

## Research Article

# Does the Stock Market Affect the Real Economy? An Empirical Analysis Based on China's Stock Market Liquidity

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This article investigates the causal effect between the stock market and the real economy. Based on the data of China's A-share market from 1998 to 2017, this article uses the fixed-effect model and other methods to find the causal effect from the perspective of the impact of illiquidity at the individual stock level on enterprise investment decision-making. Empirical results show that stock illiquidity significantly decreases enterprise investment. Information asymmetry is one of the important channels between the stock market and the real economy. The financial constraints and agency conflicts caused by information asymmetry significantly affect the causal effect. Macroeconomic policies to alleviate market information asymmetry can effectively act on the real economy through the stock market. From the microperspective of studying the causal effect, this study controls the time effect and individual effect and further explores the influence mechanism between the stock market and the real economy. Research shows that macroeconomic policies can effectively affect the real economy through the stock market and provides decision-making references for future macropolicy formulation.

## 1. Introduction

Since its establishment in 1990, China's stock market has gradually occupied an important position in the international financial market after nearly three decades of development. In 2015, China's stock market surpassed the European stock market for the first time to become the world's second-largest stock exchange market. In 2017, the total market value of China's listed companies accounted for 11% of the world's total. The international influence of China's stock market has been increasing year by year. In 2018, China's A-share market was formally included in the MSCI Emerging Markets Index, which shows that international investors have widely recognized the A-share market. In 2020, a total of 396 companies were listed on the mainland exchanges, raising a total of more than 472.5 billion yuan, the highest amount of IPO financing since 2011. The scale of China's stock market is expanding and its international influence is gradually increasing, but its

performance is far behind expectations. Compared with other developed and developing countries, the average annual return of China's stock market is 6.5%–11.7% lower [1]. Compared with the performance of the stock market, the development of China's real economy has been steadily advancing. In 2010, China's total economic output surpassed Japan's and became the second largest economy globally. The gap between China's total economic output and that of the United States and the European Union is gradually narrowing. In 2020, China's GDP broke through the 100 trillion mark for the first time, reaching 101 trillion yuan, accounting for about 17.4% of the world's total. Under the impact of the epidemic, the economic data of some major economies in the world in 2020 showed negative growth, while China's GDP still grew by 2.3% over the previous year, reflecting the rich foundation of China's economic development.

The relationship between the performance of China's stock market and the development of the real economy has

always been the focus of academic and practical circles. One view is that China's stock market has been seriously separated from the real economy [1]. The reason may be the independent operation mechanism of the stock market and the speculative psychology of some participants. As a result, there is a certain degree of disconnection between its development and the real economy [2]. It may also be that the asymmetry of the structure of the stock market and the real economy makes the deviation between them a normal state. But another view is that there is a strong correlation between the stock market and the real economy [3]. For example, Carpenter et al. [3] showed that the information content of the stock price of Chinese listed companies is significantly positively correlated with the investment efficiency of the company. They found that from the time series, after 2000, the information content of stock prices in China's stock market has increased significantly, and the pricing efficiency has improved significantly. From a cross-sectional point of view, it is similar to the capital markets of developed countries. The scale, growth ability, and liquidity of listed companies have gradually become important factors in determining the stock value of listed companies in China.

Is China's stock market really divorced from the real economy? Will the performance of the stock market affect the investment behavior and efficiency of enterprises? If so, what is the mechanism between the two? For a long time, the stock market has been known as the "barometer" of the real economy, and it is also an important basis for investors and decision-makers to make investment decisions and policies. Obviously, the answers to these questions are important for policymakers. If the stock market can have an impact on the real economy, the deepening reform of the capital market by the Chinese authorities can not only improve the pricing efficiency and long-term performance of the capital market but also promote the development of the real economy and optimize the effective allocation of resources. For the stock market, the liquidity of stocks reflects the state of the stock market very well [4]. For the real economy, enterprise investment plays a decisive role in the future development of enterprises, and the relationship between the two can better reflect the relationship between the stock market and the real economy. In order to answer the above questions, this article starts from the perspective of the impact of stock liquidity on enterprise investment. This paper studies whether the stock liquidity of listed companies will affect the investment level and efficiency of listed companies, to empirically verify the relationship between the stock market and the real economy.

If there is a significant correlation between stock liquidity and corporate investment, it can be proved that the stock market can affect the real economy. Then what is the mechanism of this impact? There are two major conjectures in the existing literature about the channels through which the stock market affects corporate investment. One is the positive information hypothesis: they believe that the stock market conveys information to managers that helps them to make investment decisions. Even if the information has some noise interference, it will still be used for reference by the management, so the information transmitted by the stock market greatly affects the investment decisions of

enterprises. The core idea of this hypothesis is that the main function of the stock market is to transmit information, through which decision makers judge the development of the industry and the future direction of enterprises. Another hypothesis is the stock market pressure hypothesis: the stock market can influence investment by exerting pressure on corporate managers regardless of whether they can transmit effective information. This can be understood as that if the project funds come from external financing when the investors prefer to invest in an industry with sufficient stock liquidity information, they will not do so. To keep their jobs, managers will be more inclined to invest in projects preferred by investors to achieve the purpose of smooth financing, even if the project is not the best choice for the enterprise. Both of these hypotheses hold that the stock market will affect corporate investment through information transmission [5]. Therefore, this article also empirically tests the impact of information on stock liquidity and corporate investment from the perspective of information transmission and then verifies the role of the information transmission mechanism in the relationship between the stock market and the real economy.

The main contributions of this article are as follows: First, the existing literature studies the relationship between the stock market and the real economy from a macro-perspective [6], and this paper studies the relationship between the stock market and the real economy from the micro-perspective, taking the impact of liquidity on enterprise investment at the individual stock level as the breakthrough point. Second, this article further studies the mechanism of stock illiquidity affecting corporate investment and finds that information transmission is the main channel affecting the relationship between stock illiquidity and corporate investment, and financing constraints and agency conflicts caused by information asymmetry are the main moderating variables affecting the relationship between stock illiquidity and corporate investment. Third, we find that macro policies to alleviate market information asymmetry can effectively affect real economic activities through the stock market and then provide a decision-making reference for future macropolicy formulation.

## 2. Theoretical Analysis and Research Assumptions

*2.1. Stock Liquidity and Corporate Investment.* Amihud and Mendelson [7] found that the illiquidity of stocks increases the expected return on investment of shareholders and creditors to compensate for the illiquidity cost they bear, which increases the opportunity cost of capital of enterprises. When enterprises make investment decisions, they need to choose projects with higher returns to meet the requirements of shareholders and creditors for expected returns. Therefore, the lack of stock liquidity will increase the opportunity cost of enterprise investment and have a negative impact on enterprise investment. Amihud and Levi [8] believe that stock illiquidity affects corporate investment because companies with insufficient stock liquidity tend to use variable capital in the production process, which means

that the marginal cost of capital increases and the leverage ratio of enterprises decreases. Therefore, stock liquidity affects the investment of enterprises and further affects the production process of enterprises. Based on the research of Amihud and Mendelson [7], Becker-Blease and Paul [9] further analyzed and found that improving stock liquidity can reduce the opportunity cost of capital used by enterprises, so that managers can accept projects with negative net present value, which increases the investment opportunities of enterprises. Therefore, improving stock liquidity can ultimately affect the investment choice of enterprises. Kang et al. [10] established the relationship between corporate investment and the reversal of short-term investment returns when discussing the relationship between stock liquidity and corporate investment, which further expanded the research ideas in the field of stock liquidity and corporate investment. Xiong and Su [11] believe that stock liquidity can improve the investment efficiency of enterprises by affecting agency costs and stock price information content, and put forward effective corporate governance methods. Gu et al. [12] found that stock liquidity can reduce the financing cost of enterprises, expand the investment opportunities of enterprises, and affect the investment of enterprises. So, this article proposes the following hypotheses to be tested:

Hypothesis 1: Stock illiquidity affects firm investment.

