Analysing Characteristics and Motivation Factors of Stock Repurchases in the A-share Market of China

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Abstract

This paper focuses on analysing the characteristics of Chinese stock buybacks and the drivers of stock buybacks in the Chinese market.

I collect data from 2005, when there were public listed companies conducting buybacks to date。The results show that the total number of Chinese share buybacks is on an upward trend, especially during the market trough in 2018-2019, when the number of buybacks increased significantly. The main repurchase methods are agreed repurchases or over-the-counter (OTC) repurchases, with repurchases concentrated in the industrial manufacturing, information technology, consumer goods and services, and pharmaceutical sectors. Despite the small size of the repurchase, the purpose is diverse, of which the share incentive cancellation accounts for the largest proportion, and private listed companies have become the main body of repurchase due to their flexibility.

This paper selects all A-share listed companies that conducted share buybacks in Shanghai and Shenzhen from 2013 to 2022 as the research sample. The main variables are the various share price synchronisation, PB ratio, equity ratio, dividend payout ratio, agency cost and FCF ratio. At the same time, logistic and OLS regression analyses are used to examine the motivation of share buybacks by listed companies in China. It is found that reducing information asymmetry, reversing market undervaluation, improving financial leverage, increasing financial flexibility by replacing cash dividends with cash dividends, managing the size of free cash flow, and reducing principal-agent costs are the main motivations for companies to engage in share repurchases.

Further ranking of the importance of buyback motives through the random forest model shows that among the various share buyback motives, the effect of share price synchronisation is the most significant.

Contents

1. Introduction

1.1. Background and Problem Statement

In recent years, China's A-share market has performed sluggishly, but at the same time, more and more listed companies are engaging in share buybacks. Compared with share repurchases in the United States, share repurchases in China started later, have a shorter history and are subject to more legal restrictions. Therefore, China's share repurchase system has distinctive local characteristics. The market is at a low level and the repurchase policy is gradually relaxed, which stimulates the enthusiasm of listed companies to carry out share repurchase and promotes the climax of share repurchase in China. Therefore, it is of extreme practical significance to research the characteristics and motivations of Chinese share repurchases. The research in this paper helps to deepen the understanding of China's share repurchase situation and the motivation of repurchase.

This article will focus on two main topics:

Characteristics of stock repurchases in China's A-share market
This topic includes a comprehensive introduction to the fundamental principles of stock repurchases in China and elucidation of their evolutionary trajectory within the nation. Utilising historical publicly accessible data, it performs a statistical description of the traits observed in the stock repurchase market among listed companies in China.

Research on the motivations for stock repurchases by Chinese A-share listed companies
On the basis of existing previous theoretical studies and conclusions, we propose hypotheses on the motives for share repurchases and test these hypotheses using data on share repurchases by Chinese listed companies. Through this study, we aim to explore the motivations of Chinese listed companies to engage in share repurchases and the logic behind this behaviour

1.2 Overview of Methods

In order to answer the above questions, this study will use a combination of quantitative and qualitative analyses.

Firstly, data collection and statistical analyses are used to identify the basic characteristics of stock buybacks in the Chinese market, starting with the distribution of the number of shares repurchased by year, repurchase method, industry, scale, purpose, and equity nature.

Secondly, based on the literature review and theoretical hypotheses presented in Chapter 2, I propose hypotheses regarding the motivations for stock repurchases and select relevant variables for regression analysis. For the motivation of stock repurchase analysis, my study adopted two different regression models associated with two distinctive explanatory variables. This approach was taken to verify each driver and conduct comprehensive research on the motivation for share repurchase, instilling confidence in the robustness of our findings.

- Based on the explanatory variable for 'Whether a listed company completed a stock repurchase' (a dummy variable where 1 indicates a completed repurchase and 0 otherwise), a bivariate Logit model was constructed for regression analysis. Initially, a univariate regression was conducted, followed by a multivariate regression incorporating main variables, control variables, and industry-fixed effects. This approach facilitated a more precise analysis of the motivations and variations, shedding light on the relationships among various influencing factors.

- Furthermore, I developed a model using OLS regression with the repurchase scale as the explanatory variable, replicating the previous method of conducting univariate and multivariate regressions for each main variable. This approach aimed to provide deeper insights into the relationship between share repurchases and motivation factors.

- Describing variables involves conducting descriptive statistics and correlation tests.

- In addition, I implemented three approaches to conduct robustness tests: adding one more lag for variables, substituting independent variables, and employing propensity score matching (PSM) with a 1:4 matching ratio.

In order to delve deeper into the study of stock buyback motivation, the random forest model was used to analyse the ranking of the degree of influence on the stock buyback motivation variables and to test whether the influence of different factors differed across industries. In this model, the impact of various factors on stock buybacks one year lag and two years lag prior were compared, and the influence of

each factor was ranked. A histogram was then used to display the probability of firms conducting or not conducting stock repurchases within different intervals of the given variable.

1.3 Data Selection

In order to provide a more comprehensive overview, statistical data to describe the characteristics of the Chinese A-share market focuses on listed companies actively trading in all exchange markets in the Shanghai, Shenzhen and Beijing exchange markets. For data reliability and rigour, companies listed on the Beijing Stock Exchange were excluded when conducting motivation research. Compared with the Shanghai and Shenzhen exchanges, the information disclosure level in the Beijing Exchange is relatively lower, making it more difficult to obtain relevant data. Furthermore, the Shanghai and Shenzhen exchanges are closer aligned with trading mechanisms and disclosure standards, so they are more suitable for comparison and analysis.

The data used to describe the characteristics of Chinese stock repurchases span from March 2005, when public record information about stock repurchases started to be available, to April 1, 2024. The data used for the empirical analysis of stock repurchase motivations are intercepted from the annual data from 2013 to 2022. The data for stock repurchases are collected from the Wind database, and the financial data of listed companies that conduct repurchases come from the CSMAR database. The Wind Database is a comprehensive database for financial engineering and financial data around Chinese securities. CSMAR is China Stock Market & Accounting Research, one of China's leading financial databases, provided by the China Securities Market Research and Regulation Center (CSMAR).

1.4 Structure Preview

Chapter 2: The Characteristics of the Stock Repurchase in the Chinese A-share Market.
This section provides an overview of the basic concepts of stock repurchases in China and traces their developmental path in the country. Based on historical publicly available data, it conducts a statistical analysis of the characteristics of the stock repurchase market among listed companies in China.

Chapter 3: Literature Review
This chapter offers a detailed summary of prior research contributions, comprehensively summarizing existing theories and hypotheses in the field. Based on this extensive review, the study ultimately formulates its own hypotheses.

Chapter 4: Empirical Research for Motivation
This section primarily focuses on empirically testing the hypotheses proposed in Chapter 2. It involves selecting and explaining the methodology, data, and variables. Finally, it encompasses the design and implementation of empirical research methods, as well as the analysis of regression results. Subsequently, critical improvement suggestions regarding the main regression method are proposed.

Chapter 5: Further research
This section used a random forest model to analyze the impact ranking of various variables on stock buyback motivations across industries. It compared the effects of different factors on stock buybacks one and two years prior, ranking their influences. A histogram visualized firms' likelihood of engaging in or abstaining from stock repurchases across variable intervals.

Chapter 6: Conclusion
A summary and conclusion regarding the research topic's results.

1.5 Contribution

1. Proving the last data for the empirical research
My study presents updated empirical data on stock buyback motivations. The data used for analysing stock buyback motivations is annual data up to 2022, representing the most recent available information. This is because the annual data for companies up to 2023 was only updated until April 1, 2024, after my empirical analysis.

2. Expanded research methods
Compared to the majority of empirical studies focusing on single regression approaches in examining stock buyback motivations, my research extends to investigating the effects of the same variables on different explanatory variables and various repurchase methods. Furthermore, it incorporates a comparison between univariate and multivariate regression analyses within the regression framework.

3. In-depth study results
The random forest model is used to analyze the ranking of the influence of stock repurchase motivation variables, to test whether there are differences in the influence of different factors on different industries, and to use a bar chart to show the probability of a company conducting a stock repurchase or not conducting a stock repurchase within different intervals of a given variable, and relevant suggestions are made accordingly.

1.6 Delimitation

There are delimitations in the study due to objective reasons:

Data processing:
Various datasets from different databases need to be accessed to meet the research requirements. However, some data cannot be matched during the merging process due to differences in data recording methods across databases. To ensure the rigour of the report, unmatched data are excluded. However, this approach may result in the inability to capture all possibilities comprehensively.

Contractive Commence:
Analysis of Chinese stock buyback characteristics: I can only conduct a descriptive analysis of characteristics without the ability to compare and comment on the situation of stock buybacks in China with those of other countries horizontally or longitudinally. This limitation is not due to any oversight, but rather, it arises from the relatively late start of stock buybacks in China, which are still in a developmental stage. Compared to countries like the UK and the US, where stock buybacks are more mature, the data may not convey as much underlying significance.

2. The Characteristics of the Stock Repurchase in the Chinese A-share Market.

2.1 The Structure of the Chinese Stock Market

According to the place of listing, Chinese Stock is divided into A shares, B shares, H shares, S shares and N shares.

A-share market: The A-share market refers to stocks listed on domestic Chinese exchanges and traded in CYN. It mainly includes stocks listed on the Shanghai Stock Exchange (SSE) and the Shenzhen Stock Exchange (SZSE). Therefore, the A-share market I studied can reflect the stock status of local Chinese companies and is less affected by international capital and the international environment. As of September 13, 2022, there are 4,911 A-share listed companies, with a total market value of 88.42 trillion. It primarily aimed at Chinese domestic investors.

Except for the A-share market, the remaining share markets primarily aim at international investors.

- The B-share market consists of stocks listed on overseas exchanges and traded in foreign currencies denominated in US dollars, Hong Kong dollars, or other currencies.
- The H-share market comprises shares of mainland Chinese companies listed on the Hong Kong Stock Exchange and traded in Hong Kong dollars.
- The N-share market comprises shares of mainland Chinese companies listed on the NASDAQ exchange and traded in US dollars.
- The S-share market comprises shares of mainland Chinese companies listed on the Singapore Stock Exchange and traded in Singapore dollars or US dollars.

2.2 Basic knowledge for the implementation of share repurchase of Chinese listed companies.

2.2.1.Definition of stock repurchase

Share repurchase refers to the transaction in which a listed company buy back its outstanding shares from shareholders using cash or debt in the secondary capital market. The company can directly delist repurchased stocks or retain them as "treasury stock," which can no longer be considered for future dividend payments or earnings per share computations. So, Share repurchase is one of the two methods of distributing cash to shareholders, while dividend payment is the other. However, those "treasury stock" can be used as equity incentives, convertible bonds, and employee benefit plans. Treasury stocks are still considered outstanding shares but do not participate in dividend distribution.

Share repurchase has become a common capital operation method and corporate financial management behaviour in securities markets. Since it emerged in the U.S. securities market in the 1970s, share repurchases have gradually expanded to the United Kingdom, Germany, and Japan. China's share buybacks started later, in 1992.

2.2.2 Purpose of share repurchase in stock repurchase announcement statement.

Based on the provisions of the Shanghai Stock Exchange's stock repurchase rules for listed companies, Article 2 refers to the purchase of its shares due to one of the following circumstances:

(i) Reducing the company's registered capital.
(ii) For employee stock ownership plans or equity incentives.
(iii)Convert Convertible Corporate Bonds
(iv) Safeguard the company's value and shareholders' interests

- The closing price of the company's stock is less than the net asset value per share of the most recent period.
- The cumulative decline in the closing price of the company's stock within 20 consecutive trading days reaches 30%.

(v) Implement Mergers and Acquisitions Restructuring

In addition to the above-mentioned prescriptive reasons, combining the reality situation and the theory of corporate finance, the main motivations for listed companies to repurchase shares are:
1) Undervalued

2) Excess cash
3) Financial flexibility
4) Signal transmission
5) Resist takeovers

Here, I aim to elucidate the role of stock repurchases in Convertible Corporate Bonds. Suppose a company issues convertible shares, and the creditor chooses to convert their corporate bonds into shares. In that case, the company can use the repurchased shares to meet these conversion requests instead of purchasing new shares from the market to complete the conversion. This benefits the company by reducing its reliance on external markets and efficiently using repurchased shares.

2.2.3 The main method of stock repurchases.

1) According to the place of share repurchase conducting, it can be divided into On-market of Open Market repurchases and Off-market agreement repurchases.

Open Market Repurchases

Open market repurchase refers to the companies repurchase of its shares in the open securities market through securities institutions. Instead of dealing directly with specific shareholders, the company repurchases shares through the securities broker on the open market within a price and quantity buyback plan. When a company repurchases shares in the open market, it is required to disclose information such as the intention and quantity of the repurchased shares. Open market repurchase is the most frequently used method. Over 90% of stock buybacks by U.S. companies are conducted through open market repurchases. However, the quantity of shares repurchased in the open market accounts for a smaller proportion than other methods, averaging only 5% of outstanding shares. This repurchase method can easily push up the stock price, thereby increasing the cost of repurchase, and the costs of transaction taxes and transaction commissions are also high. Companies typically use this method to repurchase stock for particular purposes (such as stock options, employee benefit plans, and convertible securities to exercise conversion rights) on a small scale when the stock market is underperforming.

Off-Market Negotiated Repurchases

In this repurchase method, price and quantity are negotiated privately between the company and the counterparty, not on an exchange. The company makes its offer directly to shareholders. OTC repurchases usually include factors such as the time required to execute the repurchase plan and the proportion and quantity of the repurchase. The disadvantage of over-the-counter agreement repurchases is that they are open and transparent.

(2) According to the different pricing methods, it can be divided into Dutch auction repurchase and fixed-price tender offer repurchase.

Fixed Price Tender Offer
A fixed price tender offer is when a company determines a repurchase price in a repurchase offer to purchase a certain number of shares. Its advantage is that it provides all shareholders with an equal opportunity to sell their shares to the company, and it has a short validity period, usually 2 to 3 weeks. The company can cancel the repurchase plan or extend the offer's validity period when the repurchase quantity is insufficient. The repurchase price of the offer will be higher than the current market price; that is, there is a certain premium compared with the open market repurchase. Therefore, a fixed-price tender offer is considered a more positive signal than open market repurchases. However, the premium also increases the execution cost of this repurchase method. Determining the offer price or premium range is the most critical in a fixed-price tender offer. (William J. McNally, 1999)

Dutch Auction Tender offer
The company sets the repurchase price range and planned repurchase quantity. Then, shareholders choose a specific price within the price range to bid on. The company aggregates the bids proposed by all shareholders, determines the "price-quantity curve" for the stock repurchase, and, based on the actual repurchase quantity, determines the final repurchase price. This method has a low repurchased premium and high selectivity, so it is widely used.

2.2.3 Sources of funds

One source of funds includes internal assets, comprising net profits generated from the company's daily operations, cash inflows from government tax incentives and rebates, and the company's accumulated retained earnings and other self-owned funds. the company uses its free cash flow to repurchase its shares to make more effective use of its funds.

The other is external funds. To prevent hostile takeovers, a company borrows funds from banks and other financial institutions to obtain the funds needed to repurchase shares. Funds can also be borrowed and leveraged to achieve share repurchases through bond issuance and other methods.

Certainly, the company has the option to combine these two sources in order to execute stock repurchases.

2.2.4 Announcement and implementation process of share repurchase.

The share repurchase announcement and information disclosure systems of listed companies in the Chinese stock market are relatively unique compared to Western countries.

First, stock repurchase proposals must be submitted to the board of directors by the appropriate parties. Upon receiving a proposal that complies with the relevant provisions, the company will convene a board meeting to discuss it. The proposal and the board's resolution will then be announced simultaneously. This is the first time a company has publicly disclosed its intention to repurchase shares. However, the market usually does not react strongly to the announcement due to the limited information provided. The announcement typically includes.

- The proposer's basic information and the time of the proposal,
- Reasons and objectives for the share repurchase.

After the company's board of directors approves the stock repurchase plan, the company will disclose the board resolution, the stock repurchase plan, the independent directors' opinions, and other related materials. A share repurchase plan is the second time a listed company discloses information about share repurchase, which contains complete details on the repurchase and the process, so the market will generally react positively. The main contents include the following:
Purpose, method and price range of share repurchase.

- The stock repurchase's type, purpose, quantity and Proportion of the company's total share capital and the total amount of funds intended for repurchasing.
- The source of the funds for the stock repurchases.
- The period for stock repurchases carried out.
- Estimated changes in the company's equity structure after the repurchase.
- management's analysis of the possible impact of the share repurchases on the company's operations, profitability, finance, research and development, debt performance capabilities, future development and maintenance of listing status;
- Relevant arrangements for cancellation or transfer of shares after repurchase according to law.

After the shareholders' meeting considers the matter, the listed company will again disclose the status of the relevant resolution and notify creditors of the share buyback details. These disclosures are required before a listed company can implement a share buyback.

2.3 Development of the repurchase system in China

2.3.1 Chinese Repurchase System Development

The establishment of China's share repurchase system began in 1993 with the promulgation of the Company Law and the introduction of relevant provisions on share repurchase. Subsequently, with the amendments to the Company Law and the market demand for share repurchases, the restriction on share repurchases under China's share repurchase system has been gradually relaxed. As can be seen from the several amendments to the Company Law regarding share repurchases, the Chinese regulatory authorities have been exploring how to utilise the role of share repurchases more effectively, and the impact of each amendment has been in line with the needs of the times and the market under the prevailing circumstances and has helped to promote the construction of a sound capital market in China. China's share repurchase regime has embodied different requirements at different times and can be divided into four stages in particular.

1. Exploration stage

Compared to the origins of share repurchases in the United States in the 1950s, China's share repurchases had a late start. China's share repurchase system began in 1993. China initially adopted the German principle prohibition system as a civil law country.

