ERASMUS UNIVERSITY ROTTERDAM

ERASMUS SCHOOL OF ECONOMICS

MSC Economics & Business

Master Specialisation Financial Economics

Abnormal stock performance following repurchase activity in China

Motives and price performance in the Chinese domestic stock market

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Acknowledgements

I would like to show my appreciation and gratitude to those who have supported me throughout the writing process of this thesis. The circumstances were quite abnormal since this thesis was written during the COVID-19 pandemic. First, I would like to thank my supervisor, Ms. Li, who has always been very supportive and provided me with the necessary data and help to finish this research successfully. Without her quick responses and clear answers, I would not have finished this thesis as successfully as I aimed to. In addition, I would like to thank my parents, girlfriend, and roommates, who have always been very loyal and were especially helpful during the period in which this thesis was written.

Abstract

This research studies short- and long-term price performances of Chinese stocks during the period 2010–2020. In addition, it is examined if the different main motivations relating to share repurchases hold. This market in particular is interesting to examine since the Chinese government changed its attitude towards buybacks from controversial to encouraging. The short-term sample consists of 1,149 repurchase announcements and the long-term sample of 1,232 actual repurchases. First, the abnormal returns are calculated for both the short- and the long-term. Subsequently, the relation with different firm-characteristics is studied. Negative pre-announcement abnormal returns are observed, in contrast to positive post-announcement abnormal returns relating to the short-term period. In addition, positive abnormal returns are documented in the long-term. The results of this study are not in line with the efficient market hypothesis. However, evidence is found for the overreaction hypothesis, return reversal, and the buyback anomaly. In addition, the book-to-market quintiles provide proof of the information-signalling motivation, even though the size quintiles do not confirm this completely. Moreover, the cash ratio supports the cash-flow motivation, but no evidence is found for the capital structure and dividend pay-out motivation. Lastly, it is not proven that non-experienced firms have higher returns than firms which have repurchased their stock multiple times.

Keywords: share repurchases, short- and long-term price effects, Chinese domestic A-share market, motives, Shenzhen and Shanghai Stock Exchange

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1 Introduction

Since the 1980s, the concept of repurchasing shares has gained popularity worldwide. Firms initiated these corporate events for various reasons, which in turn created a new research field in academic literature. In this thesis, the price performance after repurchase activity is studied in both the short- and long-terms. Furthermore, this thesis aims to find a relationship between firm characteristics regarding the main motivations for buybacks and the short-term cumulative abnormal returns (CARs). In addition, it studies the differences between firms repurchasing shares more frequently and those which only repurchase once. Lastly, this study seeks evidence supporting the information-signalling hypothesis in the long-term (Ikenberry et al., 1995).

Share buybacks are corporate events in which a firm's management exchanges shares outstanding for excess cash. This method has a positive effect on the investment value for the remaining shareholders since the company's value is divided by fewer shareholders. The company's value depends on the future performance and can be determined by discounting the future free cashflows, which subsequently depend on the firm's risk.

The efficient market hypothesis states that the market is not expected to react to new information published by firms as all information is already incorporated in market prices. The share prices therefore always reflect their fair and intrinsic value. Based on this hypothesis, one could expect that repurchase programmes would not affect share prices in the short- and long-terms. However, according to several studies (e.g., Vermaelen, 1981; Ikenberry et al., 1995; Peyer and Vermaelen, 2005; Rees, 1996; Zhang, 2005), a change in abnormal returns (ARs) can be observed at a repurchase. This contradicts the efficient market hypothesis.

This study researches the repurchases of domestic shares of Chinese firms listed on the Shanghai Stock Exchange (SSE) and the Shenzhen Stock Exchange (SZSE). Most Chinese companies have a different share structure than the majority of Western firms. This split structure distinguishes A-shares, targeting Chinese investors, and B-shares, targeting foreign investors. Share repurchases in China comprise a relatively new field in academic literature since the Chinese government have traditionally been conservative towards this method. However, since 2018, the authorities have been actively stimulating firms to buy back shares by changing regulation, which can be seen in the increased number of such programmes initiated by Chinese companies (figure 1). This study focusses on the period between the global financial crises and the Covid-19 recession. During this time, interest rates were low, making it cheap for firms to borrow. Therefore, more money was available, which boosted the economy. The debt markets were increasingly tapped to fund buybacks, stimulated by these low-interest rates (Bloomberg, 2019). This study is the first to assess the impact of the prices in the short- and long-terms on the Chinese stock market during this sample period.

This research first examines the short-term ARs for different event windows. Various studies have found positive short-term returns after repurchasing announcements (Vermaelen, 1981; Ikenberry

et al., 1995; Stephens and Weisbach, 1998; Grullon and Michaely, 2004; Lie, 2005; Peyer and Vermaelen, 2002; Zhang 2002; Gan et al., 2017; Yang et al., 2020). As far as the research showed, only the studies by Gan et al. (2017) and Yang et al. (2020) examined the short-term effects in China and found small positive returns. However, their research was based on a small and outdated dataset. Since the market of the largest Asian country has developed quickly and their administration have started stimulating the repurchase programmes, this thesis constitutes an addition to the existing literature.