*2.2. The Mechanism of Stock Liquidity Affecting Corporate Investment.* The channels through which the stock market affects corporate investment can be classified into three main viewpoints. The first view holds that the information transmission mechanism is an important channel through which the stock market affects the investment of enterprises. In the process of enterprise management, managers make investment decisions through the information feedback of the stock market. When the market feedback is negative, managers may withdraw their investments. Coca-Cola's withdrawal of its acquisition of Quaker Oats is a typical case. The second view is that the stock market can affect corporate investment through the mechanism of financial constraints. Financing constraints are that the cost of using external funds is higher than that of internal funds, and the lack of stock liquidity will aggravate the degree of financing constraints. Eventually, the cost of external financing may be too high for enterprises to give up some investment options. The third view holds that agency conflict is also one of the channels through which the stock market affects corporate investment. The information asymmetry between the owner and the manager of the enterprise will lead to agency conflict. Lack of information about stock liquidity will aggravate agency conflicts and lead to underinvestment [13]. The latter two views can be explained by the information asymmetry in the information transmission mechanism, so this article argues that the information transmission mechanism is the main channel through which the stock market affects corporate investment.

According to Morck et al. [5], the information transmission mechanism is an important channel through which

the stock market affects corporate investment. The stock market influences enterprise investment through an information transmission mechanism, and an essential role of the stock market is to provide financing to the real economy [14]. Then the enterprises with less stock information transmission need to pay higher external financing costs to compensate for the lack of information. In fact, the less liquid the stock is, the higher the cost of raising funds for enterprises, such as the increase in investment banking fees and the higher discount on selling stocks and bonds, which is the compensation of external investors for the unknown risks (lack of information) of enterprises. Therefore, when enterprises use external funds to invest, they need a higher rate of return on investment to obtain profits, which also proves Morck's conjecture from the perspective of financing constraints [15]. From the data of the US market from 1947 to 2008, we can find that the liquidity exhaustion of the stock market has become a precursor of the real economic crisis. The liquidity fluctuation of the stock market is closely related to the business cycle of the real economy. With the change of liquidity information in the stock market, investors constantly adjust their investment structure, which makes the whole real economy change dramatically from quantity to quality [16]. By studying the stock liquidity in China, by improving the liquidity of stocks, investors can get more information about enterprises [17]. The information content of stock prices increases and the agency costs of enterprises decrease, which helps to improve the investment efficiency of enterprises [11]. The stock market ultimately affects the development of the real economy through the information transmission mechanism. According to the above document, the stock with better liquidity contains more stock market information, which may affect the agency cost of enterprises, the use cost of external funds of enterprises, and ultimately affect the overall investment behavior of enterprises. Therefore, we propose the following hypothesis to be tested:

Hypothesis 2: Stock illiquidity affects firm investment through information transmission.

If the stock market depends on the information transmission mechanism to affect the real economy, then for different information receivers, the information transmitted by the stock market is asymmetric. For outside investors, stock market information has a certain reference value for them to understand the company, and the liquidity of the stock increases the market information content. The better the liquidity, the better the performance of enterprises, which may be due to the stimulation of the investment behavior of informed people [4]. In a sufficiently developed capital market, the cost of using internal funds and the cost of external financing should be the same. However, internal investors (insiders such as shareholders) know more about the value and expected return of the project than external investors (external capital providers such as creditors, banks, and financial institutions), resulting in information asymmetry between internal and external investors, which makes the cost of external financing higher than that of internal capital use. In this case, when enterprises invest, if a large

amount of capital comes from external financing, it will increase the cost of capital for enterprises, so that enterprises will have to give up some investment options. Information asymmetry will also lead to a difference in issuing costs between equity and bond financing, and investors will not only bear the market risk when buying stocks but also bear the cost of transaction costs when buying and selling stocks. Moreover, the more illiquid the stock is, the higher the transaction cost is, which shows from another point of view that enterprises lacking liquidity information have to pay higher costs for external financing [18]. According to the theory of financing constraints, when enterprises face higher financing costs, their investment scale of enterprises will be reduced accordingly, and most of the funds of listed companies will come from external funds. The cost of external financing can easily affect the investment behavior of enterprises. In the case of insufficient internal cash flow, enterprises are likely to underinvest because of the high cost of external financing [19]. To save costs, enterprises will use internal funds to invest as much as possible. Only when the capital is insufficient, the higher cost of external funds will be used, so we speculate that the illiquidity of stocks may aggravate the financing constraints of those enterprises operating in debt, leading to higher financing costs of enterprises, thereby affecting enterprise investment. According to the research conclusion of Giannetti [20], the higher the debt leverage, the higher the financing cost of enterprises. Therefore, we use corporate debt leverage as an indicator to measure the impact of stock illiquidity on financing costs. Stock illiquidity has a negative impact on corporate financing, and the increase in corporate financing costs will lead to insufficient investment. Therefore, this article proposes the hypothesis of the moderating effect of debt leverage on stock illiquidity and corporate investment as follows.

Hypothesis 2a: Debt leverage enhances the relationship between stock illiquidity and firm investment.

The information conveyed by the stock market is also asymmetric to the owners and managers of enterprises. When good news comes from the stock market, shareholders may think that the management is doing well, but only the managers themselves know whether the company has reached the optimal capital allocation. Managers know more about the operation of the enterprise than shareholders, so when the interests of the two are not in line, it is necessary. This information asymmetry eventually leads to agency conflicts. At present, the ownership and management of many enterprises in the capital market are separated. Shareholders hope to maximize the value of enterprises, while managers hope to maximize their benefits. The separation of ownership and management leads to a deviation in capital allocation efficiency from the optimal level [13]. The pursuit of personal interests by managers may lead to a decline in the efficiency of enterprise investment, but it is difficult for shareholders to identify whether each investment is the best choice, and when the enterprise's own cash flow is more sufficient, the agency conflict caused by information asymmetry is more obvious, leading to excessive

investment. According to the investment cash flow sensitivity hypothesis, the investment of enterprises is significantly related to the cash flow level of enterprises. When the cash flow of enterprises is sufficient, the agency cost is the main reason for the sensitivity of investment cash flow, which eventually leads to excessive investment. Therefore, we speculate that information asymmetry leads to agency conflicts in enterprises with the separation of two rights. The more sufficient the cash flow is, the more significant the agency conflict is, which leads to over-investment, and the impact of stock illiquidity on corporate investment will be weakened. Therefore, the following hypotheses are proposed in this article.

Hypothesis 2b: Corporate cash flow weakens the relationship between stock illiquidity and corporate investment.