Restricted by the strict institutional environment and factors such as imbalanced shareholding structure and difficulties in share circulation prevailing in the capital market, the development of share repurchase in China was slow. According to the Company Law at that time, share buybacks were only permitted when a company reduced its capital or merged with other companies holding shares in the company. At the stage when the share repurchase system was just beginning to operate, the concept of the so-called treasury shares did not even exist.

As a result, very few listed companies used their funds for share buybacks at that time, and there were only a very few sporadic cases of share buybacks. These buybacks were often related to political factors and were mainly in line with the share split reform. Therefore, during this period, Chinese companies conducted share buybacks mainly for two reasons. Some of the more famous cases include Yuyuan Group's M&A buyback . Grand Yuyuan acquired Little Yuyuan's shares in 1992 for the purpose of merger and acquisition, the earliest case of share repurchase in China. As the major shareholder of Little Yuyuan, Grand Yuyuan repurchased all of its shares by private agreement and cancelled them. In essence, this was an acquisition of a subsidiary and not a share repurchase in the strict sense.

2. 1. Initial stage - serving the share-trading reform (1993-2004)

Between 1999 and 2004, the initial development phase of share repurchase by listed companies in China was characterized by targeted buybacks of state-owned shares. This trend was closely related to the national policy of reducing state ownership at that time. The targeted buyback of state-owned shares emerged as an effective tool to address the issue of dominant state ownership ("one dominant shareholder") and improve the equity and governance structures of state-owned listed companies. Consequently, state-owned enterprises began significantly reducing state-owned shares to enhance corporate governance and ownership structures, making it a unique motivation for Chinese companies' stock buybacks.

During this initial development phase, five listed companies on the Shenzhen and Shanghai stock exchanges announced and implemented stock buybacks. The state-owned share reductions attracted a great deal of attention in the capital market. However, these buybacks also led to significant market price fluctuations, raising concerns about the use of stock buybacks to reduce state ownership. Regulatory authorities began to scrutinize the legitimacy of using buyback for this purpose, ultimately deciding to terminate the reduction of state-owned shares. As a result, stock repurchase activities were also put on hold.

3. Rapid development-- Exploration as a tool for capital market operations (2005-2017)

Since 2004, share buybacks in the Chinese stock market have entered a phase of rapid development. The legal and regulatory framework for share repurchases was gradually improved during this period.

In 2005, due to the prolonged market downturn, the CSRC issued a series of regulations to stabilise the stock market. These regulations allowed listed companies to repurchase public shares. 2006， the SFC further relaxed the policy that domestic listed companies were allowed to use share repurchase as a form of share incentive scheme, adding another impetus to share buybacks in China. This marks a significant shift in the development of share buybacks in the country.

However, from a market-wide perspective, the number of voluntary share buybacks remains low, and companies' enthusiasm was limited. Therefore, Listed companies were strongly encouraged and supported to carry out open market repurchases under the following circumstances without impairing their ability to continue operations:

- The share price is persistently below the net asset value per share.
- Positive cash flow from operating activities or a large amount of idle funds.
- Debt ratio significantly lower than the industry average.
- The company is unable to pay cash dividends after a major asset reorganisation with unrecovered losses.
- Companies with the ability to pay dividends but with a low level of cash dividends.
- Large differences in pricing in the A-share, B-share and H-share markets, with

some stocks being undervalued.

- Other circumstances deemed necessary to adapt to market changes and protect investors' rights and interests.

The revised regulations provide a degree of incentive to listed companies. After 2013, the number of companies voluntarily conducting share buybacks began to increase and the scale of buybacks expanded significantly. However, the scale of share buybacks in China's capital market remains relatively small compared to Western countries.

During the rapid development phase between 2004 and 2017, China's legal and regulatory system for share buybacks became increasingly sophisticated, clearing the way for corporate buybacks in the open market. The regulations allow the repurchase of shares as employee incentives without the need for immediate cancellation, which, to a certain extent, indicates that the regulator accepts the concept of ‘treasury shares’.

4. Promotional phase - buybacks have been strongly promoted as a means of boosting the market (2018 - present)

According to the foregoing analysis, the share repurchase system in China had been gradually improving and had been thoroughly explored and researched by regulators, the practice sector, and academia. However, compared with other countries, the scale of China's share buyback is relatively small. In addition, relevant laws and regulations still need to be further improved.

At the beginning of 2018, the Shanghai Stock Exchange and Shenzhen Stock Exchange made a significant announcement. They indicated their support for eligible listed companies and their major shareholders to repurchase additional shares in compliance with the law. This move was not just a regulatory change, but a testament to the positive effects of share repurchases. They emphasized that such repurchases help improve investor confidence, stabilize market expectations, and have a profound positive effect on the healthy development of the capital market.

In November 2018, the Securities and Futures Commission, the Ministry of Finance and the State-owned Assets Supervision and Administration Commission jointly issued a series of new policies to relax the restrictions on share repurchases by listed companies. This initiative has, on the one hand, broadened the sources of funds for repurchase, simplified the implementation procedures and guided the improvement of governance arrangements; on the other hand, it has encouraged and supported all types of listed companies to implement share repurchase through different programmes. After the release of the new policy, the enthusiasm of listed companies for repurchase has rapidly risen.

2.3.2 Comparison of Share Repurchase Systems in different Countries

Share repurchase originated in the United States and has since been gradually adopted and expanded by countries such as the United Kingdom, France, and Germany. However, regulators' attitudes toward share repurchases may differ due to variations in capital market statutes and legislative traditions among different countries. Based on the extent of regulatory permission granted to listed companies for share repurchases, the share repurchase systems in various countries can be categorised into two groups.

The first category is ‘permitted in principle but prohibited by exception’. Common law countries represented by the United States and the United Kingdom have relatively loose legislation and regulation on share repurchases, and therefore, the scale and activity of share repurchases are relatively high. In the U.S., the SEC promulgated Rule 10b-18 in 1982 in the form of ‘reasonable exceptions’, which set up a ‘safe harbour’ for companies to carry out share buybacks in four aspects, namely, the method of buyback, the time, the price and the quantity, to prevent the existence of insider trading; in the U.K., share buybacks are not subject to any regulation. In the United Kingdom, the system of share repurchase is a process of gradual liberalisation, and the relaxation of the system mainly stems from the relevant provisions of the European Communities on ‘companies being allowed to buy their own shares under any circumstances’.

The second category is ‘prohibited in principle, permitted by exception’. In civil law countries represented by Germany, share repurchase is a strict system, and listed companies are allowed to carry out repurchase only under certain specific conditions and are strictly supervised by the regulators. In Germany, the acquisition of shares of less than 10% is allowed only under certain special circumstances; in Russia, the legislation on share repurchase is gradually liberalised, but Russian-listed companies are still subject to more restrictive restrictions on share repurchase.

Compared to the above two categories, the current share repurchase regime in China's A-shares is a ‘loose-tight’ combination between the common and civil law systems. In terms of overall implementation conditions and information disclosure, the current A-share share repurchase system is in favour of the civil law system, allowing repurchases under only six circumstances. At the same time, timely information disclosure is required at key points in the implementation of repurchase. In terms of funding sources and implementation procedures, the current A-share repurchase system favours the common law system, where the regulator encourages companies to raise funds for repurchases through various funding channels, and in some cases, only the approval of the board of directors is required to implement share repurchases.

2.4 China's A-share market share buyback status

China's A-share market has been sluggish in recent years. In March 2014, the Shanghai Composite Index fell to 1973.38, a record low in 2014. At the same time, an increasing number of listed companies are carrying out share buybacks. Historically, recent buyback waves have occurred at market lows, especially in 2018-2019, when the Shanghai Composite Index fell 24.59%, while the number of completed share buybacks was highest during the recording period. The stock market downturn, simplification of policies and corporate awareness have facilitated the repurchase wave in China. In this part, I mainly conduct a preliminary statistical analysis of the current situation of share repurchase in the Chinese market from the following aspects to understand the characteristics of share repurchase in China. The data is from the WIND database of intercepts from March 2005 to April 2024.

In order to provide a more comprehensive overview, statistical data to describe the characteristics of the Chinese A-share market focuses on listed companies actively trading in all exchange markets in the Shanghai, Shenzhen and Beijing exchange markets. The data used to describe the characteristics of Chinese stock repurchases span from March 2005, when public record information about stock repurchases started to be available, to April 1, 2024. The data for stock repurchases are collected from the Wind database.

Distribution of the number of shares repurchases by Year

Type of Repurchases	Off Market Repurchases					Open Market Repurchases					Total
Year	Completed	Implementation	Invalidated	Pre-implementation	Total	Completed	Implementation	Invalidated	Pre-implementation	Total	
2006	12				**12**	7			4	**11**	**23**
2007	1				**1**	2				**2**	**3**
2008	1				**1**	2				**2**	**3**
2009	2				**2**	2		1		**3**	**5**
2010	8				**8**	1				**1**	**9**
2011	9				**9**	6				**6**	**15**
2012	28	1	2	2	**33**	4				**4**	**37**
2013	52		1	13	**66**	14		1	2	**17**	**83**
2014	133	3		18	**154**	10	1		1	**12**	**166**
2015	155	1		33	**189**	17			1	**18**	**207**
2016	274	3	3	41	**321**	15			4	**19**	**340**
2017	361	16	2	62	**441**	16			2	**18**	**459**
2018	507	31	7	77	**622**	96	3	1	10	**110**	**732**
2019	676	63	5	97	**841**	367	22	7	54	**450**	**1291**
2020	656	76	6	76	**814**	208	16	2	32	**258**	**1072**
2021	668	69	4	91	**832**	260	33	4	34	**331**	**1163**
2022	680	98	5	101	**884**	295	75	7	60	**437**	**1321**
2023	741	132	9	117	**999**	299	101	4	82	**486**	**1485**
2024	137	19	3	18	**177**	132	52		30	**214**	**391**
Total	**5101**	**512**	**47**	**746**	**6406**	**1753**	**303**	**27**	**316**	**2399**	**8805**

Table 1: Distribution of the number of shares repurchases by Year

First, the number of shares repurchases by listed companies has shown an overall upward trend, and most share repurchases are agreement repurchases or Off-Market Repurchases. Table 1shows the distribution of the number of shares repurchases and the implementation status from 2006 to 1 April 2024.

Since the formal legislation of the stock repurchase system in China's A-share market with the issuance of the "Regulations on Share Repurchases" by the China Securities Regulatory Commission (CSRC) in 2015, the number of stocks repurchases implemented in the A-share market has accumulated to over 8800 times. According to Table 1 for completed repurchase activities, share repurchase activities started rapidly in 2014, closely related to the stock market crash then. Some listed companies tried to save themselves and boost their share prices by stock repurchases. In 2018, share buyback activities peaked due to a plunge in Chinese A-shares caused by the Sino-U.S. trade war, the decline in corporate earnings expectations and risk appetite. When the global economic situation is uncertain and market volatility increases, some companies may use share buybacks to deploy funds and flexibly reduce sensitivity to market fluctuations. They also want to increase investment confidence and boost share prices through share buybacks. During this period of heightened global economic uncertainty and market volatility, companies utilised stock repurchases to utilize capital and reduce sensitivity to market fluctuations. Additionally, they sought to enhance investor confidence and boost stock prices through these repurchase initiatives.

Distribution of the number of shares repurchases by share repurchase method.

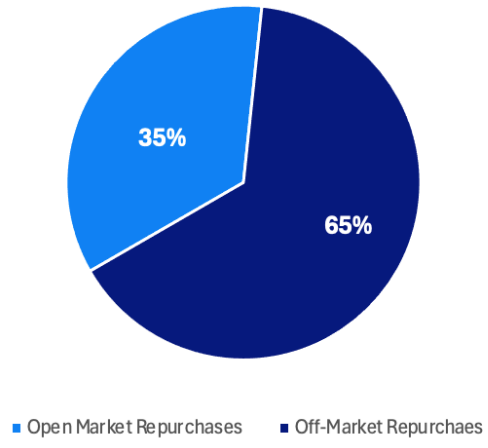

Figure 2: Distribution of the number of shares repurchases by

Secondly, the primary share repurchase method in the Chinese A stock market is an off-market repurchase, which accounts for 65%, while open-market repurchases account for only 35%. The reasons are that off-market repurchases are more flexible

and private than open-market repurchases. Once an agreement is set, the purchase process can proceed swiftly without waiting for public announcements and approval procedures. Moreover, the repurchase schedule can be adjusted rapidly according to the company's financial and market conditions. Off-market repurchases generally do not require disclosure of the company's plans, thereby avoiding potential impacts on the market and hostile takeovers by rivals.

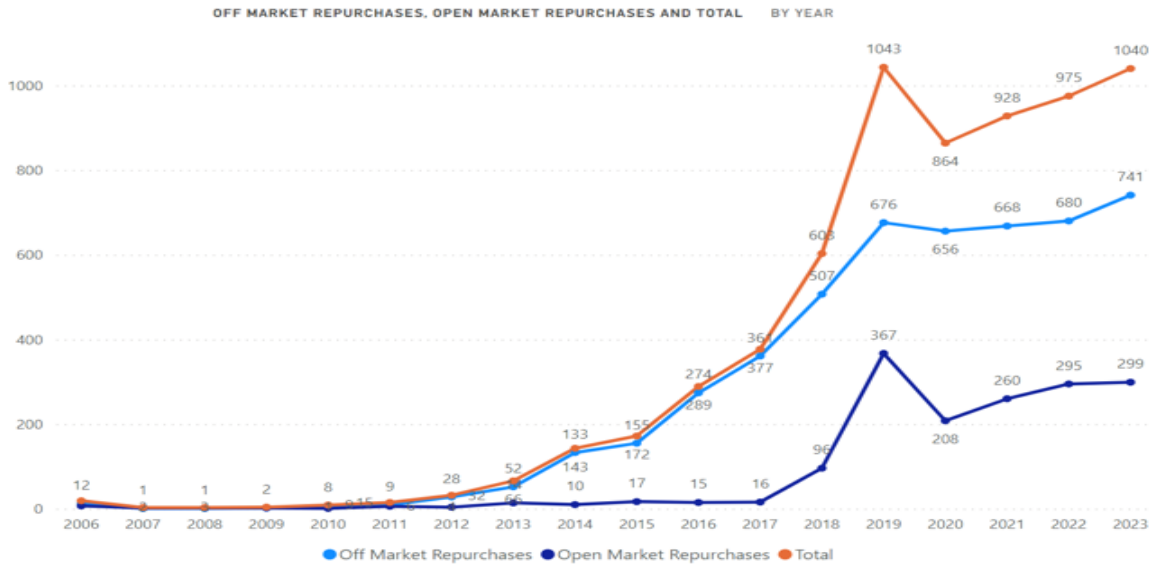

Figure 1: Distribution of the number of shares repurchases by method

Distribution of the number of shares repurchases by Industry

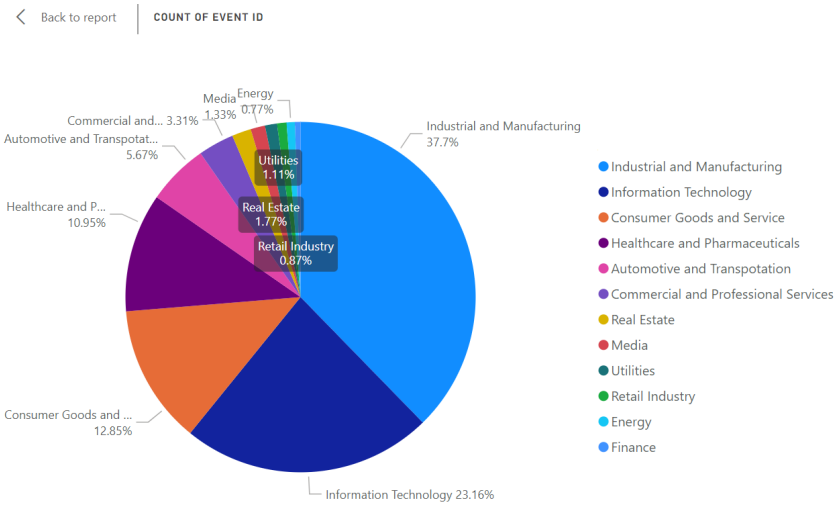

Figure 3:Distribution of the number of shares repurchases by Industry

Third, the industry distribution of share repurchases by listed companies focuses on Industry and Manufacturing, Information Technology, Consumer Goods and Services, and Healthcare and Pharmaceuticals.

Although there are more shares repurchase activities in the industrial and manufacturing and consumer goods and services industries, these two industries contain more subdivided industries and more listed companies. Additionally, industrial and manufacturing are capital-intensive businesses requiring significant capital investments to purchase equipment, build plants, and develop. As a result, these companies tend to have high capital expenditures. Share buybacks can be used as a form of capital allocation to manage a company's capital structure and optimize the efficiency of capital utilisation. Additionally, it is highly influenced by market demand, resulting in higher fluctuations in the company's cash flow. During an industry boom, the company may have more cash. Share buybacks are appropriate forms of capital allocation to improve shareholder returns.

Among them, it is worth noting that the information technology section and healthy pharmaceutical and service section also account for a significant number of shares repurchases. This trend is likely attributed to their characteristic of belonging to the high-tech sector, which undergoes rapid technological advancements and updates. In addition, for information technology section due to the frictions caused by the Sino-U.S. trade war in 2018, high-tech enterprises have been severely affected, and the corresponding stock price fluctuations have also been relatively violent. Hence, share repurchases are sought after by these types of companies to maintain stability and bolster their stock prices. For the healthy pharmaceutical and service section, pharmaceutical products are often protected by patents with a limited term. Within the patent life, pharmaceutical companies can generate substantial profits. Consequently, firms may conduct stock repurchases as a strategy for excess cash management and enhancing shareholder value. Additionally, pharmaceutical companies can enhance investor messaging through stock buybacks.