The first objective of this study is therefore to examine the short-term returns. The study by Gan et al. (2017) has analysed specific determinants of share repurchase in the Chinese market from 2000 to 2012. They have concluded that the market is responding most favourably to buybacks made by high-growth and undervalued companies (Gan et al., 2017). Nonetheless, their findings did not prove that share buybacks from state-owned shareholders yield higher CARs in the short-term. A potential reason for this outcome is that the sample size was too small. Prior studies have indicated that managers have different motives for initiating a repurchase programme, as explained in section 2.1. To analyse these motives, various firm characteristics are studied throughout this thesis.

In addition to the short-term, long-term effects for Chinese firms remain unstudied. It is important to note that the short-term effects are studied directly around the announcement date; however the long-term effects are reviewed starting in the month following the actual repurchase. The studies by Ikenberry et al. (1995) and Peyer and Vermaelen (2005) have found positive ARs in the long-term for US stocks. In contrast, Zhang (2005) has shown negative long-term returns following actual buybacks in the Hong Kong Stock Exchange. Since the Hong Kong stock market is closely related to the Chinese stock markets, it is insightful to study the long-term price performance of Chinese stocks after actual repurchases. Moreover, this thesis explores the differences in ARs between frequent and infrequent repurchase companies and analyses if managers try to send an information signal relating to undervaluation of their stock in the long-term.

These various queries are researched within a new timeframe with a recent dataset. The abovementioned goals further lead to the following main research question: *What is the effect of share repurchasing in the Chinese stock market, and for which motivations can evidence be found?*

This research question is answered using two datasets retrieved from the CSMAR repurchase database, consisting of 6,252 announcement dates and 4,677 actual repurchases. For both sets, additional information has been retrieved from several databases to address the hypotheses. The modification of both sets is further explained in section 3.2. For the short-term effects, papers by Zhang (2005), Gan et al. (2017), and Yang et. al. (2020) are used as a basis. Additionally, the study by Peyer and Vermaelen (2009) is used as a starting point for the long-term effects.

The remainder of this thesis is structured as follows: The second chapter focusses on the theoretical framework behind the stock buybacks and provides a clear overview of the existing literature. It also constructs several hypotheses to answer the research question above. In chapter 3, the

data are discussed, as well as the manipulation of the dataset and the descriptive statistics. Chapter 4 describes the methodology and the framework behind the calculation of the price analyses performed for this study. In chapter 5, the results are outlined and interpreted. Lastly, in chapter 6, the study is summarised and concluded before stating the limitations and recommendations for future research.

2 Theoretical framework

2.1 Motivations for share buybacks

A broad set of motives for buybacks is discussed in the academic literature on share repurchases. The different motives are introduced in this chapter, and an overview per hypothesis is given based on prior academic literature. It is important to note that a specific motive does not necessarily overturn the other motives. This study focusses on the main hypotheses described in the following sections.

2.1.1 Information-signalling hypothesis

Information signalling is one of the best-known motives for share repurchases, according to several studies. Jagannathan and Stephens (2003) have described two different types of signalling. The first type relates to undervaluation of the firm's shares, making it a cheap possibility for management to buy their own shares. The second concerns management's aim to inform the market about the positive future performance of the firm in terms of generating cashflow.

In principle, the signalling hypothesis is based upon the economic concept of asymmetric information (Ikenberry et al., 1995). This follows from the fact that managers have more inside information than outside investors. Since it is relatively cheap to execute repurchase programmes, managers can profit from undervaluation. As managers are aware of the internal processes and have more information than public investors, they can better predict the future free cashflows and consequently make a better estimation of the current share price (Vermaelen, 1981). On the other hand, executives could argue that stock prices are not high enough. Positive ARs over a more extended period would correct this. Ikenberry et al. (1995) have found positive ARs in the four years after the buyback. They have concluded that following a repurchase, the price does not adjust enough in the short-term to represent the actual value of the company (Ikenberry et al., 1995). Hillert et al. (2016) have shown in their study that when share prices exactly represent their fundamental value, no ARs are observed. However, positive ARs are detected after repurchase announcements when share prices decrease below the actual value.

Thus, if the share price is too low compared to the actual performance of the company from the perspective of the manager, the company could engage in buybacks. Several studies have shown that the ARs after repurchase announcements have been positive. Researchers have also proven the relationship between undervaluation and announcement returns in different markets (Vermaelen 1981; Comment and Jarrel, 1991; Stephens and Weisbach, 1998; Ikenberry et al., 1995); however, the Chinese market is yet a relatively unexplored field due to recent changes in legislation. This Asian market is different from the Western market in various aspects, which are explained later in this thesis.

