior executives, this paper finds that when the gender of senior executives is female, the roles of chairman and CEO are not the same, and the senior executives have overseas background, the stock liquidity has a more significant promoting effect on the cash holding level of listed companies.

Based on the research conclusions of this paper, the following suggestions are put forward: First, listed companies should actively pay attention to the performance of their stocks in the capital market, make full and reasonable use of stock repurchase decisions, strengthen the value of cash holdings, prevent future stock prices from correctly reflecting the value of the company and seize future profit opportunities through stock repurchase. Second, a high-quality executive training system should be designed to cultivate executives with financial consciousness who are good at taking advantage of the capitalized market, and fully stimulate the management to solve the problem of stock illiquidity that listed companies may encounter in the future through the use of stock repurchase. At the same time, attention should be paid to the gender ratio of senior management personnel, so as to give play to the advantages of women who are naturally high in risk aversion.

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