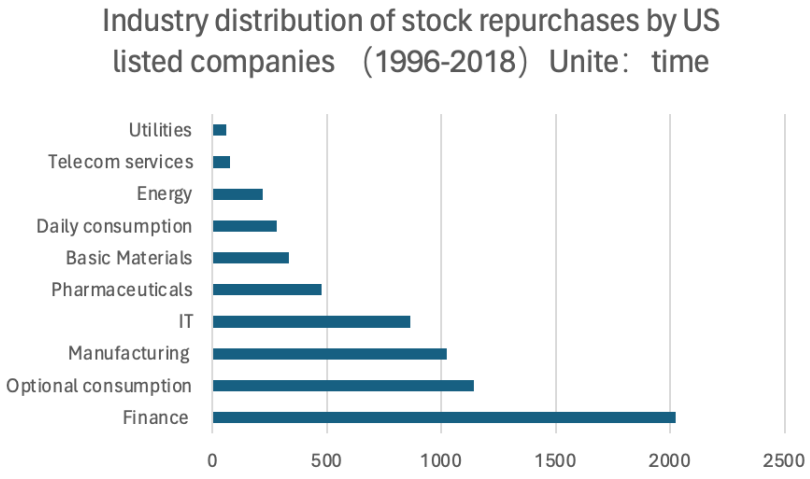

Figure 4:Distribution of the number of shares repurchases by USA Industry （1996-2018）

Based on the data of the stock repurchase distribution industry in the US market from 1996 to 2018, the most significant difference between the two markets was repurchase activities in the finance section occupied mainly section in the US market, while repurchase activities in the finance section in China were only around 1%.

Distribution of the number of shares repurchases by scale.

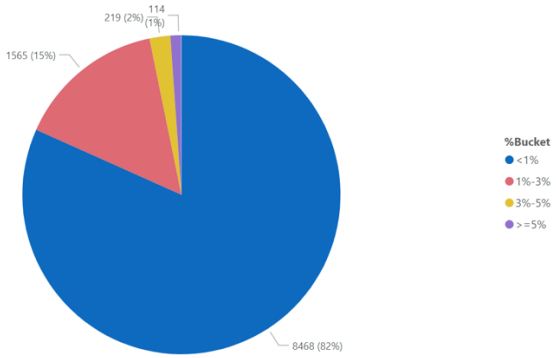

Figure 5: Distribution of the number of shares repurchases by scale.

Fourth, the scale of share repurchases of Chinese listed companies in A Stock Market is small, and the number of repurchases accounts for a low proportion. Figure 5 illustrates the repurchase quantity ratio between 2015.03.18 and 2024.03.29 from the Wind Database. Data points with a share ratio of 0 have been excluded.

Figure 5 shows that the repurchase quantity by Chinese-listed companies accounts for a low proportion of the total share capital. Among them, 80.3% of the listed companies repurchased shares ratio was less than 1%, and only 1.2% of listed companies repurchased a ratio of more than 5% of their shares. The possible reason is that China's share buybacks started late compared with the stock repurchases by U.S. listed companies since the 1980s. Moreover, China's regulatory policies on share repurchases are relatively strict, which limits the development of share repurchases. However, with the development of the capital market and the relaxation of share repurchase policies, the scale of share repurchases by Chinese listed companies showed a substantial growth trend in 2019, and more and more high-quality listed companies have begun to repurchase shares actively.

Distribution of the number of shares repurchases by purposes.

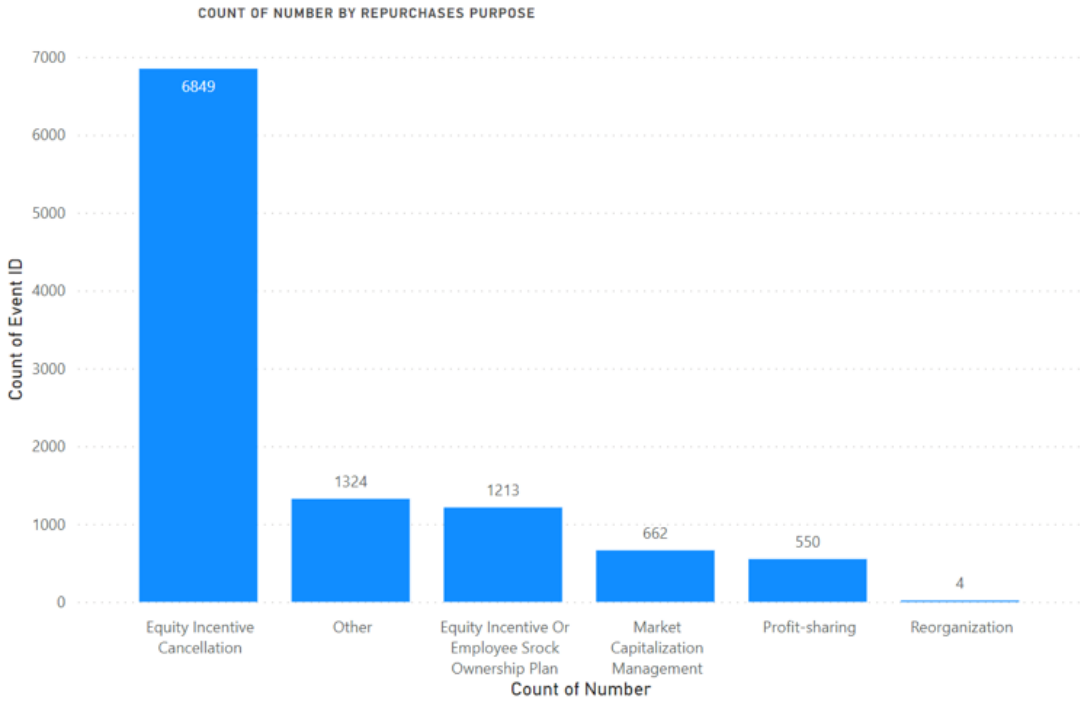

Figure 6: Distribution of the number of shares repurchases by Purpose

Fifth, the purpose of share repurchases are more complex and diversified. Figure 6 shows the disruption for reasons for stock repurchasing stated by listed companies in their stock repurchase announcement. The purposes of share repurchase by Chinese listed companies mainly concentrate on market capitalisation management, employee stock ownership plans or equity incentive plans, equity incentive cancellation, conversion of convertible bonds, cancellation, Profit compensation and restructuring, etc.

Among them, equity incentive cancellation accounts for the most significant proportion, mainly related to the failure of equity incentive plans in China. Equity incentive cancellation means the company cancelling the award of equity incentives granted to employees or executives due to resignation, change in company ownership or structure, or failure to meet performance targets. In equity incentive plans, companies often grant stock options and restricted stock units (RSUs), which refers to a company granting a certain number of shares to the incentive target according to predetermined conditions by selling at a lower price at the beginning of the incentive plan. The incentive target can only sell and benefit from the restricted stock if their working years or performance goals meet the predetermined conditions. Once the incentive targets lose the qualification of equity incentive, the company will repurchase restricted stocks from the employees at a predetermined price and then cancel it. The second is implementing equity incentives and employee stock ownership plans. Companies using repurchased shares as equity incentive plans can, on the one hand, increase the management's shareholding ratio, which could closely tie their interests with the interests of the company's shareholders, which decreases the

agency cost. On the other hand, implementing equity incentives or employee stock ownership plans through stock buybacks can mitigate issues of equity dilution stemming from stock issuance, rights offerings, and similar measures. This is also why China's stock repurchase methods focus predominantly on off-market agreement repurchases, with repurchase ratios concentrated below 1%. The reason for ranking third was market capitalization management. The continued downturn in the stock market has caused companies' stock prices to be seriously underestimated. To reasonably return the company's stock price to its intrinsic value, companies have carried out share repurchases to maintain stability and increase its stock price. This reason corresponds to the signal transmission theory.

With the development of share repurchases in China, the purpose of share repurchases by companies has become more complex and diversified. It has become more realistic to explore the motivations of companies for share repurchases.

The distribution of stock repurchases by equity natural.

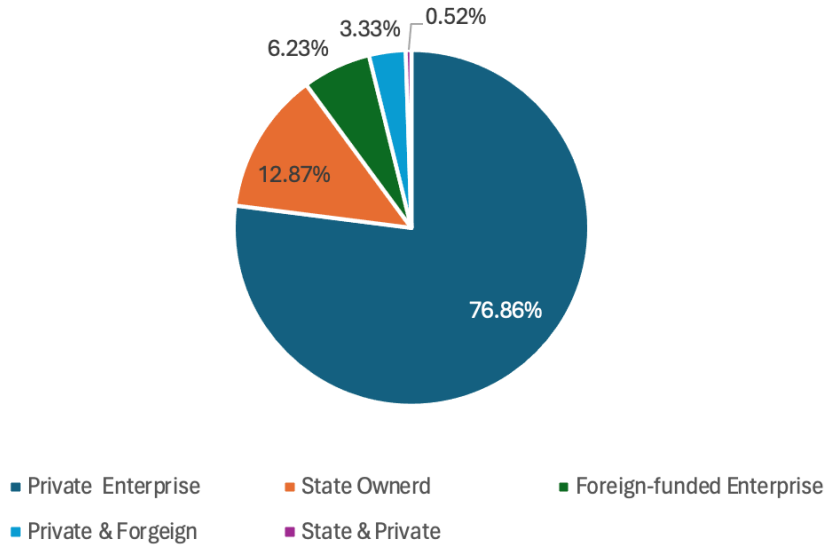

Figure 7: Distribution of the number of shares repurchases by equity natural

Since the statistical data from 2005 to April 2024, private companies have dominated China's stock buyback activities. State-owned enterprises and foreign-invested enterprises only account for 12.87% and 6.23% respectively.

Here, I will briefly add the ownership structure of Chinese companies. Chinese enterprises could be classified as State-owned enterprises and private enterprises whose owners are Chinese legal persons or individuals, as well as foreign-funded enterprise firms in which some or all investors are foreign legal entities or individuals.

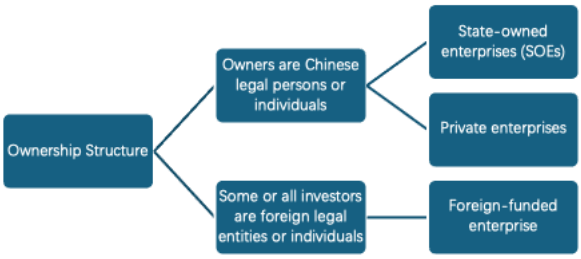

Figure 8: The structure of Chinese firms' equity natural

State-owned enterprises (SOEs) are legal entities established by the government to participate in commercial activities on behalf of the government. The state represents the shareholders, which have all or part of the management and control rights. These enterprises are often specialized in specific business activities. State-owned enterprises play a pillar role in developing China's national economy. The Chinese nation's annual report for 2022 shows that 379 SOEs listed companies achieved a total revenue of 24.69 trillion yuan and a net profit of 1.30 trillion yuan. Regarding numbers, SOEs, comprising 7.48% of the total, contributed 34.52% of the revenue and 23.09% of the profit. These state-owned enterprises focus on strategic industries such as energy, communications and finance. There are strict restrictions and complicated policies for stock repurchases because they affect the allocation and efficiency of state-owned assets. This also proves why its proportion in China is deficient in finance, which is the main force of stock repurchases in the United States.

Foreign-funded enterprises are firms established by foreign investors or foreign companies. Policy and foreign exchange management also strictly restrict the implementation of stock repurchases by foreign-funded enterprises, which leads to a few activities in the stock repurchases market.

Overall, the number of share buybacks by listed companies has been increasing since publicly available data on share buybacks became available in 2015, with recent waves of buybacks occurring mainly during periods of market downturn. Firstly, the total number of shares repurchased by listed companies in China has been on an upward trend, with significant growth especially in 2018-2019, thanks to the economic crisis in 2018 and the revision of China's company law, which relaxed the regulations on share repurchases. Most of the share buybacks were carried out through agreed buybacks or over-the-counter buybacks. The sectoral distribution of share buybacks by listed companies is mainly concentrated in industrial manufacturing, information technology, consumer goods and services, and pharmaceuticals. The repurchase scale of Chinese A-share listed companies is relatively small, and the repurchase amount accounts for a relatively low percentage. The purpose of share repurchases is more complex and diverse, of which the largest proportion is the cancellation of equity incentives, which is mainly related to China's corporate governance system. The main body of share buybacks are private listed

companies, largely due to the flexibility of the corporate nature of private listed companies. State-owned enterprises and foreign-invested enterprises, on the other hand, have stricter restrictions and more complex policies on share repurchases in China due to asset allocation and efficiency considerations.

3. Theory and Literature Review

3.1 Literature Review

Previous scholars' studies on the decision motives of listed firms in adopting share buybacks as a capital market value management tool have two main dimensions: external and internal. For the external motivation, it has been argued that economic policies (Zhiyuan Zhang & Xinqi Li, 2021) and changes in the economic environment (Burak Pirgaip & Burcu Dinçergök, 2019) of the regions where listed firms are located will spur firms to use share buybacks as a precautionary tool to maintain the stability of the firm's stock market capitalisation, to fend off stock takeovers (Fenn & Liang, 1998) and to plan for long-term capital market operations. From the perspective of internal motivation, scholars' analyses of the drivers of corporate share repurchase behaviour can be categorised into three main aspects: the information effect hypothesis, the financial effect hypothesis and the cash flow effect hypothesis. Considering the uncertainty and indirectness of the impact of changes in the external market environment on corporate share repurchase decisions (Jagannathan, 2000), the study in this paper focuses on a systematic and comprehensive exploration of the internal drivers of corporate share repurchase behaviour.

3.1.1. Information effect hypothesis

The signalling theory hypothesis of share buybacks suggests that share buybacks can serve as a channel for the transmission of listed firms' positive information to the securities market. Stock repurchases can create opportunities for listed firms to optimize the information environment at a time when they are suffering from information transmission barriers and undervalued market capitalisation dilemmas. As early as the end of the last century, Commeent & Jarrell, (1991) found that the excess return of enterprises could be significantly improved after share repurchase through empirical research. The study believed that share repurchase behaviour can improve the capital market investor's expectation of the future return of the repurchase subject. This conclusion laid the foundation for further research by subsequent scholars. At the beginning of the 21st century, many scholars filled in the mechanism of the market phenomenon of stock repurchase behaviour enhancing corporate excess return from different aspects. Cook et al. (2003) argued that share repurchase behaviour can help firms to absorb the pressure of stock selling in the capital market, thus dampening the decline in share prices in the context of investor sentiment volatility. Pandey & Surya Bhushan Kumar, (2011), based on the data of listed firms in India, concluded that share repurchase behaviour can increase the listed firms' stock option value, thereby enhancing the willingness of corporate shareholders to hold shares on hand. Moreover, some scholars proposed some innovative perspectives on when enterprises prefer to conduct share buybacks when they suffer information barriers.

Fried (2001) proposed that under the problem of information asymmetry, corporate managers can utilize internal information to illegitimately transfer the interests of shareholders to themselves through share buyback activities.Additionally, some scholars have questioned the ability of share buybacks to convey positive market signals; Zschoch (2011) argues that the impact of share buybacks on a company's market value varies across different markets and over time.

In summary, although there is still some controversy about whether share buybacks by companies can release positive signals on equity, most scholars still believe that share buybacks are an effective tool for capital management, which could help firms solve the dilemma of undervalued share prices. Although some controversies emerged within the Chinese market during the initial phase of applying share buybacks in the. capital market， they gradually disappeared after the decade. In recent studies, many scholars still believe that investors can predict share repurchase behaviour by measuring the information asymmetry of listed firms. The share repurchase could be used as an investment arbitrage tool (Cui Yinggang, 2022).

3.1.2 Cash flow effect hypothesis

Scholars of the cash flow effect hypothesis believe that when a company chooses to use its own funds to carry out share buybacks, free cash flow will decline within the company. Companies' owners can reduce managerial self-interest by employing the cash-reducing effect of share buybacks. There are no differences in research findings have been found between Chinese and scholars from other countries regarding the cash flow effects of share buybacks.

Jagannathan (2000) suggested that enterprises can use free funds for stock buybacks to prevent the misuse of excess internal funds by corporate managers without harming the interests of shareholders and to protect the interests of future shareholders preventively. Li Zhentao (2016) conducted a comparative study on the utilisation methods of internal free cash flow in enterprises and found that stock repurchases yield the highest returns on capital utilisation among various methods. This return is even greater than that from project investments and debt repayment. The primary reason for this is that stock repurchases not only safeguard the assets of the company's owners but also, through the previously mentioned signalling and financial effects, contribute to the company's long-term development in ways that project investments and debt repayment cannot achieve. Fenn and Liang (2001) argue that from the perspective of managers' motivations for dividend distribution, excessive idle internal free cash flow can provide managers with opportunities to illicitly gain personal benefits through the distribution of cash dividends. They contend that the ability of stock repurchases to reduce internal free cash flow can effectively control the level of free cash flow, thereby limiting the escalation of agency costs within the company. Dittmar (2000) found through empirical research that the formulation of a corporate share repurchase plan and its retained cash flow content showed a significant positive

relationship. On the one hand, sufficient free cash flow reserves are a necessary condition for enterprises to carry out share repurchase through their own funds; on the other hand, share repurchase can be regarded as one of the strategic choices of free cash flow of the situation. Ming ma al. (2009) used a multivariate regression model to analyse the share repurchase behaviour of Chinese listed companies empirically, and the results confirmed the explanatory validity of the free cash flow hypothesis in the motivation of share repurchase behaviour of Chinese listed companies.

3.1.3 Financial Effect Hypothesis

The financial effect hypothesis is another important hypothesis for analysing the motivation for share repurchase.