2.1.2 Cashflow hypothesis

The free cashflow (FCF) motivation is based on the principal-agent theory, best explained by Jensen (1986). The FCF is the cash which remains after all the positive net present value (NPV) projects are paid for and consequently discounted at the cost of capital (Jensen, 1986). Since managers act on the behalf of shareholders, they can be considered as the agent and the investor as principal. This separation in ownership and control results in different preferences—in other words, agency conflicts. Such conflict can arise if excess cash is available to the manager, mainly in mature firms. Since managers' incentives are often based upon the growth or size of the company, they are incentivised to undertake all projects. Empire-building is the name for the situation when managers grow the firm as large as possible, even when this results in undertaking negative NPV projects. This is harmful to the shareholders as they would fare better if the cash spent on negative NPV projects was distributed. The FCF hypothesis states that shares are repurchased to maximise shareholder value, which sends a positive signal to investors (Jensen, 1986). Grullon et al. (2002) have further explained that lower agency costs and less risk follow from preventing overinvesting and reduced control of the agent. Several studies (Lo et al., 2008; Grullon and Michaely, 2004; Jagannathan and Stephens, 2003); Nahel and Tarhan, 1998) have found evidence for this motive.

2.1.3 Capital structure hypothesis

All companies have an optimal capital structure. This ideal structure can be reached by adjusting the amount of debt relative to the amount of equity. This hypothesis reflects this process and covers the cash distribution to achieve this optimal structure. Dittmar (2000) has stated that managers repurchase shares to achieve this optimal structure. This consequently affects the amount of equity since the number of shares outstanding decrease. Firms must create an optimal position regarding their costs and obtain as many benefits as possible. Due to information asymmetry and financing costs, this optimal target leverage ratio is not always obtained. Warr et al. (2012) have concluded that the concept of adjustment costs plays a role when a company moves to their optimal leverage ratio. The trade-off theory indicates that this ratio can be reached by buying back shares.

In addition to the trade-off theory, a second concept regarding the capital structure hypothesis is the market timing theory. This concept focusses primarily on equity. It introduces the method of mispricing and the fact that managers can use this by issuing and repurchasing equity. Overvalued firms' stock prices react quicker than undervalued firms' stock prices, from which it can be stated that executives use the concept of mispricing.

2.1.4 Dividend substitution hypothesis

The dividend substitution hypothesis concludes that companies face a trade-off if they distribute cash employing dividends or perform pay-outs in the form of repurchases. Miller and Modigliani (1961) have stated that share buybacks and dividends are substitutes when the market is a perfect, complete

capital market. However, other researchers have found evidence against Miller and Modigliani's findings; for instance, John and Williams (1985) and Allen et al. (2000) have concluded that mainly institutional investors prefer dividends over buybacks. Since these large institutions have access to more data, it is easier for an institution to detect over- or undervaluation compared to individual investors. Voss (2012) has argued that the preferred route to distribute cash for a long time in history has been employing dividends instead of share repurchase programmes. However, a shift towards share repurchasing has become slowly recognisable over the years. Grullon and Michaely (2002) have partly assigned this shift to tax treatment, which is more advantageous for capital gains. When dividends are distributed, a dividend tax is incurred. However, when shares are repurchased, the share price increases due to the demand-and-supply principle. When the investor sells shares, capital gains are realised.

A second reason is given by Grullon and Michaely (2002), who have stated that managers sometimes prefer a buyback programme over a dividend pay-out model because a share repurchase programme is more adaptable. This is due to the nature of dividends, a commitment which can be difficult to reverse.

2.1.5 Price-support hypothesis

The undervaluation form of the information-signalling hypothesis is strongly linked to the price-support hypothesis but is different in the sense that managers repurchase stock when a decline is observed (Busch and Obernberger, 2017). Therefore, the hypotheses are not completely similar; the undervaluation hypothesis states that buyback programmes are initiated when the share is valued below the intrinsic value. However, the price-support hypothesis presumes that executives repurchase the shares when a decline is observed in the short-term since the price converges to the fundamental value over a more extended period. Busch and Obernberger (2017) have concluded that the prices of stocks are lower on the days when the company buys back shares compared to previous non-repurchase days.

2.1.6 Market-timing ability

Market-timing ability is best explained as managers thinking they can time the market. When they are making repurchases, they are, according to this concept, able to evaluate and observe if the share price has reached a low point. Therefore, the price of the stock on repurchase days should be lower than on days when firms are not repurchasing. However, it is still unclear whether managers can time the market and outperform it simultaneously. Several studies have tried to determine if managers can outperform the market this way; however, researchers are locked in debate (Dittmar and Field, 2015).