### 3. Study Design

*3.1. Sample Selection.* This article selects the data of A-share listed companies in Shanghai and Shenzhen Stock Exchanges from 1998 to 2021 as the sample. (The data of capital expenditure and other major regression variables in the CSMAR database are collected from 1998, so our sample time is also from 1998.) We excluded stocks with abnormal trading status (suspended trading, ST enterprises, etc.), and financial stocks (since the capital structure and operation mode of the financial stock industry are quite different from those of other industries, we excluded the data of financial stocks in the sample), and stocks with IPO data less than 5 years because the main explanatory variables in this article are enterprise investment and newly listed enterprises. Investment and stock liquidity are both unstable, and the regression equation below involves the demand of lagging variables, and there are many missing data of enterprises with suspension or ST, so the stocks with data of less than 5 years are screened out (not deleting does not affect the final regression results). In the end, we ended up with 2822 listed companies. In order to eliminate the impact of outliers on the results (the reason why ILLIQ is not truncated is that the index is calculated as a logarithm, which means that outliers have been processed, and whether ILLIQ is truncated or not does not affect the final results). In this article, all continuous variables are truncated at a level of 1%. The final sample contains 31029 “company-year” unbalanced panel data. The data in this article are from the China Economic Policy Uncertainty Index (Refer to Baker et al. [21] and Tan and Zhang [22]. The data are from the website <http://www.policyuncertainty.com>) compiled by Baker et al. [21]. In addition, other data are from the Guotai'an (CSMAR) database.

#### 3.2. Variable Definition

*3.2.1. Enterprise Investment.* This article uses two indicators to measure enterprise investment: one is the enterprise investment index reflecting the capital stock, which is calculated by the ratio of investment expenditure to the total

TABLE 1: Variable definition.

| Variable name                                   | Variable symbol | Variable definition   |
|---|-----------------|---|
| Enterprise investment (capital stock) indicator | INV1            | Capital expenditure/total assets of the previous period.  |
| Enterprise investment (capital flow) indicator  | INV2            | (Funds paid for acquisition and construction of fixed assets, intangible assets, and other long-term assets-depreciation and amortization)/total assets of the previous period.   |
| Stock Illiquidity Index                         | ILLIQ           | The ratio of the absolute value of the daily return rate of a stock to the trading amount is summed and then divided by the annual trading days, and finally, the logarithm is taken as a whole, excluding stocks with a daily trading volume of less than 100 shares and annual trading days of less than 150 days. See formula (1) for details. |
| Enterprise Cash Flow Inflow Index               | CF1             | The ratio of earnings before interest, tax, depreciation, and amortization to total assets of the previous period.  |
| Enterprise Cash Flow Expenditure Indicator      | CF2             | The ratio of cash paid for the acquisition and construction of fixed assets, intangible assets, and other long-term assets to total assets of the previous period.  |
| Financial Leverage Index                        | LEV             | Asset-liability ratio.  |
| Company Growth Index                            | Q               | Cathay Pacific Tobin $Q_A$ : enterprise market value/total assets.  |
| Company size indicator                          | TA              | Natural logarithm of total assets.  |
| Stock Volatility Index                          | VOL             | Standard deviation of weekly stock returns over the course of a year.   |
| Investor sentiment indicator                    | RET2            | Cumulative return on equity over two years.   |
| Business Capability Index                       | S               | The ratio of operating income to total assets of the previous period.   |
| Index of funds held by major shareholders       | ORECTA          | The ratio of other receivables to total assets at the end of the period.  |
| Management cost indicator                       | MCOST           | The ratio of administrative expenses to main business income.   |

assets of the lagging period [8]. Capital expenditure includes the net cash flow of all long-term investment expenditures (such as cash paid for operating leases, the purchase and construction of fixed assets, and other long-term assets). This data belongs to the category of fixed costs in economic cost accounting, which can best reflect the enterprise's grasp of the future development direction. The second is the enterprise investment index reflecting capital flow, which is calculated by deducting depreciation and amortization from fixed assets, intangible assets, and other long-term assets, mainly measuring the annual new investment of enterprises. This article uses the enterprise investment stock index as the main analysis variable and the enterprise investment flow index as the robustness analysis.

3.2.2. *Stock Illiquidity (Pastor and Stambaugh [23] and Barinov [24]; Two Other Measures of Liquidity Are also Used in the Robustness Test, and the Results Are Robust).* With reference to Amihud and Levi [8], the stock illiquidity index in this article is defined as follows:

$$ILLIQ_{j,t} = \ln \left[ \sum \frac{|r_{j,d,t}| / \text{volume}_{j,d,t}}{N} \right]. \quad (1)$$

In the above formula,  $r_{j,d,t}$  is the rate of return of individual stock of stock  $J$  on day  $d$  of year  $t$ , taking into account the reinvestment of cash dividends;  $\text{volume}_{j,d,t}$  is the transaction amount of stock  $J$  on day  $d$  of year  $t$ ; and  $N$  is the annual trading days of the stock.

3.2.3. *Other Variables.* Control variables include corporate cash flow indicators (Amihud and Levi [8] believe that the cash flow of the enterprise in the current period affects the

investment of the enterprise in the current period, so only this indicator does not take the lag term and other explanatory variables lag by one period). Enterprise financial leverage index, Tobin  $Q$  value reflecting enterprise growth, enterprise asset size, the standard deviation of stock weekly return in each year (controlling company risk) and cumulative return rate of stock for two consecutive years (controlling the influence of investor sentiment), operating ability index, major shareholder's share index and management efficiency index. These indicators have been shown to influence business investment [4, 8, 11, 25]. The main variables used in this article and their calculation methods are given in Table 1.

3.3. *Model Design.* Based on Amihud and Levi [8], we use a fixed-effect model to test stock liquidity and corporate investment, controlling for time effects and individual effects, as shown in the model:

$$\begin{aligned} INV_{j,t} = & b1 * ILLIQ_{j,t-1} + b2 * CF_{j,t} + b3 * LEV_{j,t-1} \\ & + b4 * Q_{j,t-1} + b5 * TA_{j,t-1} \\ & + b6 * VOL_{j,t-1} + b7 * RET2_{j,t-1} + b8 * S_{j,t-1} \\ & + b9 * ORECTA_{j,t-1} \\ & + b10 * MCOST_{j,t-1} + \varepsilon_{j,t} + \text{firmFE} + \text{yearFE}. \end{aligned} \quad (2)$$

The variables are defined as shown in Table 1.

3.4. *Descriptive Statistics.* Table 2 shows the descriptive statistics results of the main variables in this article. As can be seen from the table, the annual capital expenditure of enterprises accounts for 5.73% of the average proportion of total assets at the beginning of the year, but the median is only 3.57%,

TABLE 2: Descriptive statistics.