Fazzari et al. (1987) thought share repurchases consume companies' existing cash balances, which reduces their financial leverage. That leads to, in turn, reducing the liquidity within the firms and negatively affecting the firm's financial performance. However, Mitchell & Dharmawan, (2007) disproved the conclusion that share repurchase had a negative effect on the financial performance through empirical research. And they believed that with the support of various methods of share buyback channels, listed companies can optimize their capital structure through share buybacks, thereby controlling their financial leverage to suit the current stage of the company's development. Jagannathan (2000) argues that the impact of corporate share buybacks on a company's cash flow liquidity was heterogeneous. Large-scale buybacks positively affect financial liquidity, while small-scale buybacks negatively impact the company's liquidity. On the other hand, some scholars suggested that besides alleviating the cash flow pressure of buybacks through debt repurchase, companies can use share buybacks as an alternative to cash dividends. This approach helped companies gain more options for cash flow management, earnings management, and other operational choices, thereby enhancing their financial flexibility. John&Williams (1985) argued that from the point of the market effect, both cash dividend payout and stock size can release positive signals of the enterprise to the capital market. The payment of cash dividends and share buybacks by companies should serve as substitution tools for market value management. An enterprise with a strong governance level can choose to replace the cash dividend payments to optimise the firm's cash flow level. Wang, Jian & Huang, Jinchun. (2014) study on the Chinese corporate market found that, for these companies, the securities market reacted very similarly to announcements of cash dividend distributions and share buybacks.

However, Jiang et al. (2013) argue that for companies which were already facing financing constraints, there was a significant negative correlation between share buybacks and cash dividends. In other words, the motivation for share buybacks in these companies was mostly to use buybacks as a substitute for cash dividends to alleviate their current cash flow difficulties.

Li Liping (2016) constructed a financial performance evaluation model related to corporate share buybacks. Through a comprehensive assessment of various financial indicators, he pointed out that the capital operations involved in share buybacks have positive financial effects. Moreover, optimising the internal capital structure through share buybacks was an effective strategic choice for the long-term development of listed companies. Wang Jianjun (2013) critically pointed out that due to the late development of share buybacks in the Chinese securities market and insufficient policy support, share buybacks can easily increase the liquidity risk for listed companies and even cause disorder in the capital market. According to Lin Qi (2013), regardless of whether the enterprise uses its own funds or external financing funds to carry out, share repurchases could reduce the net assets, which made the gearing ratio increase. These results improved the efficiency of financial leverage. Coupled with the tax avoidance effect of the share repurchase, the capital structure would be idealised and optimized. Qu Wenzhou et al. (2011) provided evidence that share buybacks were more likely to signal a shortage of investment opportunities than cash dividend distributions. This, in turn, increased financing constraints for companies, leading to further bottlenecks in optimising capital structure.

In conclusion, compared to the signalling effect, the positive or negative financial effect of share buybacks is more controversial in the research of previous scholars. On the one hand, the development of China's share repurchase market is immature. Additionally, managers lack the ability to correctly choose the right time for share repurchase with the purpose of financial effect (Xu, R. J. & Hou, H. H., 2020). On the other hand, the capital structure optimization effect of share buybacks is heterogeneous for different firms. As previously mentioned in the literature, share buybacks are more likely to positively impact the financial performance of companies with higher financing constraints and stronger governance capabilities. Because of this, there is significance to repeat the validation of the financial effects of share buybacks in Chinese listed firms at this stage. Therefore, reconfirming the financial effects of share buybacks among Chinese listed companies is important at the current stage.

3.1.4 Literature Review

Summarising the results of previous academic research, I think that previous scholars' research on stock return by listed companies has been relatively mature and systematic. On the one hand, in addition to external factors, existing scholars' research has exhausted all aspects of the possible reasons for listed companies to carry out stock repurchases; on the other hand, existing literature research has also explored many reasons for the differences in the actual effects of stock repurchase by listed companies. Even so, I still think some areas could be optimised and fill in gaps in the existing research.

Firstly, it's crucial to note that the research of Chinese domestic scholars on the motivation of share repurchases has not been updated after 2020. This is particularly significant given the slow development of the share repurchase mechanism in China's securities market and the immature timing ability of listed companies for share repurchase. However, the revision of China's Company Law after 2018 has provided a more comprehensive legal and regulatory basis and safeguard for listed companies to carry out share repurchase. This expansion of the research time period to explore the changes in the motivation of share repurchase by listed companies after the gradual development and maturity of China's securities market has a strong practical demand and research significance.

Second, most existing studies focus on the information, financial, and cash flow effects of stock repurchase. No previous paper has comprehensively researched the internal drivers of each of the above dimensions and compared the degree of influence of different variables on the motivation of stock repurchases for the comapany.

3.2 Theory and Hypothesis

3.2.1. Theories related to information effect hypothesis

1. The information asymmetry theory

In 1970, Akerlof identified the problem of "Information asymmetry", whereby the two parties to a transaction have different amounts of information, which one party has more or better information than the other during the transaction. In market transactions, the seller of goods, compared to the buyer, has an adequate advantage of insider information. For this reason, the seller with more information about the goods can obtain additional transaction gains through transmitting reliable information to the buyer.

The content referenced in this paper to study the motivation of share repurchase of listed companies is mainly the expansion of the theory in the development of the securities market, which argues that the information possessed by investors in the securities market in the process of market transactions that is asymmetric (Goldstein & Yang, 2017). There are three main reasons for this phenomenon. On the one hand, internal employees have more internal information about the development of the enterprise than external investors, and the proliferation of information from internal employees will directly cause the emergence of more informed traders, who can take advantage of the information advantage to profit from the stock trading process (de Long et al., 1990); Secondly, the market ordinary traders have knowledge reserve and ability disadvantage compared with informed traders, institutional investors and securities stakeholders, and they need to pay additional knowledge acquisition costs in the stock trading process (Wang Chunfeng et al., 2018); Thirdly, the efficient market theory believes that the price of corporate securities directly reflects the asset value and profitability level of the securities, and after the efficient market theory is questioned, the transmission of corporate information is no longer considered to be directly determined by the market supply and demand relationship, and the transmission of information of the listed companies is subject to market conditions. After the efficient market theory was challenged, corporate information transmission was no longer considered to be directly determined by market supply and demand, and the information transmission methods, efficiency and channels of listed firms were challenged by the market, and most of the capital market development of listed firms suffered from significant information barriers (Lin et al., 1995).

Against the background of the information asymmetry theory, this paper argues that the share buyback behaviour of firms has the efficacy of impacting on breaking the information barriers in the capital market, and reducing the problem of information asymmetry in the company. On the one hand, stock repurchase announcements and plans by listed companies can serve as an additional information disclosure channel,

apart from regular disclosures, to convey operational information and future development strategies to market investors (Xueying Zhang et al., 2023).On the other hand, the release of stock repurchase plans by listed companies attracts capital market investors to reassess the company's market value. It also utilises information such as the scale and price of the repurchase to reduce the knowledge barriers for ordinary market investors, thereby restoring the stock trading order disrupted by informed traders (Xing Jiawei, 2020).

Based on this analysis, the corresponding research hypotheses is proposed

H1: Reducing asymmetric information in the securities market is one of the motivations for companies to engage in stock buybacks.

2. Signalling Theory

In the practical application of this theory, in an environment of market disorder and rampant speculation, commercial participants can use certain intervention measures, like government policies, corporate capital market activities, and additional information disclosures, to release positive signals to the market and guide correct consumer behaviour.

Based on the signalling effect theory, share buybacks are considered market interventions, which means they initiatively release positive signals to the market. On the one hand, when a firm chooses to use its own funds for share repurchase, it sends a positive signal to the outside world that its cash flow is abundant and its resources for future dividend payments are stable (Guffey & Schneider, 2004); on the other hand, the fact that a firm chooses to carry out share repurchase usually implies that the owners or managers of the firm are confident in the future trend of the market value of the firm, thus sending a positive signal to the market investors that the market value will change in an upside direction. That can change the future market value of their shares, thus sending a favourable message to market investors about the firm's future performance (Lie, 2005). Due to the characteristics of corporate share repurchase behaviour discussed above, this paper argues that share repurchase behaviour can convey the information that the current corporate stock price is undervalued by the market through the release of positive signals, and then corresponds to the following research hypotheses:

H2: Reversing the undervaluation of market value is one of the motivating factors for companies to carry out share buybacks.

3.2.2 Theories related to the cash flow effect hypothesis

1. Principal-agent theory

Jensen & Meckling, (1976) initially constructed a basic framework for applying principal -agent theory to analyse corporate governance issues. The theory suggests an agency relationship between a firm's owners, also called a contractual relationship. Under this relationship, the enterprise owner hires the manager as an agent to participate in the company's daily management and delegates a certain amount of the company's business decision-making power to the manager. Under the basic assumption that managers are rational beings within the economic market, the managers' action objectives incorporate management to maximise their personal compensation income rather than prioritising the shareholders' interests. The agent cost arises in this situation.

The theory also refines the agency costs from the principal's perspective, splitting them into monitoring costs and residual losses. For the former, the owner usually needs to pay an additional monitoring cost to build a monitoring system for the internal governance of the enterprise in order to restrain the agent's transgressions. For the latter, corporate agents may obtain additional avenues for increasing their own income by illegally occupying shareholders' interest by taking advantage of the decision-making power and the information gap between principal and agent. Excessive agent costs will reduce corporate governance efficiency and profitability (Harford et al., 2014), which would affect the medium- and long-term growth of enterprises. The research framework of corporate governance issues based on principal-agent theory has continued since then. Reducing the interest deviation between corporate principals and agents has become a core topic in the research of corporate governance structure optimization. (QIAN Ting & WU Changqi, 2016).

2. Free cash flow theory

Jensen (1986) proposed the free cash flow theory based on agent theory. In conjunction with agent theory, it argues that when there is a large amount of free cash flow in a firm, when a company has a substantial amount of free cash flow, its managers tend to engage in overinvestment, inefficient acquisitions, and arbitrary earnings spending. These actions often help corporate agents obtain additional private benefits beyond their compensation and significantly increase the company's agency costs (Hart, 1995). The academic hypothesis that corporate managers' excess free cash flow will generate profit-seeking behaviours, such as overinvestment, has also been validated in a sample of domestic listed firms in China (Huang, Bendo & Gan, Shengdao, 2009). Consequently, controlling free cash flow should be an important channel for firm owners to reduce agency costs and self-interested behaviours of managers (Zhou, Xiaosu & Jia, Jing, 2015).

Under the dual theoretical background of agent theory and free cash flow theory, firms can use free funds for stock repurchase to make a controlled consumption of idle free cash flow within the firm, thus reducing the harm of the internal agency cost problem to the growth of the firm (Chen, P. P. & Gan, S. D., 2009). Share repurchase will return the redundant free cash flow to shareholders in the form of equity directly, instead of flowing to inefficient investment projects under the risk of agency cost. This paper's theoretical hypotheses, therefore, play a crucial role in advancing our understanding of the motivations for firms to engage in share buybacks:

Based on this, the following theoretical hypotheses are further proposing

H3: The greater the free cash flow of a company, the higher the probability it will engage in stock buybacks and vice Versa.

H4: The greater the agency costs of a company, the higher the probability it will engage in stock buybacks; Vice Versa

3.2.3 Theories related to the financial effect hypothesis

1. Financial Leverage Theory

The financial leverage hypothesis suggests that share repurchases decrease outstanding shares and shareholders' equity. This method, alongside unchanged total liabilities, increases the proportion of debt in the company's capital structure and leverage ratio, optimising the capital structure. Furthermore, if a company's long-term funds remain unchanged, the debt cost paid from operating profit will be relatively fixed. Therefore, the company can leverage its operating profit by taking on debt, causing a small change in operating profit to trigger a significant change in earnings per share in the capital market. This allows the company to profit substantially from appreciating its securities market value.

Financial leverage within a reasonable range can help enterprises alleviate short-term capital shortage problems (Yao Yijun, 2022). A certain amount of financial leverage will be directly converted into the power of enterprise operation by providing debt repayment pressure, which could enhance the efficiency of enterprise operation and mobiliser the motivation of enterprise managers and internal employees (Yang Hua et al., 2011). However, excessive financial leverage can also significantly negatively impact an enterprise's performance. Chemmanur et al. (2013) argue that excessive debt levels increase the risk of bankruptcy, which indirectly infringes on the personal rights of owners and employees. Even so, in most studies, scholars still believe that by maintaining a low level of financial leverage, enterprises can optimise their operating conditions by appropriately increasing the level of financial leverage. Moreover, optimising the financial leverage of enterprises will directly reflect their ability to raise funds for future investment or growth opportunities (Tao Zhang & Chong Liu,

2015). Mitchell & Dharmawan (2007) have researched that the level of financial leverage was one of the important factors affecting the decision of firms to engage in share repurchase.

Based on the above research, the corresponding research hypothesis is prepossessed

H5: The lower the degree of financial leverage of a publicly listed company's stock price, the greater the probability of it engaging in stock repurchase activities; Vice versa

2. Financially Flexible theory

Heath (1978) argued that a more financially flexible firm could quickly make adjustments in the face of difficulties caused by cash flow mismatch. Moreover, this kind of adjustment does optimize the firm's medium- to long-term surplus capacity and could control the adverse effects on the stock market. Byoun (2011) argued that financial flexibility should be regarded as the ability of an enterprise to mobilize its financial resources to defend itself against unknown risks at a later stage, which could achieve the goal of maximizing its value. In the practical application of the theory of financial flexibility, scholars believe that the maintenance of financial flexibility needs to be significantly considered for improving their long-term profitability. On the one hand, an increase in financial flexibility can help solve the problem of insufficient capital when enterprises have investment needs (Yang Lihong & Fu Zhihui, 2024); on the other hand, enterprises with a high level of financial flexibility can accumulate more cash and debt resources in their daily business activities, which enables them to obtain the ability to flexibly adjust the ratio of capital allocation (Rapp et al., 2014).

In the research of the literature review, I have listed that there have been previous scholars arguing that the share repurchase can be used as an alternative method of cash dividend payout. When firms are under pressure to pay out cash dividends because of their own internal liquidity shortfalls, they can substitute cash dividend payouts by raising debt for stock buybacks, thereby converting the liquidity required for cash dividend payouts into corporate liabilities. Stock repurchasing can help firms increase their cash reserves in response to uncertain operating shocks in the form of releasing pressure on the use of cash (Jin Fang, 2022), thus increasing the firm's financial flexibility. At the same time, compared with other financial adjustments, share repurchase does not affect the medium- and long-term surplus capacity of enterprises. Based on this, the following research hypothesis is proposed

H6: Enhancing financial flexibility by replacing cash dividend payments is one of the motivations for companies to engage in share buybacks.

4. Empirical Research for Motivation

4.1 Research design

This study adopted two different regression models associated with two distinctive explanatory variables to verify each driver in order to conduct comprehensive research on the motivation of share repurchase.

Based on the studies of Brockman et al. (2008) and He Ying et al. (2016), 'Whether a listed company completed a stock repurchase' was taken as the explanatory variable. If a company completed a stock repurchase, it was 1; others was 0. Given that it was a dummy variable, I constructed the bivariate Logit model for regression analysis. Initially, I performed a univariate regression and then proceeded to a multivariate regression by incorporating main variables with control variables and industry-fixed-effect. This approach facilitated a more precise analysis of the motivations and variations and shed light on the relationship among other influencing factors.

Furthermore, I developed a model using OLS regression with the repurchase scale as the explanatory variable and duplicated the previous method of conducting the univariate and multivariate regression for each main variable. This approach aimed to provide deeper insights into the relationship between share repurchases and motivation factors.

Through this approach, I could comprehensively analyze the impact of each motivation factor on repurchase and consider other potential influences, resulting in a more accurate assessment of the motives for repurchase behaviour.

Industry-fixed effects also were contracted in research to control the unobserved heterogeneity in the different industries. Each industry has its special characteristics, which could lead to variance in financial metrics. Industry-fixed effects could help to mitigate the influence caused by industry characteristics on the independent variables so that improve the fit of the regression model.

To mitigate the effect of reverse causality, I lag all explanatory and control variables in the regressions by one period except for the equity incentive variable. When companies undergo share repruchase, they usually go through a number of steps, such as proposal, pre-announcement, issuance and review, which take a certain amount of time. As a result, companies tend to consider prior financial performance and market conditions rather than relying solely on current conditions when deciding whether or not to engage in share repurchases. The use of lagged one-period data can better capture this dynamic adjustment and lagged effect, reflecting the historical data that management actually refers to in its repurchase decisions. But firms making equity incentive decisions often need to implement them quickly. As a result, the time

correlation between the motivation for equity incentives and share repurchases is likely to be short, and lagged treatment is not required to reflect the effect of time delays.

In addition, I implemented three approaches to conduct robustness checks: adding ore more lag for variables, substituting independent variables, and employing propensity score matching (PSM) with a 1:4 matching ratio.

All data processing and regressions were handled in STATA, which is the statistical software package.

4.2 Data Source and Sample selection

Hypothesis 1 : The stronger the asymmetric information between the company and the external environment and the worse the information transmission, the higher the probability and scale of its stock repurchase.

This study uses data from listed companies that conducted active share repurchases in Shanghai and Shenzhen A-shares from 2013 to 2022 as the research object. To ensure the accuracy of the research data, my study selected exclude listed companies that conduct share repurchases in the A-share markets of Beijing Stock Exchange due to its low information disclosure level. In addition, the trading mechanisms and information disclosure standards of the Shanghai and Shenzhen exchanges are more consistent, which are suitable for comparison and analysis.

For the period, I intercepted financial data from 2013 to 2022 which is the most recent stock repurchase data . According to the China Securities Regulatory Commission's announcement, the 2023 annual report of listed companies would be disclosed in April 2024. The disclosure time was too late to rematch for finical data in 2023.