2.1.7 Takeover-deterrence hypothesis

Bagwell (1991) has illustrated that the supply curve of stocks has an ascensional sloping form. He has concluded that a repurchase price will be higher when more shares are repurchased. Therefore, the acquisition costs increase. This follows from the fact that the shareholders who are willing to offer the shares they have in possession are in general the equity holders who have the lowest valuation of the company (Bagwell, 1991). The share price can therefore be increased if shares are repurchased. From this perspective, as the name of this hypothesis implies, repurchases can be used as a method to deter an acquisition. Buybacks help to protect from unwanted takeover attempts. The target firm can repurchase a small portion of the (cheapest) shares, which will cause an increase in stock price of the remainder of the shares. In a takeover, the acquirer must own more than half of the total number of shares. Since the target already bought the inexpensive shares, costs increase for the acquirer. Dittmar's (2000) findings have shown that companies which are more likely to be acquired engage in share buybacks more often.

2.1.8 Managerial overconfidence

Manager overconfidence is a behavioural motive for share repurchases. Humans in general often think that they themselves are obtaining higher results than the average person. If bad results occur, they often believe that these are not caused by themselves and can be attributed to bad luck (Ben-David et al., 2007). Overconfidence can be observed in managers who assume their stock price is relatively low compared to their actual achievements. Therefore, they initiate a share repurchase programme to drive up prices (Ben-David et al., 2007). This overconfidence results in overestimating their capability and underestimating the risk which a company currently faces.

2.2 Regulatory background in China

This section provides an overview of the regulatory background of the repurchase environment in China. This is particularly important for this research since the history of the stock market regulation in China is different from Western countries and has changed over the years. In the following sections, an overview is given to obtain the required and relevant knowledge. First, the development of company law is elaborated, followed by descriptions of the share structure and state-owned enterprises.

2.2.1 Development of company law

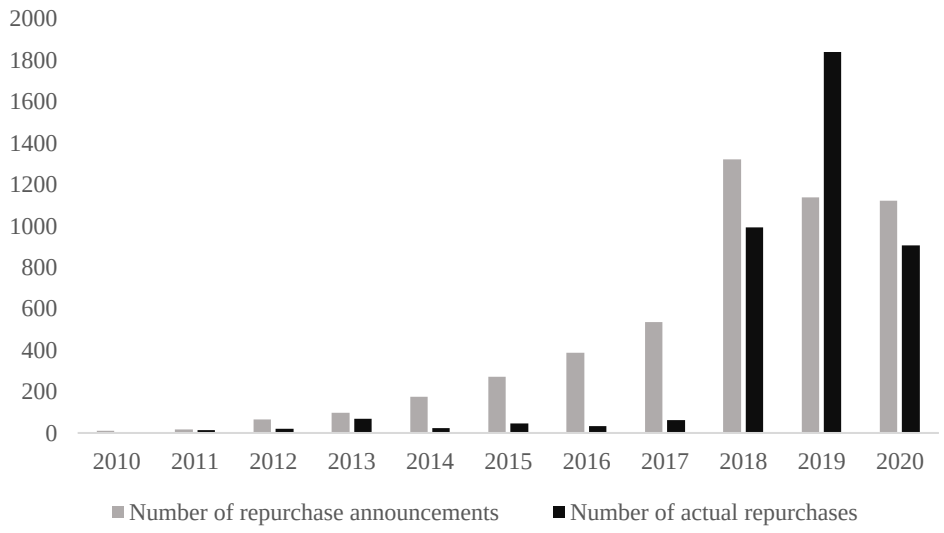
Yelin et al. (2016) have divided the development of share repurchasing in China into three periods: (1) the initial stage (1992–2005), (2) growth stage (2005–2008), and (3) development stage (2008–2018). Share repurchasing became legal and subject to Chinese company law in 1993; however, it had stringent restrictions. Share repurchases were only allowed if a firm had as a goal capital reduction or wanted to engage in mergers or acquisitions (Article 149) (Yang et al., 2020).

In 1994, the first company, Great Yu Gardens, initiated a share buyback programme. Soon after, new legislation with specific requirements was developed by regulators. At that time, repurchase programmes were rare, but several other Chinese companies followed suit and started buyback programmes. Firms in the Western markets were already actively repurchasing their shares.

In the growth stage, this legislation further developed, and specific aspects were added to the law. During the growth stage, the 'non-tradable shares reform' was created, and in parallel, these non-tradable shares slowly started to disappear. The next chapter further elaborates on these non-tradable shares. The update to the repurchase programme was intended to act as an extra stimulus in the rapidly developing Chinese domestic financial market (Yelin et al., 2016). Share repurchases also became available as an employee share award (Article 143) (Yang et al., 2020).

From 2008 onwards, the development stage started, and companies were slowly encouraged to engage in buyback programmes. This was done by evaluating the existing legislation by governmental institutions. As a result, the number of firms making repurchases increased substantially. From 2007 to 2011, 40 firms initiated buyback programmes. This increased to 60 in 2013, 78 in 2014, 165 in 2015, and the growth has continued, as seen in figure 1.