| Variable         | $N$   | Mean    | sd     | min     | $p25$   | $p50$   | $p75$   | max     |
|------------------|-------|---------|--------|---------|---------|---------|---------|---------|
| $INV1_{j,t}$     | 31029 | 0.0573  | 0.0660 | 0.0001  | 0.0137  | 0.0357  | 0.0756  | 0.3842  |
| $INV2_{j,t}$     | 31029 | 0.0283  | 0.0601 | -0.0492 | -0.0052 | 0.0087  | 0.0424  | 0.3322  |
| $ILLIQ_{j,t-1}$  | 31029 | -21.344 | 1.3324 | -24.239 | -22.239 | -21.472 | -20.570 | -17.213 |
| $PS_{j,t-1}$     | 17240 | -0.1106 | 1.3971 | -59.610 | -0.1200 | -0.0245 | 0.0080  | 0.3541  |
| $TO_{j,t-1}$     | 17514 | 0.0509  | 0.0385 | 0.0002  | 0.0224  | 0.0401  | 0.0678  | 0.9218  |
| $CF1_{j,t}$      | 31029 | 0.0990  | 0.3562 | -1.1108 | 0.0515  | 0.0824  | 0.1251  | 32.255  |
| $CF2_{j,t}$      | 31029 | 0.0668  | 0.3665 | -0.1194 | 0.0153  | 0.0388  | 0.0813  | 60.969  |
| $LEV_{j,t-1}$    | 31029 | 0.4765  | 0.2096 | 0.0071  | 0.3280  | 0.4797  | 0.6221  | 9.6988  |
| $Q_{j,t-1}$      | 31029 | 1.9714  | 4.8810 | 0.6735  | 1.1612  | 1.4646  | 2.0832  | 729.62  |
| $TA_{j,t-1}$     | 31029 | 22.119  | 1.3320 | 15.577  | 21.190  | 21.957  | 22.864  | 28.636  |
| $VOL_{j,t-1}$    | 31029 | 0.0627  | 0.0409 | 0.0044  | 0.0449  | 0.0568  | 0.0737  | 5.2686  |
| $RET2_{j,t-1}$   | 31029 | 0.4059  | 1.0528 | -1.2389 | -0.2996 | 0.1465  | 0.7864  | 21.181  |
| $S_{j,t-1}$      | 31029 | 0.8043  | 1.9647 | 0.0001  | 0.3706  | 0.5992  | 0.9235  | 212.45  |
| $ORECTA_{j,t-t}$ | 31029 | 0.1365  | 0.6244 | 0.0000  | 0.0313  | 0.0910  | 0.1787  | 88.056  |
| $MCOST_{j,t-1}$  | 31029 | 0.1236  | 3.1276 | -0.1498 | 0.0418  | 0.0693  | 0.1091  | 544.90  |

indicating that the capital expenditure level of most enterprises is lower than the average level. From the perspective of capital flow, the average proportion of new net investment to total assets at the beginning of the year is 2.83%, and the median is 0.87%. Similarly, the higher proportion of net investment in a small number of enterprises has raised the average level of the index, and the initial performance of the enterprise investment index from the perspective of capital stock and capital flow is more consistent. Among the stock liquidity indicators, the median of ILLIQ and TO is lower than the average, and the median of PS is higher than the average. It shows that the liquidity level of most stocks is above the average, and the data structure of the three indicators to measure stock liquidity is more consistent. Among the other control variables, the two cash flow indicators are constructed from the perspective of cash flow inflow and outflow, respectively. The median of the cash flow inflow indicator CF1 is basically consistent with the mean, and the data distribution is relatively balanced. The median of the cash flow outflow index CF2 is 3.88%, which is much lower than the average of 6.68%, indicating that the cash outflow level of most enterprises is lower than the average level of the sample. Therefore, this article retains two cash flow indicators with different data performance as control variables to regress separately, to enhance the robustness of the regression results.

## 4. Empirical Results

**4.1. Empirical Analysis.** This article tests the impact of stock liquidity on corporate investment through model (2), and the regression results are shown in Table 3. Column (a) is a univariate regression, which mainly examines the relationship between core explanatory variables and corporate investment and is consistent with the hypothesis. Column (b) is the basic regression model, and the explanatory variables are the factors mentioned in the existing literature that may affect the investment of enterprises (excluding illiquid variables). The results are basically consistent with the conclusions of the existing literature. Column (c) is the main regression model of this paper, and the results show that, when controlling other influencing factors, stock illiquidity is significantly negative at

TABLE 3: Main results.

| Dependent variable: | (a)                   | (b)                   | (c)                   |
|---------------------|-----------------------|-----------------------|-----------------------|
|                     | $INV1_{j,t}$          | $INV1_{j,t}$          | $INV1_{j,t}$          |
| $ILLIQ_{j,t-1}$     | -0.0024***<br>(-3.12) |                       | -0.0031***<br>(-3.72) |
| $CF1_{j,t}$         |                       | 0.0117**<br>(2.08)    | 0.0115**<br>(2.06)    |
| $LEV_{j,t-1}$       |                       | -0.0314***<br>(-4.60) | -0.0299***<br>(-4.51) |
| $Q_{j,t-1}$         |                       | 0.0005***<br>(4.16)   | 0.0005***<br>(4.40)   |
| $TA_{j,t-1}$        |                       | -0.0076***<br>(-6.41) | -0.0089***<br>(-7.01) |
| $VOL_{j,t-1}$       |                       | -0.0222***<br>(-3.57) | -0.0207***<br>(-3.39) |
| $RET2_{j,t-1}$      |                       | 0.0094***<br>(11.66)  | 0.0090***<br>(11.13)  |
| $S_{j,t-1}$         |                       | -0.0004<br>(-0.60)    | -0.0003<br>(-0.49)    |
| $ORECTA_{j,t-1}$    |                       | -0.0049***<br>(-2.82) | -0.0048***<br>(-2.81) |
| $MCOST_{j,t-1}$     |                       | 0.0000<br>(-0.75)     | 0.0000<br>(-0.89)     |
| Cons                | 0.0295*<br>-1.91      | 0.2438***<br>(10.24)  | 0.2103***<br>(8.67)   |
| Firm                | Yes                   | Yes                   | Yes                   |
| Year                | Yes                   | Yes                   | Yes                   |
| $N$                 | 17515                 | 17515                 | 17515                 |
| $R^2$               | 0.050                 | 0.087                 | 0.088                 |

the 1% level, and the coefficients and significance of other control variables have not changed significantly (All fixed effects models in this article were treated with cluster robust standard errors [26]). The results show that corporate investment is negatively correlated with stock illiquidity in the lag period, and stock liquidity can indeed affect corporate investment, which also verifies that the stock market has an impact on the real economy from a microperspective, and hypothesis 1 is true. This result confirms the conjecture of Morck et al. [5], and is similar to the research results of Amihud and Levi [8] and Xiong and Su [11].

**4.2. Robustness Test.** The impact of stock liquidity on enterprise investment may have a reverse causal relationship, and the measurement method of the explained variable and the explanatory variable in the regression is single. In addition, there may be some problems such as missing variables and biased regression results due to the influence of the inherent characteristics of the enterprise. Therefore, the following robustness test was conducted.

**4.2.1. Reverse Causation Test.** While stock liquidity affects corporate investment, corporate behavior may also adversely affect the performance of the stock market. Considering the possible two-way causality, the previous main regression models used the stock liquidity index with a lag period as panel regression. In order to ensure the robustness of the results, the two-stage least square test, entropy balance, and DID model test are used to analyze the robustness of the main regression results.

(1) two-stage least-square test.

In view of the two-way causality between stock liquidity and enterprise investment indicators, we use the stock illiquidity index with a lag of two periods and the industry median stock liquidity with a lag of one period (According to Jayaraman and Milbourn [26], the stock illiquidity index with a lag of two periods as an exogenous variable can solve the problem of time series, while according to Fang et al. [4], the investment of each enterprise cannot affect the industry median stock liquidity, but the stock liquidity of individual stocks is related to the industry median liquidity). The 2SLS test [26] was conducted as an IV variable. The first stage of OLS regression controlled for the time effect and the industry effect, and the regression was shown in formula (3). The second stage of regression used the fitted value of prILLIQ as the instrumental variable, and the regression results were shown in column (a) and column (b) of Table 4, respectively. The results show that stock illiquidity is negatively correlated with corporate investment at the 5% level, and the results are robust.

$$\begin{aligned}
\text{ILLIQ}_{j,t-1} = & b1 * \text{ILLIQ}_{j,t-2} + b2 \\
& * \text{indILLIQ}_{j,t-1} + b3 * CF_{j,t-1} \\
& + b4 * \text{LEV}_{j,t-2} + b5 * Q_{j,t-2} \\
& + b6 * TA_{j,t-2} + b7 * \text{VOL}_{j,t-2} \\
& + b8 * \text{RET2}_{j,t-2} + b8 * S_{j,t-2} \\
& + b10 * \text{ORECTA}_{j,t-2} \\
& + b11 * \text{MCOST}_{j,t-2} + \varepsilon_{j,t} \\
& + \text{firmFE} + \text{yearFE}.
\end{aligned} \tag{3}$$

In the above formula, indILLIQ is the median of stock liquidity in the industry, based on the industry classification of the Securities Regulatory Commission in 2012.