This empirical analysis of data excludes the following situations:
1) Exclude cases where share repurchase programs have expired, ceased implementation, are currently ongoing, or have failed. Data is only based on the completed stock repurchase programs.
2) Exclude stock repurchase for the cancellation of equity incentives. The cancellation of equity incentives belongs to passive stock repurchase behaviour.
3) Exclude financial listed companies. Financial institutions and banks maintain specific financial statement preparation systems, which prepare independently. Consequently, their financial data is not directly comparable to other industries.
4)Exclude "ST stock". "ST stock" stands for "Special Treatment" stocks under the context of the Chinese stock market, which those listed companies are subject to delisting risk warnings. ST stocks have received special regulatory scrutiny due to financial difficulties or more serious profit manipulation issues. The financial data of

companies labelled ST are generally considered unreliable and untrue. These stocks are often considered to be at higher risk.
5) Eliminate companies which lack of financial data information.
6) If multiple repurchase events occur in a listed company within a year, only the first time will be taken.
7）Exclude companies that being newly listed, delisted, or suspended from trading within the current year.

Finally, 18,979 valid sample observations were obtained. In order to avoid the appearance of outliers, all continuous variables were Winsorized at the 1% and 99%.The financial data were sourced from CSMAR, while the share repurchases of listed companies were obtained from the Wind database.

4.3 Regression theory

(1)Logit model

Based on the previous assumptions in the logit regression, for the explanatory variable *Repur,* the value of 1 when a firm completes a share repurchase in its corresponding year, and vice versa, the variable takes the value of 0. In the actual Logit binary regression model, this variable is needed to convert into the probability of the occurrence of the event that a firm carries out a share repurchase， which mean the probability of value of 1. Therefore, based on this requirement, the following assumption (1) was taken:

$$Prob\ (Repu_{i,t}\ = 1) = P_{i,t} \tag{1}$$

Based on this assumption and based on the research of this article, the logit binary regression model is structured as follows.

Univariate regression

$$P_{i,t}(Repu_{i,t}\ = 1) = \frac{1}{1+e^{-(\beta_0+\beta_1 x_{i,t-1})}} \tag{2}$$

Multivariate regression

$$P_{i,t}(Repu_{i,t}\ = 1/i) = \frac{1}{1 + e^{-(\beta_0+\beta_1 x_{i,t-1}+\beta_2 Size_{i,t-1}+\beta_3 Board_{i,t-1}+\beta_4 Indep_{i,t-1}+\beta_5 Listage_{i,t-1}+\beta_6 Top_{i,t-1}+\beta_7 Incen_{i,t-1})}} \tag{3}$$

- $P_{i,t}$: The probability of the value of 1
- $x_{i,t-1}$: The independent variable of the company i at the time at $t-1$
- $Size_{i,t-1}, Board_{i,t-1}, Indep_{i,t-1}, Listage_{i,t-1}, Top_{i,t-1}, Incen_{i,t-1}$: The control variable at of the company i at the time at $t-1$

Equation 2 represents a one-factor logit regression model involving only one independent variable. Equation 3 demonstrates a multivariate regression model that includes the combined effects of the main independent variable, control variables, and industry fixed effects.

Additionally, as in STATA, the logit regression displays odds ratios, which represent the ratio of the probability of a company conducting stock repurchases to the probability of not conducting stock repurchases. Additionally, to transform the model into a linear regression equation, both sides of the equation need to be transformed by taking the natural logarithm.

- Univariate regression

$$Ln(\frac{P_{i,t}}{1-P_{i,t}}) = \beta_0 + \beta_1 x_{i,t-1} + \varepsilon_{i,t} \quad (4)$$

- Multivariate regression

$$Ln(\frac{P_{i,t}}{1-P_{i,t}}) = \beta_0 + \beta_0 + \beta_1 x_{i,t-1} + \beta_2 Size_{i,t-1} + \beta_3 Board_{i,t-1} + \beta_4 Indep_{i,t-1} + \beta_5 Listage_{i,t-1} + \beta_6 Top_{i,t-1} + \beta_7 Incen_{i,t-1} + \gamma_i + \varepsilon_{i,t} \quad (5)$$

- $Ln(\frac{P_{i,t}}{1-P_{i,t}})$: The natural logarithm of the odds ration
- β_0~β_7: The coefficients of the variables, which represent their effects on the log odds of conducting stock repurchases.
- γ_i: The industry fixed effect
- $\varepsilon_{i,t}$: The error term.

(2)OLS Regression

Based on the previous assumptions in the OLS regression, the explanatory variable is stock repurchase scale which is the proportion of stock repurchase scale to market capitalization.

Univariate regression

$$RepuScaleRatio_{i,t} = \alpha_0 + \alpha_1 x_{i,t} + \varepsilon_{i,t} \quad (6)$$

Multivariate regression

$$RepuScaleRatio_{i,t} = \alpha_0 + \alpha_1 x_{i,t-1} + \alpha_2 Size_{i,t-1} + \alpha_3 Board_{i,t-1} + \alpha_4 Indep_{i,t-1} + \alpha_5 Listage_{i,t-1} + \alpha_6 Top_{i,t-1} + \alpha_7 Incen_{i,t-1} + \sum indid + \varepsilon_{i,t} \quad (7)$$

- α_0: Constant term
- $\varepsilon_{i,t}$: Standard error
- $\sum indid$: Industry fixed effect

4.4 Variable Selection and Definition

4.4.1. Variable selection

The stock price synchronicity（Syn) and P/B ratio were selected as indicators to verify information asymmetric situations and signal transmission within companies. The selection of the stock price synchronicity indicator was primarily referred by Korkos Ioannis (2023). and Yang, Rui (2021) . Stock price synchronicity measures the extent to which changes in market index returns and industry returns affect individual stock returns. When the returns of a specific stock are highly correlated with market and industry fluctuations, the degree of information asymmetry within the company is considered smaller, indicating effective transmission of stock price information. This is because there is information desynchronisation between managers and the market. Therefore, when managers believe the company is undervalued, they make buybacks to signal the undervaluation to the outside world and seek synchronization of the share price.

The P/B ratio evaluates a company's stock by comparing its market price per share to its book value per share. The P/B ratio gives investors insights into whether a stock is overvalued, undervalued, or fairly valued relative to its book value. When a company's P/B ratio is low, the market price is low relative to the company's net assets. In this case, the company may believe that its shares are undervalued. The company wants to transmit a single message to the market that its stock price was undervalued so that the price of its stock has the potential space to increase. So, the stock repurchase could increase shareholder value.

Agency cost and free cash flow ratio were chosen as independent variables to verify the role of agency theory and free cash flow in the motivation of stock buyback.

Previous literature indicates that stock repurchases are also a means of adjusting capital structure. Chan et al. (2004) posit that managers seek to enhance leverage ratios by repurchasing shares. Equity ratio is selected as the variable representing the leverage indicator. A higher equity ratio generally means the company is more reliant on shareholder equity financing, indicating a lower leverage ratio in the company.

In addition, for the regression model, this article controlled variables of the company size (Size), board size (board), independent director size (Indep), listing years

(Listage), the largest shareholder's shareholding ratio (Top), and whether to implement equity incentives (Dual), while controlling for industry effects.

4.4.2 Variable definition

Dependent variable
(1) Whether a company completed a stock repurchase ***(Repur)***

- Completed: 1
- Others: 0

(2) Repurchase Scale Ratio ***(RepuScaleRatio)***

$$\frac{Repurchase\ price \times Number\ of\ shares\ repurchased}{Market\ value\ of\ outstanding\ shares\ at\ the\ end\ of\ the\ quarter\ before\ repurchase}$$

4.2.2 Independent variable

- Stock Price Synchronicity ***(Syn)***

Stock price synchronicity is defined as the absolute correlation coefficient, which quantifies the extent to which individual stock return is correlated with the stock return of a market and industry volatility in response to common factors affecting the overall market.

formula

$$r_{i,t} = \alpha_i + \beta_{i,1} r_{m,t} + \beta_{i,2} r_{I,t} + \epsilon_{i,t}$$

$r_{i,t}$: i stock's return rate in week t;
$r_{m,t}$: Market index return in week t;
$r_{I,t}$: The rate of return of industry I in week t;
Use R^2--- goodness of fit as a stock price synchronicity indicator.

The price synchronicity indicator is the goodness of fit of the regression, which measures the degree to which variations in market index returns and industry returns can account for fluctuations in individual stock returns. Within an efficient market, fluctuations in a stock's returns should exhibit a strong correlation with fluctuations in the overall market's returns and the entire industry. For instance, individual stock returns should rise as the market and industry returns increase, and vice versa. When a particular stock's return rate is highly correlated with industry and market fluctuations, the company's stock price information transmission is considered effective. Therefore, this indicator can be used to reflect information asymmetry. The lower the stock price synchronicity, the worse the company's information transmission ability and the higher the degree of information asymmetry.

Price-to-Book Ratio ***(PBratio)***

$$PBrati = \frac{Market\ price\ per\ share}{Book\ value\ per\ share}$$

- Equity ratio ***(EquiToAcce)***

$$Equity\ ratio = \frac{Equity}{Access}$$

- Dividend Payout Ratio （***DivRat***）

Dividend Payout Ratio

$$= \frac{Dividends\ per\ share\ pre-tax}{((Net\ profit\ for\ the\ period\ /\ Total\ issued\ capital\ at\ the\ end\ of\ the\ period)}$$

- Agency Cost（***Agen***）

$$\text{Agency Cost} = \frac{Sales\ expenses + Administrative\ expenses}{Operating\ revenue}$$

- Free Cash Flow Ratio ***(FCF)***

Free Cash Flow

$$= \text{Profit before interest and taxes} + \text{Depreciation and amortization} - \text{Increase in operating capital} - \text{Capital expenditures}$$

When comparing free cash flow (FCF) across firms, it is important to take into account differences in firm size. To address this, I use a free cash flow ratio rather than FCF alone. This ratio allows for more standardised comparisons by normalising FCF to total assets. By doing so, we can better assess a company's ability to generate cash relative to its size, allowing for more comparisons of companies of different sizes.

$$FCF\ ratio = \frac{FCF}{Total\ Access}$$

4.2.3 Control variable

- Company Size（***Size***）

Taking the natural logarithm of total assets

- Board size ***(Board)***

Taking the natural logarithm of the number of board members since the number of people is a discrete variable, resulting in a discontinuous distribution,

- Proportion of Independent Directors （***Indep***）

$$Indep = \frac{the\ number\ of\ Independent\ Director}{Number\ of\ Board\ Members}$$

- Years Listed （***Listage***）

Taking the logarithm of a natural number (current year - listing years + 1)

- Shareholding percentage of the largest shareholder （***Top***）

4.5 Empirical Result

4.5.1 Descriptive statistics

Descriptive Statistics

Variable	Obs	Mean	Std. Dev.	Min	Max
Repur	25350	0.062	0.242	0	1
SumScale	25350	0.076	0.361	0.000	2.540
time	25350	0.066	0.262	0.000	3.000
Syn	25350	0.396	0.2	0.019	0.833
PBratio	25350	3.439	2.909	0.513	21.204
Agen	25350	0.153	0.123	0.013	0.730
FCF	25350	0.01	0.094	-0.382	0.254
EquiToAcce	25350	0.589	0.195	0.084	0.940
DivRat	25350	0.301	0.319	0.000	2.026
Size	25350	22.355	1.298	19.942	26.344
Board	25350	2.116	0.195	1.609	2.639
Indep	25350	0.377	0.054	0.333	0.571
Listage	25350	2.184	0.79	0.693	3.367
Top	25350	34.045	14.677	8.32	73.65
Incentive	25350	0.12	0.325	0.	1

Table 2: Descriptive Statistics for various

The table 2 shows the descriptive statistics of the variables involved during the observed sample. The mean value of the variable "Repu" is 0.062, implying that the probability of a firm in China carrying out a repurchase in a single year was 6.2 per cent. It indicates that, so far, there are still relatively few listed companies in the Chinese stock market implementing share buybacks.

For the main variables, the mean P/B ratio (*PBratio)* was 3.439, indicating that overall, the companies' share prices were higher than their book value per share. However, it is worth noting that the PB ratios of the companies in the dataset range from lower values (0.513) to higher values (21.204), indicating significant differences in valuation levels between sample companies. The mean value of agency costs

(Agen) of companies is 0.1788, which indicates that the average selling and administrative expenses of listed companies as a percentage of operating revenues is 15%, and the maximum value of 73 % shows that some public companies do have serious agency problems. There are extreme values among the free cash flow (FCF) metric. For the equity ratio (*EquiToAcce)*, with a mean value of 0.589, it indicates that, overall, Chinese listed companies exhibit relatively low financial leverage in the sample. This suggests that companies prefer to rely on shareholders' capital to support business operations and development, leading to lower risk levels. The maximum equity ratio value of 0.940 suggests the company's relatively conservative debt financing strategy, with underutilisation of debt capital. However, the minimum value of 0.084 could exacerbate the company's financial risk and potentially damage its value further if it proceeds with additional share buybacks. In the observed sample, the minimum value of the free cash flow ratio is negative, which means that companies were facing the dilemma of almost stagnant free cash flow turnover within companies in the Chinese market.

4.5.2 Correlation analysis

Pairwise correlations

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)
(1) Repur	1.000														
(2) SumScale	0.820	1.000													
	(0.000)														
(3) time	0.971	0.815	1.000												
	(0.000)	(0.000)													
(4) Syn	-0.035	-0.040	-0.034	1.000											
	(0.000)	(0.000)	(0.000)												
(5) PBratio	-0.057	-0.076	-0.056	-0.110	1.000										
	(0.000)	(0.000)	(0.000)	(0.000)											
(6) Agen	0.008	0.005	0.007	-0.007	0.219	1.000									
	(0.194)	(0.398)	(0.262)	(0.289)	(0.000)										
(7) FCF	0.069	0.080	0.071	0.001	-0.012	0.040	1.000								
	(0.000)	(0.000)	(0.000)	(0.870)	(0.066)	(0.000)									
(8) EquiToAcce	0.013	0.015	0.012	-0.072	0.109	0.343	0.019	1.000							
	(0.038)	(0.018)	(0.047)	(0.000)	(0.000)	(0.000)	(0.003)								
(9) DivRat	0.016	0.021	0.015	0.027	-0.064	0.075	0.063	0.164	1.000						
	(0.012)	(0.001)	(0.017)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)							
(10) Size	0.063	0.046	0.063	0.250	-0.356	-0.303	-0.013	-0.543	-0.033	1.000					
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.038)	(0.000)	(0.000)						
(11) Board	-0.023	-0.012	-0.020	0.101	-0.113	-0.059	0.016	-0.150	0.017	0.263	1.000				
	(0.000)	(0.059)	(0.002)	(0.000)	(0.000)	(0.000)	(0.011)	(0.000)	(0.006)	(0.000)					
(12) Indep	0.021	0.011	0.019	0.006	0.032	0.008	-0.002	0.008	-0.010	0.003	-0.563	1.000			
	(0.001)	(0.076)	(0.003)	(0.301)	(0.000)	(0.195)	(0.773)	(0.197)	(0.098)	(0.599)	(0.000)				
(13) Listage	0.031	0.042	0.032	0.124	-0.208	-0.112	-0.015	-0.343	-0.100	0.461	0.184	-0.036	1.000		
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.016)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)			
(14) Top	-0.067	-0.054	-0.065	0.080	-0.066	-0.096	0.068	-0.071	0.123	0.186	0.017	0.045	-0.044	1.000	
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.007)	(0.000)	(0.000)		
(15) Incentive	0.073	0.052	0.075	-0.061	0.104	0.037	-0.009	0.047	0.001	-0.034	-0.058	0.034	-0.174	-0.067	1.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.158)	(0.000)	(0.834)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	

Table 3: Correlation Analysis

Table 3 showed the analysis results of the correlation of the main variables. Except for the variable of agency cost (Agen), all independent variables have significant correlations with both independent variables of share repurchase and stock repurchase scale. This substantiates the correlation between the independent variables and the dependent variables, providing initial support for the research hypothesis. Moreover, variables of share price synchronization(Syn) and P/B ratio exhibit significant negative correlations with the independent variables, aligning with theories of information asymmetry and signaling. In addition, variables of Equity ratio (EquiToAccess), dividend payout ratio(DivRat), and free cash flow ratio (FCF) demonstrate significant positive correlations with the independent variables,

consistent with the hypotheses of this study as well as the theories of free cash flow and financial flexibility. *(The clear picture for table can see Appendix 1)*

Furthermore, the correlation coefficients of the individual variables remain below 0.7, indicating an absence of multicollinearity. This verifies the reasonableness and efficacy of regression model construction and variable selection.

4.5.3 Regression Results Analysis

Based on the theory of stock repurchase motivation, I selected variables representing different repurchase motivations and conducted univariate regression and multiple regression analyses, respectively, for each independent variable. Columns 1, 2, 5, and 6 present estimation results with the explanatory variable of whether the company engages in stock repurchases while columns 3, 4, 7, and 8 depict estimation results with the scale of stock repurchases in the current year as the explanatory variables. Columns 1, 3, 5, and 7 represent the results of only the main independent variables regression without control variables or industry fixed effects, whereas columns 2, 4, 6, and 8 show results of multifactor regression with the control variables and industry fixed effects.

Initially, upon the addition of control variables and industry fixed effects, the direction and significance of the estimated coefficients for the core independent variables remain largely unchanged, indicating preliminary stability in estimating these variables. Moreover, the regression's R-squared value increased after including control variables. This suggests that control variables significantly enhance the model's ability to fit stock repurchase behaviours, thereby validating the effectiveness and rationale behind selecting these control variables.