Figure 1: Frequency of share repurchase announcements and actual repurchases



Source: Dataset from CSMAR and own calculations

From 2018 since, the government has been actively supporting repurchase programmes, and a new stage has started: (4) the adolescent stage.At the beginning of the adolescent stage, company law was revised again and allowed firms to make open-market share repurchases after broadening the share repurchase scenarios. It also simplified the decision-making procedure and extended the exercise period of the buyback. The revision changed the wording from the prior regulation, making it more attractive to engage in buyback programmes. In addition to existing reasons, open-market buyback

programmes were allowed from 2018 onwards to protect shareholders' interests and firm value. Moreover, several previously introduced restrictions were cancelled, such as restrictions on repurchase amounts and repurchase capital (Article 142) [Yang et al., 2020]. This strongly encouraged companies to engage in buyback programmes, which can be seen in the number of repurchases undertaken by Chinese firms.

It could be summarised that the government only allowed repurchases for a specific set of goals before 2018. Firms must have had as a goal to lower a firm's capital or merge with another firm which holds its stock. Another admissible motivation was to use shares for employee stock ownership plans or equity incentives and to purchase the shares held by an objecting shareholder in the shareholders' meeting (Yang et al., 2020). Additionally, the money spent must consist of earlier profits to restrict the company from becoming unhealthy.

As noted from the adjustments in company law, the government changed their attitude from restrictions to encouragement. This enabled firms to have more freedom in the way they managed capital. De Cesari et al. (2011) have argued that repurchased shares could be used to increase stock liquidity and smooth the price discovery. By making repurchases easier, the flexibility of Chinese firms increased, and the repurchase market grew accordingly.

2.2.2 Share structure and state-owned enterprises

Before the 1980s, most firms in China were state-owned enterprises (SOEs). The number of SOEs decreased; however, one-third of the listed firms today are SOEs. These companies account for two-thirds of the total market capitalisation (Jiang and Kim, 2020). The first step away from this SOE structure was the start of two exchanges: the Shanghai Stock Exchange (SSE) and the Shenzhen Stock Exchange (SZSE), both established in 1990. The split share structure was used: domestic investors traded A-shares, and B-shares dominated in foreign currency and were reserved for foreign investors (e.g. for listings on exchanges abroad; Beltratti et al., 2012). This split structure of shares is common worldwide and typically assigns different rights to different investors (Faccio and Lang, 2002).

A-shares were further divided into two types: tradable and non-tradable shares. Holders of non-tradable shares were entitled to the same privileges as holders of tradable shares. These privileges, for example, consisted of cashflow rights and voting rights. Typical holders of non-tradable shares were government-related officials. Using this structure, the government could remain involved in businesses and could influence decisions.

Non-tradable shares owned by the Chinese government caused several conflicts of interest. These problems were addressed by Beltratti et al. (2012), who stated that the non-tradable shares obstructed the market principle for corporate control since the ratio between non-tradable shares and tradable shares was too large. Therefore, public investors did not have enough power to influence management decisions. Second, non-tradable shares were not for sale. Thus, non-tradable shareholders were relatively neutral towards increases or decreases in price. Beltratti et al. (2012) cite a third

reason: that the limited free float of the domestic market caused illiquidity and volatile markets, which discouraged investors. The fourth reason specified in their article is that this inefficiency resulted in listings of Chinese companies abroad, for example, at the Hong Kong exchange (H-shares). This led to the fact that domestic investors could not invest in the best companies and could only participate in firms which performed relatively worse (Beltratti et al., 2012).

The above reasons have resulted in a non-optimal governance structure which causes lower performance of firms. The Chinese government recognised this and, in the Fourth Plenary Session of the 15th CPC Central Committee, implemented the 'Decision of the CPC Central Committee on the reform of state-owned enterprises and development decisions on major issues'. Due to this decision, large state-owned companies could reduce the state-owned shares further to develop the company's performance (Huang, 2010). The decrease in the number of state-owned shares boosted the earnings per share. From a government perspective, this was advantageous as well since the value of their assets increased due to larger cashflows. From the view of the individual investor, this was a significant advantage due to reasons explained earlier. Because of the withdrawal of state-owned shares, listed firms can improve their business and make it more efficient. From an investor perspective, this leads to better understanding of the firm as government interference decreased. Therefore, it becomes easier to assess the company's actual value, which subsequently leads to maximising its market value (Huang, 2010).

2.3 Price behaviour

The primary goal of this thesis is to examine the short- and long-term effects after buyback events. With perfect capital markets, it does not matter if a firm pays dividends or engages in repurchase programmes (Miller and Modigliani, 1961). However, it has been proven that this does not hold in reality. In this section, the effects on prices after repurchases are explained, and the concept of return reversal is introduced.

2.3.1 Short-term effects following repurchase announcements

The efficient market hypothesis states that stock prices directly adjust to the value of the company after information has been made public. If the price of an asset is not adjusted directly, this theory is violated. Evidence has illustrated that this is the case since positive returns after share repurchases have been observed in several studies (Vermaelen, 1981; Ginglinger and L'her, 2006); Zhang, 2002).