TABLE 4: Two-stage least-square test.

| Dependent variable:       | (a)<br>ILLIQ <sub>j,t-1</sub> | (b)<br>INV1 <sub>j,t</sub> |
|---------------------------|-------------------------------|----------------------------|
| ILLIQ <sub>j,t-2</sub>    | 0.6774***<br>(51.60)          |                            |
| midILLIQ <sub>j,t-1</sub> | 0.3398***<br>(13.33)          |                            |
| prILLIQ <sub>j,t-1</sub>  |                               | -0.0019**<br>(-1.96)       |
| Control                   | Yes                           | Yes                        |
| Industry                  | Yes                           | Yes                        |
| Year                      | Yes                           | Yes                        |
| N                         | 17515                         | 17515                      |
| R <sup>2</sup>            | 0.892                         | 0.126                      |

(2) Entropy balance and DID test.

This article conducts a natural experiment on entropy balance and DID by using the exogenous shock event of margin trading to investigate whether there is a one-way conduction effect between stock liquidity and enterprise investment. China has launched the pilot margin trading business since 2010, which has realized that some stocks in the stock market can be traded from one-way to two-way, reducing the transaction cost of some stocks and improving the liquidity of stocks [28]. Therefore, a total of five years, from the first two years to the second two years of each stock policy implementation year, are selected as the sample interval for testing. The entropy balance matching results are shown in Table 5. The entropy balance matching results of the sample experimental group and the control group are good, and the mean, variance, and skewness of the feature vectors after matching are basically the same; DID regression is carried out for the matched results, and the results are shown in Table 6, where time is the virtual variable at the time point of margin trading, and the value of the stock after participating in the margin trading policy is 1; otherwise, it is 0. The question is whether or not to participate in margin trading. Participation is 1. Otherwise, it is 0. The results show that under the impact of the margin trading policy, which only changes the stock liquidity, the regression of the interaction term to the enterprise investment is significantly positive, indicating that the stock liquidity has a one-way incentive effect on the enterprise investment.

**4.2.2. Time Series Stationarity Test.** In view of the dynamic relationship between variables, this article chooses the time series stationarity test to eliminate the interference of trend factors on regression results and the impact of variable correlation. With two and three lags, compute the first-order difference of all variables. (The difference with a lag of one year cannot completely eliminate the influence of the trend factor, while the first-order difference with a lag of more than

TABLE 5: Entropy balance matching result.

| Variable | Treat  |        |         | Control |        |         | Std. diff | Var. ratio |
|----------|--------|--------|---------|---------|--------|---------|-----------|------------|
|          | Mean   | Var    | Ske     | Mean    | Var    | Ske     |           |            |
| LEV      | 0.5018 | 0.0364 | -0.2027 | 0.5018  | 0.0364 | -0.2025 | 0.000     | 0.999      |
| Q        | 1.9980 | 1.7240 | 3.5700  | 1.9980  | 1.7240 | 3.5700  | 0.000     | 1.000      |
| VOL      | 0.0698 | 0.0006 | 1.3860  | 0.0698  | 0.0006 | 1.3860  | 0.000     | 1.000      |
| RET2     | 1.0160 | 2.3180 | 1.9650  | 1.0160  | 2.3180 | 1.9650  | 0.000     | 1.000      |
| S        | 0.9738 | 4.0130 | 32.0400 | 0.9738  | 4.0120 | 32.0400 | 0.000     | 1.000      |

TABLE 6: Entropy balance and DID final result.

| Variable       | INN1               |
|----------------|--------------------|
| Treat * time   | 0.1042**<br>(1.98) |
| Control        | Yes                |
| Firm           | Yes                |
| Year           | Yes                |
| N              | 8085               |
| R <sup>2</sup> | 0.051              |

TABLE 7: Time series stationarity test.

| Dependent variable | Lag two periods<br>$\Delta$ INV1   | Lag three periods<br>$\Delta$ INV1 |
|--------------------|------------------------------------|------------------------------------|
| $\Delta$ ILLIQ     | <b>-0.0044**</b><br><b>(-2.00)</b> | <b>-0.0049*</b><br><b>(-1.75)</b>  |
| $\Delta$ control   | Yes                                | Yes                                |
| Firm               | Yes                                | Yes                                |
| Year               | Yes                                | Yes                                |
| N                  | 11969                              | 9876                               |
| R <sup>2</sup>     | 0.111                              | 0.128                              |

four years will lead to a small sample size that is not representative, so this article chooses to report the difference regression results with a lag of two and three years [26].) As shown in Table 7, the difference in stock illiquidity is significantly negatively correlated with the difference in enterprise investment, which proves that the results of this paper are independent of time factors and trend factors.

**4.2.3. Missing Variable Test.** Tan and Zhang [22] and Li and Yang [27] believe that economic policy uncertainty (second moment) will inhibit enterprise investment, and its transmission effect is related to the value of capital liquidity. Stock liquidity reflects information about capital liquidity. Therefore, the result of this article may be caused by economic policy uncertainty. We add the control variable economic policy uncertainty index (EPU) on the basis of formula (2). The regression results are shown in Table 8, and the conclusion of this article remains unchanged.

**4.2.4. Homogeneity Index Substitution Test.** As for the deviation of the main indicators, this article constructs an indicator INV2 (from the perspective of capital flow) to measure the new investment of enterprises instead of INV1 (from the perspective of capital stock). In addition, we also construct the PS index and the turnover rate index to measure the liquidity of the stock to regress the enterprise investment again to ensure the robustness of the conclusion of this article. The specific regression results are shown in Table 9. Columns (a) and (b) are regression results using Amihud and Levi [8] illiquidity measures; columns (c) and (d) are regression results using the Pastor and Stambaugh [23] liquidity indicator (The PS index was proposed by Pastor and Stambaugh [23], which measures stock liquidity by measuring the reversal of expected stock returns. Because the standard measurement of the index is to return monthly stock liquidity through daily stock trading data, we use the annual index. If the time span of the annual time regression is too long, the measurement results will be inaccurate. We still

TABLE 8: Missing variable test.

| Dependent variable    | INV1 <sub>jt</sub>                  |
|-----------------------|-------------------------------------|
| ILLIQ <sub>jt-1</sub> | <b>-0.0031***</b><br><b>(-2.61)</b> |
| EPU <sub>t-1</sub>    | <b>-0.0094***</b><br><b>(-3.10)</b> |
| Control               | Yes                                 |
| Firm                  | Yes                                 |
| Year                  | Yes                                 |
| N                     | 17515                               |
| R <sup>2</sup>        | 0.088                               |

calculate the monthly PS index according to the standard regression method and then calculate the annual average value to ensure the rationality of the index. The calculation method is shown in the following formula, and the final value of PS is the value of the  $\gamma$  coefficient:

$$R_{j,d,t+1} - R_{m,d,t+1} = R_{j,d,t} + \gamma * \text{Sign}R_{j,d,t} - R_{m,d,t} * \text{Volum}_{j,d,t} + \varepsilon_{j,d,t+1}.$$

Among,  $R_{j,d,t}$  is the return rate of an individual stock of the stock  $J$  on the day  $t$  of the month  $d$ ;  $R_{m,d,t}$  is the market return rate of the stock market on  $d$  month  $t$  day;  $\text{Sign}R_{j,d,t} - R_{m,d,t}$  it is the symbol of the difference between the daily return rate of individual stocks and the daily return rate of the stock market, with values of  $-1$ ,  $0$  and  $1$ ;  $\text{Volum}_{j,d,t}$  it is the daily transaction amount of individual stocks.) Columns (e) and (f) are regression results using the turnover indicator TO. The results show that, no matter which measure is used, stock illiquidity can significantly affect corporate investment, and the better the liquidity, the higher the corporate investment. The results are very robust.