Table 4 presents the regression results for Stock Price Synchronicity (Column 1 to 4) and P/B Ratio (Column 5 to 8) based on the information asymmetry and signalling theories. In column 2, the estimated coefficient of stock price synchronicity is -0.510, significant at the 1% level, for the stock repurchase dependent variable. This result suggests that poorer stock price synchronicity in the previous year is associated with a higher probability of the company repurchasing shares in the current year. The results support the notion that improving stock price synchronicity, and thus reducing information asymmetry, may serve as one of the motivations for share repurchases. In addition, in column 5, the result shows that companies may believe that larger repurchase scales are more effective in reducing information asymmetry. therefore, the result validates Hypothesis 1 proposed in the article, which states that reducing information asymmetry is a motivating factor for listed companies to engage in share buybacks. This may be due to the fact that companies use share buybacks to break down information barriers and increase the transparency of the company's information in the market. Similarly, the regression results in column 6 show that the coefficient of the P/B ratio on share repurchases is significantly negative at the 1% level. This indicates that the greater the extent to which a listed company's stock price is undervalued, the more likely it is to carry out share buybacks. This may be because of the company's efforts to signal to external stakeholders that the company's stock is undervalued and to express confidence in the company's prospects through buybacks,

aiming to stimulate an increase in the company's share price. Furthermore, P/B ratio of the size of buybacks are significantly negative at the 1% level, suggesting that larger buybacks may increase the efficiency of information transmission. The possible reason is to try to send a positive signal to the outside world that the company's share price is undervalued and that there is confidence in the company's future development, thus stimulating the company's share price to increase, which verifies Hypothesis 2 of this paper, i.e., reversing the undervaluation of market value is one of the motivating factors for companies to carry out share buybacks. The results in Table 1 demonstrate the effectiveness of theories related to information effect hypothesis in the Chinese market. Stock buybacks can serve as a channel for conveying positive information to the market, creating opportunities for listed companies to optimize the information environment during periods of constrained information flow and undervaluation of market capitalization.

Table 5 presents the regression results for Agency Cost (Column 1 to 4) and Free Cash Flow (Column 5 to 8) based on Agency theory. The regression coefficients of agency cost are positive at 5% and 10% significance levels respectively, indicating that the greater the agency cost between shareholders and management of a company, the likelihood of share repurchases the company will implement share repurchase and the larger the scale of share repurchase. This result supports the agent theory that when the agency cost between shareholders and company management is large, shareholders will push listed companies to implement share repurchases to mitigate the impact of the agent problem. Similarly, the regression coefficients of the free cash flow ratio are positive at the 1% significance level, respectively, indicating that the free cash flow a firm has, the higher the probability that the firm will implement share repurchase and the larger the scale of share repurchase. These two results support the agency theory, specifically that share buybacks reduce the company's disposable cash flow and inhibit some on-the-job consumption and inefficient investment by the company's management, thus reducing the company's agency costs.

Table 6 presents the regression results for Equity ratio (Column 1 to 4) and Dividend payout Ratio (Column 5 to 8). The regression coefficients of Equity ratio are all positive at 1% significance level, showing that the higher the Equity ratio, the higher the probability of share repurchase and the larger the scale of repurchase, which supports the financial leverage hypothesis. Firms may repurchase stock to increase their leverage ratio. This result also was shown in Bagwell and Shoven (1988) and Opler and Titman (1996). The leverage ratio hypothesis posits that repurchasing shares could optimise the firm's capital structure (Dittmar, 2000). But It is worth noting that the correlation coefficient in the equity ratio for the repurchase scale, which was shown in column (3), is not significant in the univariate regression, as the F-test did not pass. This suggests that simply adding the variable of equity ratio is insufficient to estimate the repurchase scale, leading to the results unconvincing

effectively. On the other hand, the regression coefficients for dividend payout ratio are all significantly positive at 1% level, indicating that firms with higher level of cash dividend payout are more inclined to share repurchase, which may be due to the use of share repurchase as a substitute for cash dividend. This result supports the financial flexibility hypothesis, which suggests that management chooses to implement share buybacks as a substitute for cash dividends in order to ensure financial flexibility by avoiding financial distress due to continuous dividend payments.

Information Effect Hypothsis

VARIABLES	(1) Repur	(2) Repur	(3) Sumscale	(4) Sumscale	(5) Repur	(6) Repur	(7) Sumscale	(8) Sumscale
	Stock Price Synchronicity				P/B Ratio			
L.Syn	-0.415***	-0.436***	-0.086***	-0.100***				
	(-3.04)	(-2.98)	(-6.80)	(-7.37)				
L.PBratio					-0.073***	-0.094***	-0.009***	-0.009***
					(-5.31)	(-5.82)	(-14.45)	(-13.64)
L.Size		0.353***		0.020***		0.306***		0.011***
		(14.03)		(8.30)		(11.51)		(4.63)
L.Board		-0.742***		-0.043***		-0.795***		-0.050***
		(-4.34)		(-2.71)		(-4.64)		(-3.15)
L.Indep		-0.298		-0.010		-0.340		-0.012
		(-0.48)		(-0.16)		(-0.54)		(-0.19)
L.Listage		-0.126***		0.016***		-0.172***		0.014***
		(-3.05)		(5.10)		(-4.00)		(4.42)
L.Top		-0.021***		-0.001***		-0.021***		-0.001***
		(-10.08)		(-7.32)		(-10.10)		(-7.28)
Incentive		0.608***		0.016*		0.684***		0.025***
		(8.29)		(1.89)		(9.26)		(2.89)
Constant	-2.361***	-8.856***	0.106***	-0.226***	-2.289***	-7.491***	0.103***	-0.021
	(-39.38)	(-11.18)	(16.93)	(-3.89)	(-45.51)	(-9.02)	(24.22)	(-0.36)
Observations	18,979	18,979	18,979	18,979	18,979	18,979	18,979	18,979
Wald/ F test	9.27***	481.21***	46.31***	28.07***	28.18***	499.13***	208.67***	43.14***
Pseudo/R-squared	0.0009	0.0444	0.002	0.013	0.0042	0.0493	0.005	0.014
Induatry FE	No	Yes	No	Yes	No	Yes	No	Yes

Robust z-statistics/ t-statistics in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Table 4: Regression Result for Information Effect Hypothesis

Cash Flow Effect Hypothsis

VARIABLES	(1) Repur	(2) Repur	(3) Sumscale	(4) Sumscale	(5) Repur	(6) Repur	(7) Sumscale	(8) Sumscale
	Agency Cost				Free Cash Flow			
L.Agen	0.399*	0.494**	0.025	0.043*				
	(1.84)	(2.07)	(1.12)	(1.77)				
L.FCF					1.025***	1.423***	0.316***	0.342***
					(3.19)	(4.34)	(11.60)	(12.25)
L.Size		0.354***		0.018***		0.346***		0.018***
		(13.87)		(7.26)		(13.98)		(7.51)
L.Board		-0.779***		-0.050***		-0.785***		-0.052***
		(-4.58)		(-3.12)		(-4.59)		(-3.26)
L.Indep		-0.406		-0.026		-0.396		-0.029
		(-0.65)		(-0.42)		(-0.63)		(-0.47)
L.Listage		-0.132***		0.016***		-0.131***		0.016***
		(-3.18)		(4.96)		(-3.15)		(5.06)
L.Top		-0.021***		-0.001***		-0.021***		-0.001***
		(-10.12)		(-7.45)		(-10.44)		(-8.23)
Incentive		0.612***		0.018**		0.629***		0.021**
		(8.35)		(2.10)		(8.57)		(2.42)
Constant	-2.589***	-9.027***	0.067***	-0.209***	-2.542***	-8.766***	0.068***	-0.193***
	(-58.61)	(-11.28)	(16.09)	(-3.46)	(-89.52)	(-11.07)	(27.80)	(-3.34)
Observations	18,979	18,979	18,979	18,979	18,979	18,979	18,979	18,979
Wald /F test	3.39*	472.32***	1.26	22.75***	10.17***	486.50***	134.59***	35.73***
Pseudo/R-squared	0.0003	0.0439	0.000	0.010	0.0011	0.0456	0.007	0.018
Induatry FE	No	Yes	No	YES	No	Yes	No	YES

Robust z-statistics/ t-statistics in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Table 5: Regression Result for Cash Flow Effect Hypothesis

Financial Effect Hypothesis

VARIABLES	(1) Repur	(2) Repur	(3) Sumscale	(4) Sumscale	(5) Repur	(6) Repur	(7) Sumscale	(8) Sumscale
	EquiToAcce				DivRat			
L.EquiToAcce	0.662***	1.629***	0.014	0.082***				
	(4.90)	(8.86)	(1.19)	(5.12)				
L.DivRat					0.243***	0.355***	0.028**	0.040***
					(2.96)	(4.30)	(2.57)	(3.55)
L.Size		0.455***		0.022***		0.346***		0.017***
		(16.23)		(8.56)		(13.93)		(7.23)
L.Board		-0.771***		-0.049***		-0.797***		-0.052***
		(-4.48)		(-3.07)		(-4.68)		(-3.23)
L.Indep		-0.398		-0.026		-0.412		-0.025
		(-0.63)		(-0.42)		(-0.66)		(-0.41)
L.Listage		-0.110***		0.018***		-0.122***		0.017***
		(-2.62)		(5.37)		(-2.91)		(5.33)
L.Top		-0.021***		-0.001***		-0.022***		-0.001***
		(-10.35)		(-7.63)		(-10.56)		(-8.05)
Incentive		0.615***		0.018**		0.616***		0.018**
		(8.35)		(2.12)		(8.43)		(2.13)
Constant	-2.925***	-12.306***	0.063***	-0.360***	-2.604***	-8.851***	0.063***	-0.192***
	(-33.56)	(-13.65)	(8.56)	(-5.34)	(-67.35)	(-11.18)	(15.38)	(-3.32)
Observations	18,979	18,979	18,979	18,979	18,979	18,979	18,979	18,979
Wald /F test	24.02***	546.83***	1.42	24.81***	8.79***	485.94***	6.59**	24.67***
Pseudo/R-squared	0.0021	0.0508	0.000	0.011	0.0008	0.0451	0.001	0.011
Induatry FE	No	Yes	No	Yes	No	Yes	No	Yes

Robust z-statistics/ t-statistics in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Table 6: Regression Result for Financial Effect Hypothesis

Furthermore, I conduct further regression to verify whether stock repurchases are a substitution for dividend payout. I run a regression for the current dividend payout ratio period. The regression results are displayed in columns 5-8 of Table 7.

Compared to the lagged period of the dividend payout ratio, the current period's correlation coefficients with both the probability and size of stock repurchase are reduced, which suggests that firms prioritise the previous year's dividend payout ratio when making stock repurchase decisions. Stock repurchase and dividend distribution are ways for firms to return cash to shareholders. Companies could utilise stock repurchases to effectively balance and substitute direct dividend payouts, aiming for sustained shareholder returns and optimal financial resource allocation. This strategy helps companies to flexibly adjust their returns to shareholders under different market environments and financial conditions. The diminished correlation of the current period's dividend payout ratio with the decision to repurchase stocks, contrasted with its heightened correlation in the previous period, implies that firms may favor stock repurchases in the current period following significant dividend distributions in the prior period.

This preference could stem from the substantial cash outflow associated with dividend payments. If a firm has already rewarded shareholders through dividends in the prior period, it may face constraints on cash flow in the current period, leading to a preference for share buybacks over further dividend payouts. Firms make trade-offs between dividend distributions and stock repurchases at different times based on their financial position and strategic needs. If a high level of dividends was paid in the previous period, the current period may be more inclined to repurchase shares to maintain financial stability and consistency of shareholder returns.

For control variables, the company size (Size) regression coefficient is positive at the 1% significance level. It suggests that larger companies are more likely to engage in stock repurchases and tend to conduct them on a larger scale. This is likely due to the fact that large companies typically have robust financial health, ample cash flow, and predictable earnings, which provide the necessary funds for stock buybacks. On the other hand, the regression coefficients for board size and the proportion of the largest shareholder are negative at the 1% significance level. This means that companies with smaller boards and a lower proportion of independent directors are more likely to conduct stock repurchases with a larger scale of these repurchases. Board size and the proportion of the largest shareholder reflect the concentration of ownership and the company's inclination towards strategic decisions. Smaller boards normally often experience fewer conflicts of interest and faster decision-making processes than large companies. Therefore, a smaller board size may enable the company to decide more easily and quickly to undertake stock repurchases. For the variable list years (Listage), the regression results for share repurchase show negative significance at

the 1 % level, while the regression results for the repurchase scale show positive significance at the 1 % level. This suggests that companies with shorter listing years are more likely to undergo share repurchase while their repurchase size is smaller than companies with longer listing time. The reason for this may be that newly listed companies have more need to signal the financial health of the company and self-confidence to the market through share buybacks in order to enhance investor confidence. However, due to their limited capital, the size of buybacks is smaller.

All the hypotheses proposed in this study have been confirmed. The motivations for companies to engage in stock buybacks include reducing information asymmetry in the securities market, reversing the undervaluation of market value, increasing financial leverage, substituting cash dividend payouts to enhance financial flexibility, managing the scale of free cash flow, and reducing agency costs. These findings further validate the information effect hypothesis, financial effect hypothesis, and cash flow effect hypothesis in the context of the Chinese bond market.

Dividend Payout Ratio

VARIABLES	(1) Repur	(2) Repur	(3) Sumscale	(4) Sumscale	(5) Repur	(6) Repur	(7) Sumscale	(8) Sumscale
	lag one-year Divient ratio				Current year Divient ratio			
L.DivRat	0.243***	0.357***	0.028**	0.040***	0.191**	0.329***	0.024***	0.036***
	(2.96)	(4.31)	(2.57)	(3.56)	(2.36)	(4.18)	(2.70)	(3.96)
L.Size		0.362***		0.017***		0.338***		0.019***
		(14.68)		(7.42)		(15.26)		(9.60)
L.Board		-0.834***		-0.053***		-0.912***		-0.057***
		(-4.92)		(-3.29)		(-5.76)		(-4.12)
L.Indep		-0.368		-0.024		-0.120		-0.016
		(-0.59)		(-0.39)		(-0.21)		(-0.31)
L.Listage		-0.173***		0.016***		0.057		0.013***
		(-4.18)		(5.08)		(1.56)		(4.75)
L.Top		-0.023***		-0.001***		-0.022***		-0.001***
		(-11.13)		(-8.23)		(-11.41)		(-9.69)
Constant	-2.604***	-8.936***	0.063***	-0.194***	-2.770***	-9.059***	0.069***	-0.218***
	(-67.35)	(-11.35)	(15.38)	(-3.35)	(-75.66)	(-12.54)	(20.39)	(-4.27)
Observations	18,979	18,979	18,979	18,979	25,350	25,350	25,350	25,350
Wald/ F teat	8.79***	398.22***	6.59**	28.28***	5.55**	358.45***	7.28***	38.39***
Paseu /R-squared	0.0008	0.0384	0.001	0.010	0.0005	0.0280	0.000	0.011
Induatry FE	No	Yes	No	Yes	No	Yes	No	Yes

Robust z-statistics/ t-statistics in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Table 7: Regression Result for Dividend Payout Ratio

4.5.4 Robustness Test

I tested the robustness of the regression results in three ways:
(1) Changing the independent variable
(2) Adding ore more lag for variables
(3) Conducting propensity score matching (PSM) with a 1:6 matching ratio.

(1) Changing the independent variable

At first, the independent variable is replaced by the times of stock repurchase in a company during the observed period in the OLS model.

As the Appendix 2 presented, Columns 1 to 6 present the estimation results through stock price synchronicity, P/B ratio, equity ratio, dividend payout ratio, agency cost, and free cash flow ratio as explanatory variables, respectively. According to the regression result in column (1), the regression coefficient of share price synchronization with the number of repurchases is -0.066 at 1% significance level. This indicates that firms with lower share price synchronization are more inclined to make share buybacks. From the regression results in column (2), the regression coefficient of the P/B ratio and number of shares repurchased is significantly negative at a 1% level, which further suggests that the companies were more undervalued, the more often conducted share buybacks. The regression results in columns (3), (4), and (6) show that the Equity Ratio, Dividend Payout Ratio, and Free Cash Flow Ratio regression coefficients on the number of buybacks are significantly positive at the 1% level of significance. This demonstrates that firms with higher equity ratios, dividend payout ratios, or free cash flow ratios engage in share buybacks more frequently. In addition, the results in column (5) show that the regression coefficient of agency cost on the number of repurchases is significantly positive at 5%, which indicates that firms with higher agency costs are more inclined to undertake share repurchases.

The results show that the significance and direction of the main variables' regression coefficients align with those previously observed in the analyses of both the likelihood of stock repurchases and the scale. This consistency substantiates the robustness of the primary regression models, enhancing the conclusion that these variables motivate a firm's decision-making process regarding stock repurchases.

(2) Adding ore more lag for variables

The reason I choose more one lag for variable as robustness test is considering the time of internal management process. When companies decide to repurchase shares, the internal management process also takes time, involving a number of procedures such as designing a pro forma, making a proposal, communicating with major

shareholders and obtaining board approval. These steps take additional time to complete. As a result, implementing a share buy-back decision may take longer than the time required for an external announcement. By running lagged two-period regressions on variables, the true time lags in firms' decision making and execution can be better captured to avoid confounding by short-term fluctuations and endogenous issues. This approach can more accurately capture the true drivers of firms' buyback behaviour, thereby improving the robustness of the regression analysis and the credibility of the results.

Appendix 3 (1) presents the results of the lagged 2-period multinomial regression analyses of share repurchase and repurchase size using share price synchronisation (Columns 1 and 2), price-to-book ratio (P&B ratio) (Columns 3 and 4), and equity ratio (Columns 5 and 6) as the main independent variables. The regression results of these variables are consistent with the main regression, which indicates that all of them significantly affect the share repurchase and repurchase scale. This result further strengthens the explanatory power and robustness of the model.

Slimily, Appendix 3 (2) presents the results of the lagged 2-period multinomial regression analyses of share repurchase and repurchase size using Divident payout ratio (Columns 1 and 2), Agency cost (Columns 3 and 4), and Free Cash Flow ratio (Columns 5 and 6) as the main independent variables.

（3）Conducting propensity score matching (PSM)

In order to reduce the impact of endogeneity problems, minimize selection bias, and more accurately estimate the treatment effect, my research refers to the research of Zhai Shengbao et al. (2017) and Qin Shuai et al. (2021), employing the propensity score matching (PSM) method for robust test.