Many researchers have studied the short-term effects in various markets with different timeframes, mainly focussing on Western markets. The US market is most researched in literature, for example, the study by Vermaelen (1981) with a sample period of 1970–1978. He found a positive CAR with regards to the price performance following repurchase announcements in the short-term in the United States, just like Stephens and Weisbach (1998) and Peyer and Vermaelen (2009), amongst others. Other studies focussed on different markets: Rau and Vermaelen (2002) the UK market,

Ginglinger and L'her (2006) the French market, and Otchere and Ross (2002) the Australian market. However, fewer studies have observed the effects in Asian or other non-Western countries, but Zhang (2002) has documented the effects in Japan and Zhang (2005) in Hong Kong. In general, it could be stated from the above studies that the impact of announcing a buyback programme had a positive effect on the ARs of the observed companies.

Gan et al. (2017) have concluded that undervalued Chinese firms which are growing quickly have positive ARs after share repurchase announcements. More specifically, overvalued firms are expected to have negative market reactions after buyback announcements. Yang et al. (2020) have found small positive returns in the short-term for Chinese firms; however, the timeframe of their sample was only one year. To the best of the author's knowledge, no studies other than those described above have investigated the effect on stock prices after share repurchase announcements in the Chinese market. Table 1 includes a complete overview of prior studies.

Table 1: Overview of existing literature

This table provides an overview of earlier studies which have investigated the price performance after a share buyback announcement or actual share repurchase in the short- and long-terms.

Panel A: Price performance following announcement dates in the short-term

Country	Sample Period	Obs.	CAR	Window (day)	Author(s)
US	1970–1978	243	3.67%***	[-1, 1]	Vermaelen (1981)
	1980–1990	1239	3.54%***	[-2, 2]	Ikenberry et al. (1995)
	1981–1990	591	2.69%***	[-1, 1]	Stephens & Weisbach (1998)
	1980–1984	4442	2.72%***	[-1, 1]	Grullon & Michaely (2004)
	1981–2000	4729	3.00***	[-1, 2]	Lie (2005)
	1991–2001	6471	2.38%***	[-1, 1]	Peyer & Vermaelen (2009)
UK	1985–1998	126	1.08%***	[-2, 2]	Rau & Vermaelen (2002)
Japan	1995–1999	126	4.58%***	[-1, 2]	Zhang (2002)
Germany	1998–2003	262	5.86%***	[-1, 2]	Seifert & Stehle (2003)
Korea	1994–1999	268	1.60%***	[-1, 1]	Lee et al. (2005)
France	1994–2000	363	0.57%***	[0, 1]	Ginglinger & L'Her (2006)
	1997–2006	970	0.80%***	[-1, 1]	Andriosopoulos & Lasfer (2015)
Australia	1991–1999	100	4.30%***	[-2, 2]	Otchere & Ross (2002)
China	2000–2012	417	2.64%**	[-1, 1]	Gan et al. (2017)
China	2018–2019	503	0.02%***	[0, 1]	Yang et al. (2020)

Panel B: Price performance following announcement dates in the long-term

Country	Sample Period	Obs.	CAR	Window (year)	Author(s)
US	1980–1990	1239	12.14%***	4	Ikenberry et al. (1995)
	1991–2001	3481	24.25%***	4	Peyer & Vermaelen (2005)
Canada	1990–1998	1060	21.40%***	3	Ikenberry et al. (2000)

Table 1 continued

Panel C: Price performance following actual share repurchases in the short-term

Country	Sample Period	Obs.	CAR	Window (day)	Author(s)
US	1981–1990	882	0.30%***	[-2, 2]	Rees (1996)
Norway	1998–2001	318	0.88%***	[-1, 1]	Skjeltorp (2004)
Hong Kong	1993–1997	800	0.43%***	[0, 2]	Zhang (2005)
Australia	1991–1997	927	0.43%***	[0, 1]	Akyol & Foo (2013)

Panel D: Price performance following actual share buybacks in the long-term

Country	Sample Period	Obs.	CAR	Window (year)	Author(s)
Hong Kong	1993–1997	800	-1.10%	3	Zhang (2005)
Taiwan	2000–2003	123	6.29%	3	Su & Lin (2012)

2.3.2 Long-term effects

By publishing information, stock prices should theoretically adjust instantly. Thus, it is insightful to investigate if the stock price moves to the actual value after a repurchase signal or if abnormal long-term effects can be observed after the actual repurchase. In the US market, announcements are not commitments to make an actual repurchase. More specifically, actual repurchase data are not observed, and therefore they cannot be measured. However, Chinese firms are obliged to publish their actual repurchase data. This provides valuable information, which is analysed in this thesis.

The buyback anomaly is best described by ARs which remain in existence for the long-term. Peyer and Vermaelen (2009) have found significant long-term ARs for their US sample after announcements which were positive. Ikenberry et al. (1995) and Ikenberry et al. (2000) also studied the long-term effects after announcement dates and found significant positive ARs. Fu and Huang (2016) have documented that the buyback anomaly existed until 2002. After this specific year, no ARs were observed in the long-term. They attribute this to the increased efficiency of the stock markets, rapidly increasing technology, and declining trading costs. Additionally, institutional ownership grew, which resulted in higher price efficiency.