## 5. Further Analysis

The previous empirical results show that stock liquidity has a significant negative impact on corporate investment, which



TABLE 9: Homogeneous index substitution test.

| Dependent variable:  | (a)<br>INV1 <sub>j,t</sub> | (b)<br>INV2 <sub>j,t</sub> | (c)<br>INV1 <sub>j,t</sub> | (d)<br>INV2 <sub>j,t</sub> | (e)<br>INV1 <sub>j,t</sub> | (f)<br>INV2 <sub>j,t</sub> |
|----------------------|----------------------------|----------------------------|----------------------------|----------------------------|----------------------------|----------------------------|
| LIQ <sub>j,t-1</sub> | -0.0031***<br>(-2.61)      | -0.0029**<br>(-2.46)       | 0.0043***<br>(3.20)        | 0.0038***<br>(2.93)        | -0.0516**<br>(-2.17)       | -0.0571**<br>(-2.42)       |
| Control              | Yes                        | Yes                        | Yes                        | Yes                        | Yes                        | Yes                        |
| Firm                 | Yes                        | Yes                        | Yes                        | Yes                        | Yes                        | Yes                        |
| Year                 | Yes                        | Yes                        | Yes                        | Yes                        | Yes                        | Yes                        |
| N                    | 17515                      | 17515                      | 17240                      | 17240                      | 17514                      | 17514                      |
| R <sup>2</sup>       | 0.088                      | 0.067                      | 0.089                      | 0.068                      | 0.091                      | 0.069                      |

verifies that the stock market can affect the real economy from a microperspective and that the two are not separated in fact. So, how does the stock market affect the real economy? In this part, we will discuss the mechanism by which the stock market affects the real economy.

*5.1. Mechanism Discussion.* In the second part of the literature review, this article proposes that the stock market may affect corporate investment through information channels. Based on this, this chapter chooses three common indicators to measure the information content of the stock market as dummy variables. It multiplies them with stock illiquidity indicators to see the sign and significance of the product. If the product term regression results are significant and have the same sign as the stock illiquidity index, it shows that the higher the information content of the stock, the greater the influence of liquidity on enterprise investment, thus verifying hypothesis 2.

In order to ensure the robustness of the test results, we choose the stock price synchronization index, the number of institutional investors holding index, and the stock return index to measure the information content of stock prices. At present, a large number of literature use the index of stock price synchronization to measure the information content of individual stocks, and the greater the fluctuation of stock price synchronization, the higher the information content. It has been proved to have a significant positive relationship with information transparency and other indicators to measure information content, so this article also chooses this indicator to measure the information content of the stock market, which is divided into two groups based on the order of information content from high to low, with "1" as the median and "0" as the dummy variable to measure the information content of the stock [28–30]. Compared with noninstitutional investors, institutional investors can obtain and screen out more effective stock market information, so the more institutional investors hold, the more sufficient the market information disclosure of the stock is. This chapter uses the number of shares held by institutional investors as an indicator to measure the information content of the stock market [31]. Stock returns are also used as a study of stock information content, usually using stock returns and trading volume to measure stock market trading information (including risk sharing and return reversals). We, therefore, use stock returns as a third measure of stock market information [32], and the results are shown in Table 10.

TABLE 10: Inspection of the information transmission mechanism.

| Dependent variable:    | (a)<br>ILLIQ <sub>j,t-1</sub> | (b)<br>INV1 <sub>j,t</sub> | (c)<br>INV1 <sub>j,t</sub> |
|------------------------|-------------------------------|----------------------------|----------------------------|
| ILLIQ <sub>j,t-1</sub> | -0.0033***<br>(-2.76)         | -0.0035**<br>(-2.20)       | -0.0038***<br>(-3.13)      |
| CM                     | -0.0001***<br>(-3.21)         | -0.0004***<br>(-5.61)      | -0.0003***<br>(-6.50)      |
| Control                | Yes                           | Yes                        | Yes                        |
| Firm                   | Yes                           | Yes                        | Yes                        |
| Year                   | Yes                           | Yes                        | Yes                        |
| N                      | 17515                         | 9133                       | 17515                      |
| R <sup>2</sup>         | 0.088                         | 0.126                      | 0.090                      |

The product CM in columns (a), (b), and (c) of Table 10 is the product of stock illiquidity and the dummy variable of stock price information content (stock price synchronicity index, institutional investor shareholding index, and stock return index in turn). The results show that the regression results of the product are significant at a 1% level and have the same sign as the stock illiquidity index. This shows that the higher the information content, the greater the impact of stock illiquidity on corporate investment. Hypothesis 2 is established, which shows that the information transmission mechanism is an important channel for the stock market to affect the real economy.

*5.2. Heterogeneity Analysis.* The previous article verifies that stock illiquidity affects corporate investment by information transmission mechanism. If information is the influence channel, then asymmetric information will cause the deviation of the impact of stock illiquidity on corporate investment. The information asymmetry between internal and external investors will lead to financing constraints, while the information asymmetry between shareholders and managers will lead to agency conflicts. These are all important factors affecting the investment of enterprises. Therefore, in this section, we study the impact of stock liquidity on enterprise investment under different enterprise properties from the perspective of information asymmetry.

*5.2.1. Financing Constraints.* The difference between the information received by internal and external investors from the stock market leads to the difference in their investment costs. External investors have less access to information and need a higher expected rate of return to compensate for the risk cost of asymmetric information they bear, so when

enterprises choose external financing to raise funds, they will face a higher opportunity cost of capital. Only projects with higher returns can be selected to meet the creditors' requirements for expected returns [7]. Therefore, the information asymmetry transmitted by the stock market creates a cost difference between the enterprise's own capital and external capital, and ultimately affects the enterprise's investment. External financing is the main source of capital for enterprise investment, and the higher the cost of external financing, the higher the cost loss of enterprises. External financing is the main source of capital for enterprise investment, and the higher the cost of external financing, the higher the cost loss of enterprises, the narrower the investment options [7]. When the stock liquidity of enterprises is better, they tend to use equity financing rather than debt financing [18], which makes enterprises with poor stock liquidity increase more debt than those with good liquidity when obtaining capital flow, and the higher the debt leverage, the higher the financing cost, when faced with more serious financial constraints [20]. In order to verify the impact of financing constraints caused by asymmetric information on stock illiquidity and corporate investment, we treat the debt leverage index as a dummy variable, increase the production of both the stock illiquidity index and the debt leverage index, and judge the impact of corporate debt leverage on the relationship between stock illiquidity and corporate investment through the sign and significance of the product. The model is shown in :

$$\begin{aligned}
INV_{j,t} = & b * ILLIQ_{j,t-1} + b2 * CF1_{j,t} + b3 \\
& * ILLIQ_{j,t-1} * LEV_{j,t} + b4 * LEV_{j,t-1} \\
& + b5 * Q_{j,t-1} + b6 * TA_{j,t-1} + b7 \\
& * VOL_{j,t-1} + b8 * RET2_{j,t-1} + b9 * S_{j,t-1} \quad (4) \\
& + b10 * ORECTA_{j,t-1} + b11 \\
& * MCOST_{j,t-1} + \varepsilon_{j,t} + \text{firmFE} + \text{yearFE}.
\end{aligned}$$