First, a logit model is used to regress the covariates in one lag period to obtain the propensity matching values (PS values) of all companies that did not contact stock repurchase. Second, I used a 1:4 nearest neighbour matching method to find control group firms for the repurchasing firms. Specifically, the four non-repurchasing firms with propensity scores closest to those of the repurchasing firms are identified.

The Figure 9 illustrated the degree of deviation between the repurchase sample and the non-repurchase sample on the corresponding variables. The closer the value is to 0, the smaller the deviation and the less the difference. The matching results indicate that the matched samples show significantly smaller deviation in the corresponding variables compared to the unmatched repurchase and non-repurchase samples, demonstrating the success of the matching process. PSM is designed to make the gap in control variables between firms that incur buybacks and those that do not as small

as possible, so the explanation of stock repurchase's motivations is more plausible and valid. After PSM matching, the control variables are much closer in the sample for firms that stock repurchase versus firms that do not stock repurchase.

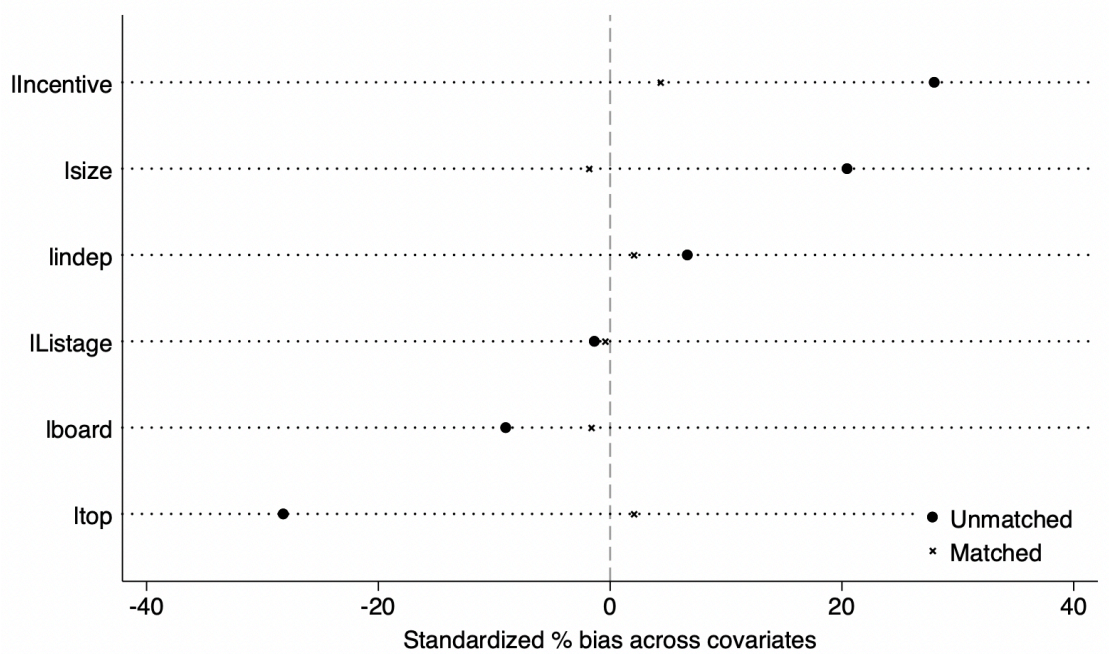

Figure 9: The Standardized Bias across covariate

After 1:4 matching, the observation sample size was reduced to 5,919, which reduced the differences between covariates and increased the credibility of causal inference. The regression results structure after matching was similar to the main regression. Separate univariate and multivariate regressions were conducted for each variable, targeting whether a repurchase occurred and the scale of the repurchase, as shown in the Appendix 4, 5,6 .

4.5.5 Critical thinking for My main regression

In response to my main regression approach, the same suggests three improvements that could be made

1. Disturbances in estimating the motivation of share repurchase can be further excluded

- The subjective interference in corporate share repurchase decisions can be further excluded by introducing the overseas/financial background of executives/CEOs. On the one hand, in the research background, as mentioned in this paper, the application of share repurchase tools in the Chinese securities

market is more immature and less common than in overseas markets, and CEOs or executives with overseas backgrounds may have more experience or awareness of the application of share repurchase; on the other hand, executives with financial backgrounds are more likely to use their expertise in the capital market tools to solve the financial or agency cost problems within the firm. or agency cost problems;

- By introducing the external economic environment uncertainty or industry development trend to further drain the influence of external environmental factors when enterprises make share repurchase decisions.

2. Consider the historical experience of firms in conducting share repurchases

- Introduce whether a firm has conducted share buybacks in previous years as a control variable to be added to the control;

- Generate the variable of whether a firm conducts repurchase for the first time in addition to whether it actually repurchases or not, and compare to determine whether the motives influencing firms to conduct stock repurchase for the first time differ from the results of the benchmark regression.

3. Supplementary exploration of the effectiveness of enterprises conducting share buybacks

- By estimating the effectiveness of corporate share repurchase, we compare and verify whether corporate share repurchase can meet the decision expectations.

5. Future Research

To further investigate the ranking of the influence levels of motivation variables for stock repurchase and examine whether the impact of different factors varies across different industries, a Random Forest model is introduced to study the motivations behind stock repurchases.

5.1 Random Forest method

The Random Forest method is a machine learning technique that integrates multiple decision tree models by training and testing samples. This algorithm has the advantage of being able to predict future strategic decisions and risks while capturing complex nonlinear quantitative relationships between variables. The algorithm has been applied more frequently in the field of economics internationally (Alessi & Detken, 2011).

The random forest model integrates the decision tree model. The core purpose of the random forest model is to compare the difference in the level of influence of different variables on the decision-making of share repurchase. The model uses regression or classification of the same dataset followed by the use of simple average or weighted average as the final result. A parallel integration bagging algorithm was used in this model. First, perform m rounds of random sampling with the replacement on the samples to be predicted, and then repeat this process k times. This results in k*m independent sampling sets formed through double sampling. Next, from each small sampling set, randomly select a certain proportion of features to construct independent decision tree models. The weighted average of the partitioning results of the decision tree models within each small sampling set is the final estimated result of the Random Forest model. This process can be expressed as follows:

$$RF_{(y)} = \frac{1}{k}\sum_{i=1}^{k} DT(y_k)$$

In the above equation, y_k is the regression result of a single decision tree model. $RF_{(y)}$ is the regression result of the random forest model after integration. During the execution process, Random Forest can generate relative importance scores for different variables. The ranking of these scores can serve as the core basis for determining the importance of various factors influencing stock repurchase decisions in this study.

In the running process, selecting the number of put-back samples for the predicted samples is crucial for judging the results. However, since the model regression in STATA is stepwise regression, the default model setting in STATA is stepwise regression. The number of iterations ranges from 50 to 500 for step-by-step testing. After 100 iterations, the model's prediction accuracy stabilized. Therefore, this study chooses to set the number of iterations to 100.

The theoretical basis and operation code of the random forest model in STATA are based on the research on the *Prediction accuracy of credit card customer default probability* by Yeh and Lien (2009) and Dheeru and Karra (2017).

5.2 Result Analysis

1)Prediction error

As mentioned in the previous robustness test, the influence of stock repurchase announcements had a certain lag because of the approval process of internal board resolution and external regulations. For this reason, in the construction of the random forest model, the result of explanatory variables with one period lag and two periods lag, respectively, for modelling were compared to present the period of influence of the influencing factors. Since the core purpose of constructing the random forest model is to rank the importance of corporate stock repurchase drivers, when constructing the random forest model, the whole sample was exercised. The prediction error rate results of random forest for corporate stock repurchase decisions are shown in table 8 below:

Lags	Prediction error
1-year	7.43%
2-year	9.26%

Table 8: Prediction Error for one-year-lag and two-year-lag

The prediction error is a key metric for assessing model predictions. According to the results, the prediction bias in the model constructed with one-year lagged variables is smaller than that of the model constructed with two-year lagged in my obvious

sample, which means operating conditions in the year before should have a greater impact on its share repurchase decision than the previous two years.

2) Ranking the relative importance of different motivation variables in share repurchase.

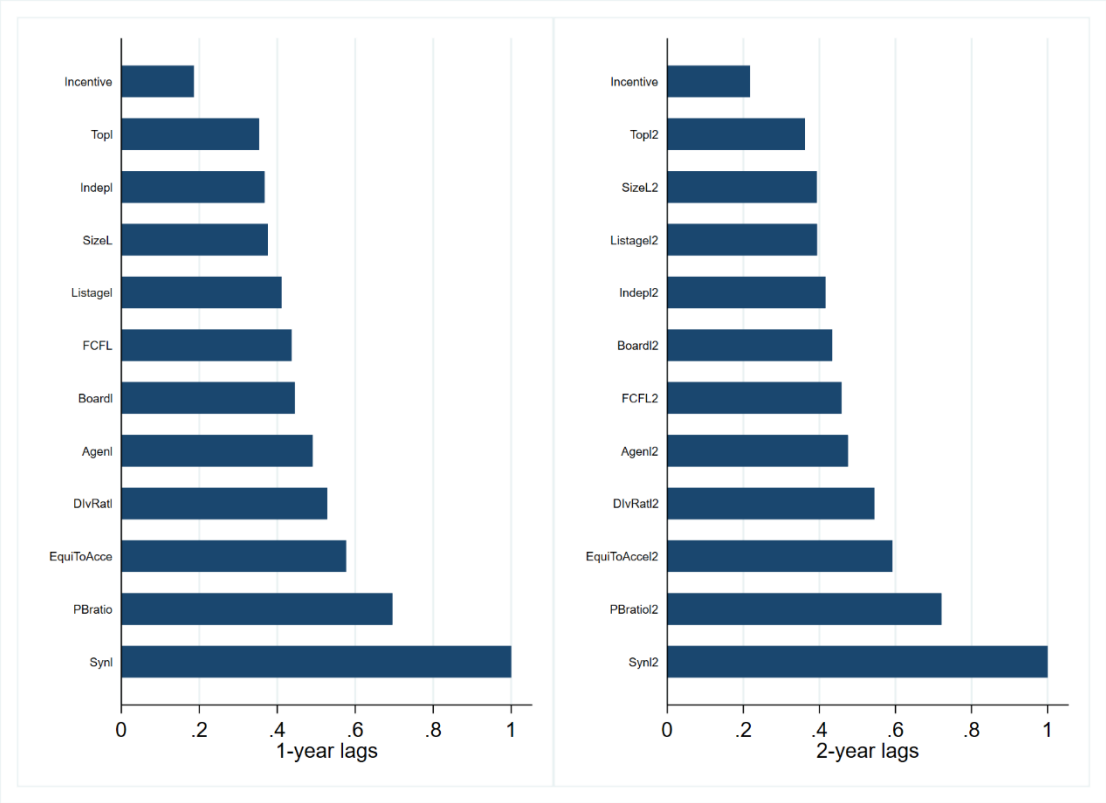

Figure 10: Ranking the relative importance of different motivation variables

The above result figure 10 visually shows that the information effect hypothesis ranks first in importance, followed by the financial effect hypothesis and the cash flow effect hypothesis, respectively, among the main motivation variables for share repurchase. It could be interpreted that the application of share repurchases as a channel tool to convey additional operational information to the market is more to be considered. Moreover, optimising the capital structure and reducing the agency cost have less significant effects on the enterprise conducting share repurchases than sending the signalling. And within the theoretical framework of the information effects hypothesis, reducing firms' information asymmetry motive, represented by the various stock price synchronisation, is far more important than mitigating the market undervaluation motive-PB ratio. It can be concluded that firms when faced with the dilemma of information transformation both inside and outside the market, demonstrate a proactive approach. Even if they are not troubled by undervalued stock prices, they will consider using share repurchase to transform the market information advantage of informed traders. This proactive measure is taken to repair the disrupted

market order and preventively ensure smooth changes in firms' market values in the medium to long term. In contrast, when a firm's stock is overvalued, the firm will also utilize share buybacks as an informational tool to cool down market trading. On one hand, it can prevent the damaging effects of stock price bubbles on the firm's reputation (Jia, Liu & Zhang, 2016). On the other hand, it prevents the risk of a stock price crash raised by subsequent large stock price vibrations (Fan, Hu & Ke, Li, 2016).

3) Histogram of the distribution of the motivation variables

Further, the Random Forest model can also show a histogram of the distribution of the motivation variables of the firms that experienced buybacks versus those that did not, which extends the explanation of how these motivation variables affect the behaviour of the firms conducting stock repurchases. The horizontal axis represents the range of values of the variable, which is expressed as a percentage in the graph.

The vertical axis represents the likelihood, expressed as a percentage, that a firm will or will not engage in share buybacks within the interval of the given variable. The blue bars represent the probability of not conducting a share repurchase, and the boxes represent the probability of a firm conducting a share repurchase in a given interval.

The results are shown in the below figure.

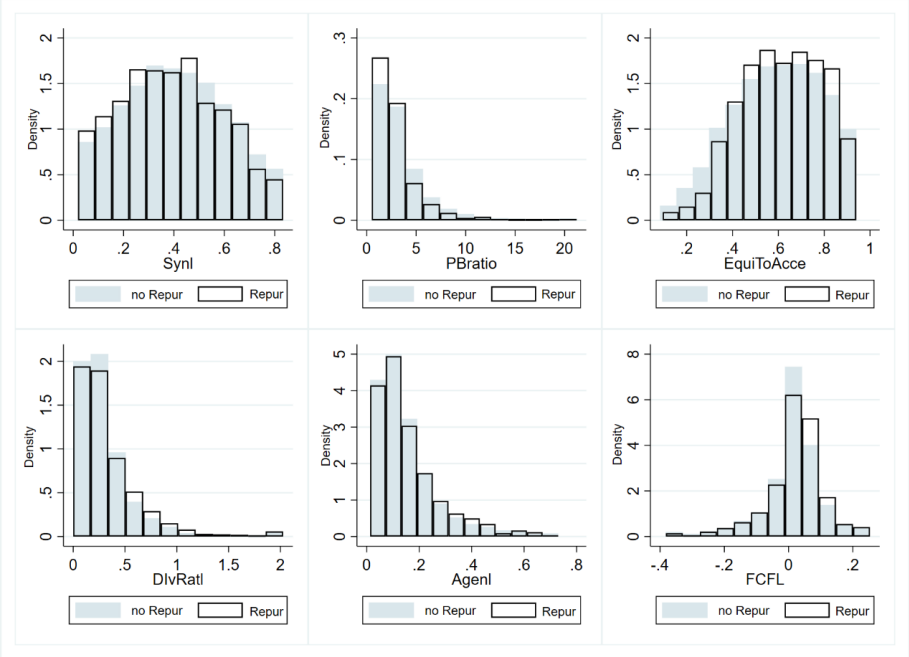

Figure 11: Histogram of the distribution of the motivation variables

As can be seen from the result, figure 11, except for the variable of stock price synchronisation and PB ratio, the characteristics of the histogram distribution of the

remaining dependent variables do not show significant differences between the groups. So, compared with the information effect, whether firms decide on stock repurchase behaviour based on the financial and cash flow impact is more subjective and random among Chinese corporates. The result also implies that the application of stock repurchases as an effective tool in the Chinese securities market is still incomplete and immature.

As can be seen from the result, except for the variable of stock price synchronisation and PB ratio, the characteristics of the histogram distribution of the remaining dependent variables do not show significant differences between the groups. So, compared with the information effect, whether firms decide on stock repurchase behaviour based on the financial and cash flow impact is more subjective and random among Chinese corporates. The result also implies that the application of stock repurchases as an effect tool in Chinese securities market is still incomplete and immature.

Moreover, through the histograms of the stock price synchronization and PB ratio, it can be seen that when the stock price synchronization ratio is less than 0.3, or the PB value of firms is less than 3, the distribution of firms that have repurchased shares is significantly more concentrated than the firms that have not repurchased shares. Therefore, I argue that these two values can be regarded as early warning thresholds for playing the role of stock repurchase behavior. This means that when the synchronisation rate of the enterprise's stock is less than 0.3 or the PB value is less than 3, using stock repurchase to the information asymmetry or enhance the enterprise's market valuation should become the strategic means that the management of the enterprise needs to focus on; On the other hand, market investors can use these two thresholds to generate investment strategies. Investors can use these thresholds and other business performance indicators to predict a company's stock repurchase behaviour. Consequently, after a company announces a stock repurchase, investors can capitalise on the short-term increase in the company's excess returns driven by the market signalling effect to gain stock trading profits. (Yang, Qizhong & Han, 2013).

Overall, the random forest model indicates that a company's operating performance in the previous year preceding a stock buyback has a greater impact than the based on the performance in the two years prior. Among various motives influencing stock buybacks, stock price synchronicity has the most significant impact, whether analysing the full samples. That means managers are more likely to conduct stock repurchases when companies face the babies of information effect. Aside from information asymmetry and corporate value variables, the distribution characteristics of other motive variables do not show significant differences between groups. This study suggests that, compared to the information effect, the financial and cash flow effects have a stronger subjective randomness in determining whether Chinese

companies choose to engage in stock buybacks. Additionally, histograms of motive variables reveal that when a company's stock price synchronicity is less than 0.3 or PB value is less than 3, using stock buybacks to reduce information asymmetry or enhance market valuation should be a strategic focus for the management.

6. Conclusion

This paper provides an in-depth study of the characteristics of China's share buyback market and the motivations behind it by analysing public data and relevant policies on share buybacks conducted by Chinese listed companies in recent years.