The above studies focussed on the long-term effects after announcements. However, in this study, the long-term effects after actual repurchases are analysed. Zhang (2005) did not find evidence for the buyback anomaly. In his sample, repurchasing firms did not outperform the market in the long-term. However, small firms with high book-to-market values responded positively towards actual repurchases in the long-term (Zhang, 2005). This is important information as it indicates that inside managers make use of the good investment hypothesis, which states that executives repurchase shares when they perceive their shares as undervalued. Moreover, Ikenberry et al. (2000) have found a CAR of 7% per year in their Canadian sample, and Chan et al. (2004) have concluded that their ARs were

also positive. These positive returns were similarly found in the Hong Kong (Brockman and Chung, 2001) and UK stock markets (Oswald and Young, 2004).

Additionally, Su and Lin (2012) have determined that Taiwanese firms engaging in share repurchase programmes underperform the market before a buyback announcement. This suggests that an executive tries to signal to the market that the stock is undervalued or aims to utilise the undervaluation possibility. However, their long-term results were not positive or significant, and they do not expect that the primary reason for share buyback programmes is information signalling (Su and Lin, 2012). Dittmar (2000) has stated that the main reason for actual repurchases is undervaluation. However, other studies have not found evidence to support the signalling hypothesis (Bradford, 2008; Mitchell and Stafford, 2000; Lee et al, 2005). An overview of the price performance following repurchase events is given in table 1.

2.3.3 Return reversal

If the price of a stock overreacts when the public has received new information, this stimulus will consequently revert, according to Shiller (1984) and Stiglitz (1989). This concept is called return reversal, and it has been well studied over the years. Several studies have indicated that the prices overreact due to prior growth. In other words, a reversal is noticed because the price is not viable over time. The earnings-to-price, cash-flow-to-price, and book-to-market (BTM) ratios are indicators for firms which have experienced poor past performance. Companies with low ratios receive lower returns in the future, which can be linked to the concept of earnings growth mean reversal.

2.4 Firm characteristics related to repurchase motives

This section briefly introduces the different firm characteristics and ratios which are used throughout this thesis. Size, BTM ratio, and the returns of the prior six months are related to undervaluation and the information-signalling hypothesis. To study the cashflow hypothesis, Tobin's Q is used as a proxy for overinvestment, and a factor related to cash level is introduced. The debt-to-equity (D/E) ratio is used to research the capital structure hypothesis. Lastly, the cash-dividend-to-cashflow ratio relates to the dividend hypothesis.

2.4.1 Size

According to Vermaelen (1981), small companies are more likely to positively affect the CAR. This follows from the reasoning that a small firm's announcement contains more information than a large firm's announcement. Vermaelen (1981) has recorded that small firms are perceived by the market as companies more controlled by insiders when compared to larger firms. The additional information from a small listed company on the market is relatively more significant than the information to be released from a larger company. Since smaller firms generally have higher insider holdings, the repurchase mechanism can more efficiently signal the market about future events. This reflects the

information asymmetry theory. A second reason follows from the fact that sources of information such as newspapers often discriminate against smaller firms, which decreases their release of information. The third reason stated by Vermaelen (1981) is that institutional investors invest less in smaller firms, which does not contribute to the firms' share price.

Ikenberry et al. (1995) have compared the CAR based upon quintiles and found that the CAR of the largest quintile was 6.10% higher than that of the lowest quintile. Zhang (2005) has stated that smaller companies buy back stock to take advantage of the fact that these firms will have a stronger performance in the future. Simultaneously, a decrease in price is seen as a reason for a buyback of larger firms. Otchere and Ross (2002), Zhang (2002), and Firth and Yeung (2005) have found similar evidence. However, Gan et al. (2017), whose sample consisted of Chinese companies, saw no significant results in their study on the firms' size measured in gross sales. This finding is contrary to prior research.

2.4.2 BTM ratio

The BTM ratio reflects the book value of equity relative to the market value of equity. This is a common metric in literature to assess the undervaluation of a firm. Undervaluation supports the information-signalling hypothesis since managers expect higher prospects in the future and therefore try to signal the market. From this point on, firms with high BTM ratios are referred to as value stocks. Glamour stocks have low BTM values and are generally more overvalued. It is expected that value stocks have higher CARs and glamour stocks have lower CARs due to the fact that the former are usually more undervalued than the latter.