**5.2.2. Proxy Conflict.** Information asymmetry between shareholders and management leads to agency conflict, and the more abundant the cash flow, the more serious the agency conflict. We verify the impact of corporate cash flow on the relationship between stock liquidity and corporate investment from the perspective of income and expenditure of cash flow, in which income refers to the cash flow brought by corporate operations. Primarily measured by the ratio of EBITDA to total assets one period behind; cash flow expenditure is measured by the ratio of cash paid for the purchase and construction of fixed assets, intangible assets, and other long-term assets to the total assets of the previous period. Both the inflow and outflow of cash flow can measure the level of cash flow of an enterprise. Using them separately can better compare the impact of different types of cash flows on the relationship between stock illiquidity and enterprise investment, and the regression results are more robust.

To verify the above analysis, we treat the cash flow indicators as dummy variables (In formula (4), the inflow and outflow indicators of cash flow are both dummy variables, which are greater than the median value of 1, otherwise they are 0; the debt leverage index in formula (5) is the same). Add the multiplication term of the dummy variable to the stock illiquidity index and the enterprise cash flow index, and judge the influence of the enterprise cash flow on the relationship between the two through the coefficient and significance of the multiplication term. The model is as shown in :

$$\begin{aligned}
INV_{j,t} = & b1 * ILLIQ_{j,t-1} + b2 * CF_{j,t} + b3 * ILLIQ_{j,t-1} \\
& * CF_{j,t} + b4 * LEV_{j,t-1} \\
& + b5 * Q_{j,t-1} + b6 * TA_{j,t-1} + b7 * VOL_{j,t-1} \quad (5) \\
& + b8 * RET2_{j,t-1} + b9 * S_{j,t-1} \\
& + b10 * ORECTA_{j,t-1} + b11 \\
& * MCOST_{j,t-1} + \varepsilon_{j,t} + \text{firmFE} + \text{yearFE}.
\end{aligned}$$

**5.2.3. Regression Result Analysis.** For the financing constraints caused by information asymmetry between internal and external investors, we construct a model (4) to study the impact of corporate debt leverage on the relationship between stock illiquidity and corporate investment. The regression results are shown in Table 11. Column (a) in Table 11 is the base regression, for the convenience of comparison of regression results. As shown in column (b), after adding the product term of stock illiquidity and corporate debt leverage index dummy variables, the stock illiquidity index is significantly negative at the level of 5%, and the product term coefficient is significantly negative at the level of 10%, which indicates that corporate debt leverage enhances the negative relationship between stock illiquidity and corporate investment. The higher the corporate debt leverage is, the higher the corporate debt is. The greater the negative impact of stock illiquidity on corporate investment, the more the financing constraints caused by information asymmetry affect the impact of the stock market on the real economy.

For the agency conflict caused by information asymmetry between shareholders and managers, we constructed a model (5) to study the impact of enterprise free cash flow indicators on the relationship between stock illiquidity and enterprise investment. The regression results are shown in columns (c) and (d) of Table 11. We find that after adding the product of stock illiquidity and enterprise cash flow dummy variables, the index of stock illiquidity is still significantly negative at the 1% level. The coefficient of cross multiplication is significantly positive at the 1% level, and we verify it from the two perspectives of cash flow inflow and outflow, respectively. The two results are consistent, which shows that the internal cash flow of enterprises weakens the negative relationship between stock illiquidity and enterprise investment, and the more sufficient the enterprise's cash flow is. The negative impact of stock illiquidity on

TABLE 11: Heterogeneity analysis of the information transmission mechanism.

| Dependent variable     | (a)<br>INV1 <sub>j,t</sub> | (b)<br>INV1 <sub>j,t</sub> | (c)<br>INV1 <sub>j,t</sub> | (d)<br>INV1 <sub>j,t</sub> |
|------------------------|----------------------------|----------------------------|----------------------------|----------------------------|
| ILLIQ <sub>j,t-1</sub> | -0.0031***<br>(-2.61)      | -0.0028**<br>(-2.12)       | -0.0046***<br>(-3.79)      | -0.0041***<br>(-4.35)      |
| CM                     |                            | -0.0016*<br>(-1.75)        | 0.0032***<br>(3.89)        | 0.0059***<br>(8.3)         |
| CF1 <sub>j,t</sub>     | 0.0233**<br>(2.01)         | 0.0238**<br>(2.08)         | 0.0707***<br>(4.09)        |                            |
| CF2 <sub>j,t</sub>     |                            |                            |                            | 0.1991***<br>(13.34)       |
| LEV <sub>j,t-1</sub>   | -0.0286***<br>(-4.51)      | -0.0416**<br>(-2.19)       | -0.0303***<br>(-4.77)      | -0.0133***<br>(-2.88)      |
| Control                | Yes                        | Yes                        | Yes                        | Yes                        |
| Firm                   | Yes                        | Yes                        | Yes                        | Yes                        |
| Year                   | Yes                        | Yes                        | Yes                        | Yes                        |
| N                      | 17515                      | 17515                      | 17515                      | 17515                      |
| R <sup>2</sup>         | 0.088                      | 0.088                      | 0.088                      | 0.375                      |

Note. \*\*\*\*, \*\* and \* indicate significant at the level of 1%, 5%, and 10%, respectively; in column (b), CM = ILLIQ<sub>j,t-1</sub> \* LEV<sub>j,t</sub>; in column (c), CM = ILLIQ<sub>j,t-1</sub> \* CF1<sub>j,t</sub>; and in column (d), CM = ILLIQ<sub>j,t-1</sub> \* CF2<sub>j,t</sub>.

corporate investment is smaller, so the agency conflict caused by information asymmetry significantly affects the relationship between the stock market and the real economy.

**5.3. Exogenous Event Shock.** After empirically testing that financing constraints and agency conflicts caused by information asymmetry affected the relationship between stock illiquidity and enterprise investment, this section will test it through external policy shocks. If macroeconomic policies can alleviate information asymmetry, can these policies alleviate the “deviation” between the stock market and the real economy caused by financing constraints and agency conflicts caused by information asymmetry? In the following, three typical policies of “margin trading,” “split share structure reform,” and “four trillion plans” are selected to verify the previous discussion.

**5.3.1. Margin Financing and Securities Lending.** Since the pilot establishment of China’s stock market in 1989, only the one-way trading mode of “doing more” has been opened. With the continuous improvement of the operation mechanism of the stock market, China officially launched the pilot trading of “margin trading” in 2010, and some stocks changed from one-way trading to two-way trading [33]. Margin trading can not only promote the disclosure of nonmandatory information (including negative news) by management but also improve the accuracy and timeliness of management’s performance forecast and show a good external information governance effect. The two-way trading in the stock market provides more perfect market information, which not only reduces the degree of information asymmetry between shareholders and managers but also reduces the degree of information asymmetry between shareholders and managers. It also reduces the degree of information asymmetry between investors and enterprises, so the development of margin trading weakens the

“deviation” between the stock market and the real economy caused by information asymmetry.