By analyzing the statistical data on Chinese stock repurchases from 2015 to date, this paper finds that although stock repurchase behaviour in the Chinese market started late, the total amount of stock repurchases by Chinese listed companies has been on an upward trend. More and more listed companies choose to carry out share buybacks during market troughs, primarily during 2018-2019, when the number of share buybacks increased significantly. This trend can be partly attributed to the economic crisis in 2018 and the revision of China's company law, which relaxed the institutional requirements for share buybacks. Most of the share repurchases were made through agreed or over-the-counter (OTC) repurchases. The industry distribution of share repurchases by listed companies is mainly concentrated in the industrial manufacturing, information technology, consumer goods and services, and pharmaceutical industries. Although the scale of share repurchases in China's A-share market is relatively small, their purposes are diversified, with equity incentive cancellations accounting for the largest share, which is related to the management system of Chinese enterprises. Privately held listed companies are more inclined to conduct share buybacks due to the flexibility of their corporate nature, while state-owned enterprises and foreign-funded enterprises have relatively few buybacks due to strict policy restrictions and complex asset allocation requirements.

Based on previous theoretical studies in stock buyback motivations, this paper summarises the primary motivations for stock buybacks. This paper selects all A-share listed companies that conducted share buybacks in Shanghai and Shenzhen between 2013 and 2022 as the research sample and, based on previous theoretical studies on the hypothesis of the drivers of share buybacks, uses Logistic and OLS regression analysis to investigate the drivers of share buybacks in Chinese listed companies. The findings suggest that reducing information asymmetry, reversing market undervaluation, enhancing financial leverage, substituting cash dividend payouts to increase financial flexibility, managing free cash flow size, and reducing principal-agent costs are the main motivations for firms to engage in share repurchases. These motivations further verify the validity of the information effect hypothesis, the financial effect hypothesis, and the cash flow effect hypothesis in the Chinese capital market. To ensure the robustness of the results, this paper conducts a robustness test of the repurchase results by adding lagged terms, replacing explanatory variables, and matching propensity scores according to the principle of

nearest-neighbour matching (PSM 1:4). The results are consistent with those of the main regression results, which excludes errors caused by a single analytical method.

Further ranking the importance of buyback motivators through the random forest model shows that among the various motivations for the share repurchase, share price synchronisation has the most significant effect. This implies that management is more inclined to conduct share repurchases when facing information effect problems. Except for the information asymmetry and PB ratio, the distributional characteristics of the rest of the driver variables do not show significant differences across groups. This paper suggests that the financial effect and cash flow effects have a stronger subjective randomness in determining whether Chinese firms choose to conduct share repurchases compared to the information effect. Furthermore, a company's operating conditions in the year before conducting a share buyback have a greater impact on its buyback decision than in the previous two years. In addition, the histograms of the variables show that when a company's stock price synchronisation ratio or PB ration is less than 0.3, reducing information asymmetry or enhancing market valuation through stock buybacks should become a strategic priority for the management of the company.

In summary, optimizing the information environment, managing free cash flow and increasing financial flexibility have a significant effect to drive the decision -making the stock repurchase behavior.

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8. Appendix

Appendix 1. Correlation table

Pairwise correlations

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)
(1) Repur	1.000														
(2) SumScale	0.820	1.000													
	(0.000)														
(3) time	0.971	0.815	1.000												
	(0.000)	(0.000)													
(4) Syn	-0.035	-0.040	-0.034	1.000											
	(0.000)	(0.000)	(0.000)												
(5) PBratio	-0.057	-0.076	-0.056	-0.110	1.000										
	(0.000)	(0.000)	(0.000)	(0.000)											
(6) Agen	0.008	0.005	0.007	-0.007	0.219	1.000									
	(0.194)	(0.398)	(0.262)	(0.289)	(0.000)										
(7) FCF	0.069	0.080	0.071	0.001	-0.012	0.040	1.000								
	(0.000)	(0.000)	(0.000)	(0.870)	(0.066)	(0.000)									
(8) EquiToAcce	0.013	0.015	0.012	-0.072	0.109	0.343	0.019	1.000							
	(0.038)	(0.018)	(0.047)	(0.000)	(0.000)	(0.000)	(0.003)								
(9) DivRat	0.016	0.021	0.015	0.027	-0.064	0.075	0.063	0.164	1.000						
	(0.012)	(0.001)	(0.017)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)							
(10) Size	0.063	0.046	0.063	0.250	-0.356	-0.303	-0.013	-0.543	-0.033	1.000					
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.038)	(0.000)	(0.000)						
(11) Board	-0.023	-0.012	-0.020	0.101	-0.113	-0.059	0.016	-0.150	0.017	0.263	1.000				
	(0.000)	(0.059)	(0.002)	(0.000)	(0.000)	(0.000)	(0.011)	(0.000)	(0.006)	(0.000)					
(12) Indep	0.021	0.011	0.019	0.006	0.032	0.008	-0.002	0.008	-0.010	0.003	-0.563	1.000			
	(0.001)	(0.076)	(0.003)	(0.301)	(0.000)	(0.195)	(0.773)	(0.197)	(0.098)	(0.599)	(0.000)				
(13) Listage	0.031	0.042	0.032	0.124	-0.208	-0.112	-0.015	-0.343	-0.100	0.461	0.184	-0.036	1.000		
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.016)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)			
(14) Top	-0.067	-0.054	-0.065	0.080	-0.066	-0.096	0.068	-0.071	0.123	0.186	0.017	0.045	-0.044	1.000	
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.007)	(0.000)	(0.000)		
(15) Incentive	0.073	0.052	0.075	-0.061	0.104	0.037	-0.009	0.047	0.001	-0.034	-0.058	0.034	-0.174	-0.067	1.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.158)	(0.000)	(0.834)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	

Appendix 2 :Table for Regression result for independent variable of repurchase time (Robustness Test)

VARIABLES	(1) time	(2) time	(3) time	(4) time	(5) time	(6) time
L.Syn	-0.066***					
	(-7.11)					
L.PBratio		-0.005***				
		(-8.78)				
L.EquiToAcce			0.053***			
			(4.85)			
L.DivRat				0.026***		
				(3.63)		
L.Agen					0.036**	
					(2.15)	
L.FCF						0.213***
						(11.82)
L.Size	0.019***	0.014***	0.021***	0.017***	0.018***	0.019***
	(10.51)	(7.74)	(10.61)	(9.70)	(9.77)	(10.30)
L.Board	-0.042***	-0.046***	-0.045***	-0.047***	-0.046***	-0.050***
	(-3.53)	(-3.91)	(-3.86)	(-4.00)	(-3.92)	(-4.26)
L.Indep	0.018	0.015	0.008	0.008	0.007	0.006
	(0.44)	(0.37)	(0.19)	(0.20)	(0.17)	(0.15)
L.Listage	0.008***	0.007***	0.009***	0.008***	0.007***	0.007***
	(3.47)	(2.94)	(3.74)	(3.71)	(3.32)	(3.09)
L.Top	-0.001***	-0.001***	-0.001***	-0.001***	-0.001***	-0.001***
	(-8.33)	(-8.33)	(-8.60)	(-8.92)	(-8.45)	(-9.85)
Incentive	0.021***	0.026***	0.022***	0.022***	0.022***	0.023***
	(3.14)	(3.89)	(3.34)	(3.36)	(3.32)	(3.24)
Constant	-0.247***	-0.135***	-0.333***	-0.225***	-0.240***	-0.233***
	(-5.78)	(-3.04)	(-6.86)	(-5.28)	(-5.47)	(-5.49)
Observations	18,979	18,979	18,979	18,979	18,979	18,979
F-test	34.38***	39.97***	31.00***	29.99***	29.01***	42.37***
R-squared	0.019	0.019	0.017	0.017	0.017	0.023
Induatry FE	Yes	Yes	Yes	Yes	Yes	Yes

Robust t-statistics in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Appendix 3 (1) : Regression results of the lagged 2-period multinomial regression
--- (Robustness Test)

VARIABLES	(1) Repur	(2) Sumscale	(3) Repur	(4) Sumscale	(5) Repur	(6) Sumscale
	L2.Stock price synchronicity		L2.PBratio		L2.Equity Ratio	
L2.Syn	-0.835***	-0.071***				
	(-5.09)	(-4.63)				
L2.PBratio			-0.035**	-0.009***		
			(-2.55)	(-11.59)		
L2.EquiToAcce					1.714***	0.064***
					(8.47)	(3.62)
L2.Size	0.373***	0.019***	0.333***	0.011***	0.475***	0.021***
	(13.14)	(7.16)	(11.49)	(4.10)	(15.05)	(7.22)
L2.Board	-0.966***	-0.051***	-1.006***	-0.055***	-1.002***	-0.053***
	(-5.12)	(-2.80)	(-5.35)	(-3.03)	(-5.26)	(-2.94)
L2.Indep	-1.175*	-0.025	-1.274*	-0.023	-1.342*	-0.037
	(-1.68)	(-0.37)	(-1.83)	(-0.35)	(-1.90)	(-0.54)
L2.Listage	-0.243***	0.014***	-0.260***	0.012***	-0.233***	0.015***
	(-5.25)	(4.06)	(-5.52)	(3.49)	(-4.98)	(4.22)
L2.Top	-0.021***	-0.001***	-0.021***	-0.001***	-0.022***	-0.001***
	(-9.56)	(-6.52)	(-9.48)	(-6.18)	(-9.81)	(-6.66)
L.Incentive	-0.003	0.017*	0.032	0.024**	0.008	0.018*
	(-0.03)	(1.78)	(0.35)	(2.46)	(0.08)	(1.90)
Constant	-7.572***	-0.198***	-6.840***	-0.009	-11.199***	-0.312***
	(-8.98)	(-3.10)	(-7.81)	(-0.14)	(-11.64)	(-4.17)
Observations	14,273	14,273	14,273	14,273	14,273	14,273
Wald / F test	321.74***	18.76***	299.77***	31.41***	366.44***	18.29***
Pseudo/ R-squared	0.0393	0.012	0.0372	0.015	0.0444	0.011
Induatry FE	Yes	Yes	Yes	Yes	Yes	Yes

Robust z-statistics in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Appendix 3 (2) : Regression results of the lagged 2-period multinomial regression
--- (Robustness Test)

VARIABLES	(1) Repur	(2) Sumscale	(3) Repur	(4) Sumscale	(5) Repur	(6) Sumscale
	L2. Dividend Payout ratio		L2.Agency Cost		L2. FCF	
L2.DivRat	0.129	0.046***				
	(1.46)	(3.83)				
L2.Agen			1.057***	0.015		
			(4.26)	(0.56)		
L2.FCF					-0.128	0.295***
					(-0.37)	(9.28)
L2.Size	0.351***	0.022***	0.376***	0.017***	0.349***	0.017***
	(12.57)	(7.33)	(13.10)	(6.26)	(12.51)	(6.74)
L2.Board	-1.004***	-0.052**	-1.011***	-0.053***	-0.991***	-0.056***
	(-5.34)	(-2.52)	(-5.40)	(-2.94)	(-5.27)	(-3.13)
L2.Indep	-1.304*	-0.007	-1.361*	-0.035	-1.287*	-0.043
	(-1.87)	(-0.09)	(-1.96)	(-0.52)	(-1.85)	(-0.63)
L2.Listage	-0.244***	0.006	-0.253***	0.014***	-0.246***	0.014***
	(-5.26)	(1.40)	(-5.47)	(3.99)	(-5.32)	(4.04)
L2.Top	-0.021***	-0.002***	-0.021***	-0.001***	-0.021***	-0.001***
	(-9.63)	(-8.18)	(-9.51)	(-6.51)	(-9.54)	(-7.08)
L.Incentive	0.010	0.062***	-0.003	0.018*	0.011	0.020**
	(0.11)	(5.06)	(-0.04)	(1.89)	(0.11)	(2.05)
Constant	-7.403***	-0.261***	-8.016***	-0.182***	-7.361***	-0.180***
	(-8.78)	(-3.62)	(-9.34)	(-2.71)	(-8.74)	(-2.83)
Observations	14,273	14,273	14,273	14,273	14,273	14,273
Wald/ F test	296.17***	21.06***	308.57***	17.04***	294.09***	23.93***
Pseudo/R-squared	0.0365	0.014	0.0383	0.010	0.0363	0.017
Induatry FE	Yes	Yes	Yes	YES	Yes	YES

Robust z-statistics in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Appendix 4 :PSM Regression Result for Information Effect Hypothesis

VARIABLES	(1) Repur	(2) Repur	(3) Sumscale	(4) Sumscale	(5) Repur	(6) Repur	(7) Sumscale	(8) Sumscale
	PSM:Stock price Synchronicity				PSM: P/B ratio			
L.Syn	-0.505***	-0.447***	-0.105***	-0.117***				
	(-3.37)	(-2.80)	(-3.84)	(-4.02)				
L.PBratio					-0.053***	-0.082***	-0.012***	-0.012***
					(-3.96)	(-4.93)	(-8.34)	(-7.47)
L.Size		0.108***		0.015***		0.068**		0.007
		(3.68)		(2.88)		(2.22)		(1.34)
L.Board		-0.068		-0.046		-0.130		-0.056*
		(-0.35)		(-1.40)		(-0.67)		(-1.71)
L.Indep		0.372		-0.140		0.304		-0.154
		(0.54)		(-1.18)		(0.44)		(-1.29)
L.Listage		0.033		0.041***		-0.008		0.035***
		(0.70)		(5.47)		(-0.16)		(4.74)
L.Top		0.000		-0.001*		-0.000		-0.001*
		(0.03)		(-1.72)		(-0.04)		(-1.85)
Incentive		0.162**		0.009		0.220***		0.018
		(2.07)		(0.62)		(2.77)		(1.26)
Constant	-0.966***	-4.543***	0.149***	-0.107	-0.996***	-3.363***	0.145***	0.105
	(-14.52)	(-5.23)	(11.23)	(-0.90)	(-19.28)	(-3.71)	(16.27)	(0.84)
Observations	5,919	5,919	5,919	5,919	5,919	5,919	5,919	5,919
Wald / F test	11.33***	100.84***	14.75***	10.56***	15.70***	120.60***	69.54***	16.12***
Pseudo/R-squared	0.0017	0.0164	0.003	0.014	0.0001	0.0210	0.006	0.016
Induatry FE	No	Yes	No	Yes	No	Yes	No	Yes

Robust z-statistics/ t-statistics in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Appendix 5:PSM Regression Result for Cash Flow Effect Hypothesis

VARIABLES	(1) Repur.No	(2) Repur	(3) Sumscale	(4) Sumscale	(5) Repur	(6) Repur	(7) Sumscale	(8) Sumscale
	PSM Agent Cost				PSM Free Cash Flow Ratio			
L.Agen	0.601**	0.379	0.055	0.064				
	(2.53)	(1.44)	(1.17)	(1.25)				
L.FCF					1.124***	1.251***	0.457***	0.487***
					(3.29)	(3.63)	(7.66)	(7.98)
L.Size		0.107***		0.014**		0.104***		0.015***
		(3.60)		(2.53)		(3.58)		(2.81)
L.Board		-0.097		-0.052		-0.112		-0.059*
		(-0.50)		(-1.59)		(-0.58)		(-1.79)
L.Indep		0.270		-0.161		0.316		-0.150
		(0.39)		(-1.35)		(0.46)		(-1.26)
L.Listage		0.025		0.039***		0.028		0.040***
		(0.54)		(5.32)		(0.60)		(5.36)
L.Top		-0.000		-0.001*		-0.001		-0.001**
		(-0.05)		(-1.87)		(-0.28)		(-2.39)
Incentive		0.163**		0.010		0.171**		0.012
		(2.08)		(0.68)		(2.17)		(0.83)
Constant	-1.260***	-4.683***	0.098***	-0.107	-1.184***	-4.534***	0.101***	-0.110
	(-26.18)	(-5.34)	(10.96)	(-0.86)	(-37.99)	(-5.21)	(19.27)	(-0.92)
Observations	5,919	5,919	5,919	5,919	5,919	5,919	5,919	5,919
Wald/F-test	6.41***	93.15***	1.36	8.92***	10.85***	102.58***	58.70***	14.27***
Pseudo/R-squared	0.0009	0.0155	0.000	0.011	0.0018	0.0173	0.010	0.023
Induatry FE	No	Yes	No	YES	No	Yes	No	YES

Robust z-statistics/ t-statistics in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Appendix 6:PSM Regression Result for Financial Effect Hypothesis

VARIABLES	(1) Repur	(2) Repur	(3) Sumscale	(4) Sumscale	(5) Repur	(6) Repur	(7) Sumscale	(8) Sumscale
	PSM Equity Ratio				PSM Dividend Payout ratio			
L.EquiToAcce	1.178***	1.701***	0.043	0.145***				
	(7.52)	(8.09)	(1.59)	(3.98)				
L.DivRat					0.401***	0.390***	0.058**	0.069***
					(4.10)	(3.91)	(2.30)	(2.72)
L.Size		0.215***		0.022***		0.103***		0.013**
		(6.60)		(3.85)		(3.54)		(2.45)
L.Board		-0.086		-0.050		-0.119		-0.056*
		(-0.44)		(-1.53)		(-0.61)		(-1.70)
L.Indep		0.413		-0.147		0.270		-0.160
		(0.59)		(-1.23)		(0.39)		(-1.34)
L.Listage		0.048		0.042***		0.034		0.041***
		(1.02)		(5.57)		(0.73)		(5.53)
L.Top_		-0.000		-0.001*		-0.001		-0.001**
		(-0.17)		(-1.94)		(-0.51)		(-2.33)
Incentive		0.167**		0.010		0.160**		0.009
		(2.11)		(0.70)		(2.04)		(0.65)
Constant	-1.866***	-8.202***	0.081***	-0.382***	-1.292***	-4.591***	0.089***	-0.089
	(-18.82)	(-8.20)	(4.93)	(-2.77)	(-29.55)	(-5.29)	(10.02)	(-0.74)
Observations	5,919	5,919	5,919	5,919	5,919	5,919	5,919	5,919
Wald/ F-test	56.62***	155.89***	2.53	10.57***				
Pseudo/R-squared	0.0082	0.0250	0.000	0.014			0.002	0.013
Induatry FE	No	Yes	No	Yes	No	Yes	No	Yes

Robust z-statistics/ t-statistics in parentheses

*** p<0.01, ** p<0.05, * p<0.1