On the basis of formula (2), this section adds the cross term of the virtual variable index of margin trading and its cross term with stock illiquidity. The model is shown in formula (6). If the cross term is significant and its coefficient sign is opposite to that of the stock illiquidity index, it shows that the policy of “margin trading” weakens the noise interference of the relationship between stock illiquidity and enterprise investment caused by information asymmetry. The regression results are shown in Table 12 columns (a) and (b), which verify the theory of this article.

$$\begin{aligned}
INV_{j,t} = & b1 * ILLIQ_{j,t-1} + b2 * ILLIQ_{j,t-1} * \text{dummy} \\
& + b3 \text{dummy} + b4 * CF1_{j,t} \\
& + b5 * LEV_{j,t-1} + b6 * Q_{j,t-1} + b7 \\
& * TA_{j,t-1} + b8 * VOL_{j,t-1} \\
& + b9 * RET_{j,t-1} + b10 * S_{j,t-1} \\
& + b11 * ORECTA_{j,t-1} \\
& + b12 * MCOST_{j,t-1} + \varepsilon_{j,t} + \text{firmFE} + \text{yearFE}.
\end{aligned} \tag{6}$$

**5.3.2. Share-Trading Reform.** In April 2005, China began to solve the historical problem of split share structures, and carried out a series of new policies, such as the pilot reform of split share structures, so that nontradable shares before the stock market can also be traded in the stock market, achieving the effect of the same share and the same right, which is also a great leap in the process of improving the capital market system. The policy of stock reform has enhanced the liquidity of stocks. It also makes the interests of large and small shareholders tend to be consistent, and the equity hierarchy is significantly reduced, which alleviates the agency conflict caused by information asymmetry [34].

TABLE 12: Verification of the microlink between stock liquidity and enterprise investment by macropolicies (margin trading group is to verify the impact of stock illiquidity on enterprise investment before and after the margin trading policy, so the sample of stocks not participating in margin trading is deleted, and the number of samples is 9334. Similarly, the share-trading reform group deleted the data of stocks that had not participated in the share-trading reform, leaving 15390 samples).

| Dependent variable     | (a)<br>INV1 <sub>j,t</sub> | (b)<br>INV2 <sub>j,t</sub> | (c)<br>INV1 <sub>j,t</sub> | (d)<br>INV2 <sub>j,t</sub> | (e)<br>INV1 <sub>j,t</sub> | (f)<br>INV2 <sub>j,t</sub> |
|------------------------|----------------------------|----------------------------|----------------------------|----------------------------|----------------------------|----------------------------|
| ILLIQ <sub>j,t-1</sub> | -0.0052***<br>(-2.84)      | -0.0047***<br>(-2.60)      | -0.0079***<br>(-4.01)      | -0.0073***<br>(-3.82)      | -0.0064***<br>(-3.67)      | -0.0062***<br>(-3.62)      |
| CM                     | 0.0059***<br>(2.77)        | 0.0058***<br>(2.80)        | 0.0073***<br>(3.46)        | 0.0069***<br>(3.41)        | 0.0955***<br>(2.70)        | 0.0921***<br>(2.68)        |
| Dummy                  | 0.1252***<br>(2.67)        | 0.1251***<br>(2.71)        | 0.1757***<br>(3.93)        | 0.1665***<br>(3.87)        | 0.0055***<br>(3.14)        | 0.0056***<br>(3.26)        |
| Control                | Yes                        | Yes                        | Yes                        | Yes                        | Yes                        | Yes                        |
| Firm                   | Yes                        | Yes                        | Yes                        | Yes                        | Yes                        | Yes                        |
| Year                   | Yes                        | Yes                        | Yes                        | Yes                        | Yes                        | Yes                        |
| N                      | 9318                       | 9318                       | 15390                      | 15390                      | 17515                      | 17515                      |
| R <sup>2</sup>         | 0.108                      | 0.082                      | 0.090                      | 0.068                      | 0.089                      | 0.068                      |

Therefore, the macropolicy of nontradable share reform weakens the noise impact of agency conflict caused by information asymmetry on the relationship between stock illiquidity and enterprise investment.

On the basis of formula (6), the model in this section changes the dummy item into the dummy variable of share reform, and the regression results are shown in column (c) and column (d) of Table 12, which are consistent with the theory in this article.

**5.3.3. Four Trillion Plan.** In response to the financial turmoil in 2008, the Chinese government launched ten measures to expand domestic demand and promote economic growth in November 2008, with an estimated total investment of about 4 trillion yuan, covering transportation, health care, high-tech industries, etc., implementing value-added tax reform policies for all industries, and lifting credit restrictions on commercial banks. Since the “four-trillion plan,” the government has given some subsidies to enterprises’ investment within the scope of the policy, and both the value-added tax reform and the credit easing policy have reduced the financing constraints of enterprises to some extent. Therefore, this article argues that the “four-trillion plan” has alleviated the financing constraints of enterprises and weakened the noise effect of financing constraints on the relationship between stock illiquidity and enterprise investment.

On the basis of formula (6), the model in this section changes the dummy into the dummy variable of the “four-trillion plan,” and the regression results are shown in columns (e) and (f) of Table 12, which are consistent with the previous discussion.

## 6. Conclusion

The rapid growth of China’s stock market and the steady development of the real economy are out of touch with the macroperformance, but the stock market is based on and serves the real economy, so the short-term “deviation” does not mean that they are independent of each other. Most scholars believe that the stock market relies on the information transmission mechanism to affect the real economy,

and they discuss the relationship between the two at the macrolevel. From the microperspective, this article proves that stock liquidity affects corporate investment through empirical research and then confirms that the stock market does affect the development of the real economy. Finance is the core of the modern economy, which is related to development and security, and the stock market is an important part of the capital market in the financial market. Exploring the path of its impact on the real economy can make finance better serve the real economy.

Drawing on the information transmission mechanism of the existing literature, this article further studies the performance between the stock market and the real economy when the information receivers are different. The information asymmetry between internal and external investors leads to the aggravation of financing constraints and then affects enterprise investment, while the information asymmetry between shareholders and managers leads to agency conflicts and then affects enterprise investment. Therefore, information asymmetry may be one of the reasons for the “deviation” between the stock market and the real economy. However, it is difficult to achieve information symmetry between internal and external investors or between shareholders and management, and the degree of information asymmetry can only be alleviated through a series of policy regulations and market maturity. This article selects several macropolicies that can alleviate information asymmetry, financing constraints, and agency conflicts for event testing and finds that these policies can ultimately affect the real economy through the stock market.

According to the results of this study, enterprises can use the link between the stock market and the real economy to better develop their strength. For example, enterprises can improve stock liquidity by strengthening corporate information disclosure [35], thereby improving their capital structure and enhancing enterprise value. For investors, sound accounting information disclosure makes them more confident in investments and reduces investment risk. Information transparency is conducive to healthy competition in the overall market, which can be said to kill many birds with one stone. In addition, the research of Xiong and Su

[11] shows that stock liquidity can improve the efficiency of capital allocation, alleviate underinvestment, and restrain overinvestment. This also shows that corporate investment through improved stock liquidity is a more efficient investment. The conclusion of this article also provides data support for macropolicy control, and standardizing the operation rules of the stock market is conducive to the openness and transparency of the market, alleviating the degree of information asymmetry of the weak side of information, and increasing investor confidence and capital flow to contribute to the vigorous development of the real economy.

### Data Availability

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

### Conflicts of Interest

The authors declare that they have no conflicts of interest.

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