Zhang (2005) has studied the returns of the stock for the month after the repurchase and found significant results: a CAR of 1.90% for value stocks as opposed to a -2.78% CAR for glamour stocks. He also studied the long-term effects but did not obtain significant results. Moreover, based on the highest BTM quintile, he found that value firms have an AR of 20.66% over the three-year period (Zhang, 2005). Ikenberry et al. (1995) have also studied glamour and value stocks based on BTM ratio. Their research showed a long-term AR of 45.29% for value stocks. This is in contrast to the glamour stocks, for which a statistically insignificant AR of -4.31% was found. Lastly, Peyer and Vermaelen (2009) have studied the effect on the BTM ratio and saw a significant CAR of almost 29% in the long-term for value stocks. This is almost double the percentage for glamour stocks, which, at 14.87%, was not significant.

2.4.3 Tobin's Q

In addition to the cash ratio, Tobin's Q is studied here, following the papers by Grullon and Michaely (2004) and Nohel and Tarhan (1998). This proxy is an indicator of overinvesting and has a value between 0 and 1 if the firm is more likely to engage in overinvesting. The ratio can be defined as the market value of assets to the replacement cost of assets (Lang and Litzenberger, 1989). The aim of

these studies was to show that under specific assumptions, a value lower than 1 is a condition for a company to be categorised as an overinvesting firm. Grullon and Michaely (2004) have concluded that the reaction of the market to share repurchase announcements is larger for companies which are more likely to overinvest. Thus, when agency conflicts caused by overinvesting are more expected to occur, companies raise pay-out to equity owners by means of a buyback. This reduces agency costs.

However, Nohel and Tarhan (1998) have concluded that the performance of a firm only increased for mature companies. Therefore, a repurchase programme is initiated as managers have a goal to reduce the assets of the company, which leads to a positive price performance of the stock. This is also addressed by Lo et al. (2008), who found that a repurchase programme addresses agency problems, which consequently leads to higher ARs.

2.4.4 Cash ratio

This section expands on the second proxy used to study the cashflow hypothesis. Since share repurchases are mostly done with cash, the excessive cash is reduced, which consequently reduces the agency costs and risks, as documented by Oswald and Young (2004) and Nohel and Tarhan (1998). Prior literature has shown that if a company has a high FCF, this leads to an increased chance of engaging in share repurchases (Vafeas and Joy, 1995; Busch and Obernberger, 2016; Stephens and Weisbach, 1998). By dividing the cash and short-term investments by the total assets, a proxy is created. It is expected that firms with fewer and smaller investment opportunities have a higher chance to overinvest, as explained in section 2.1.2. The information regarding a decline in cash explains why the market sees this signal as positive.

2.4.5 Prior six-month returns

Companies which have suboptimal stock returns before a buyback are more prone to signal undervaluation to the market by means of a buyback programme, according to Ikenberry et al. (2000). When the shares of a company have displayed lower prices, and the company consequently repurchases shares, it can be seen as an undervaluation signal imposed by management. Ikenberry et al. (2000) have concluded that companies making buybacks in the lowest prior returns quintiles have the highest results in the long-term. The prior six months characteristic is incorporated in the short-term regression to study the effect of undervaluation and relates to return reversal, explained in section 2.3.3.

2.4.6 Debt-to-equity ratio

To test the capital structure hypothesis, the D/E ratio is studied. The D/E ratio is determined by dividing the company's total debt by their total equity at a specific point in time. If a company is buying back stock, this could adjust the D/E level. Companies with a high leverage ratio are less inclined to make repurchase announcements since a high level would possibly increase expected costs

incurred when going bankrupt. Furthermore, leverage also has an influence on the repurchase decision since the FCF is reduced (Jensen, 1986). Dittmar (2000) has argued that companies use share repurchases to change their D/E structure and reach the optimal leverage ratio. When a firm buys back their shares, it is financed by either decreasing the asset side or increasing the debt side on the balance sheet. To study if the capital structure hypothesis is applicable, the D/E level is investigated. It is projected that the D/E ratio is positively related to price performance.

2.4.7 Dividend ratio

According to the dividend substitution hypothesis, the price effects are greater when a buyback programme has a larger tax advantage than a dividend has. Thus, a negative impact is expected between the cash-dividend-to-cashflow ratio and the share buyback. Dividends and repurchases are seen as substitutes by Miller and Modigliani (1961); however, this is subject to several assumptions which do not hold in reality. Blouin et al. (2007) have explained that the preference of firms is based upon the cutback in taxes of dividends relative to the cutback in taxes of capital gains. By studying the dividend ratio, the presence of the related motive is investigated, and the relation to the returns is analysed. It is expected that non-dividend payers have higher ARs since they already paid dividends to the shareholders to distribute cash. Therefore, the lower the cash-dividend-to-cashflow ratio, the higher the ARs.

2.5 Hypothesis development

The literature review comprehensively elaborated on motives for share repurchases and variables of interest throughout this study. This thesis focusses on price performance and firm-specific characteristics relating to the short-term returns, investigates differences in frequency of buybacks, and studies information signalling in the long-term. Since literature on the Chinese market obtained contrary or insignificant results, it is interesting to research this market using a recent dataset. In the following sections, related hypotheses are developed to answer the central research question.

2.5.1 Short-term

The first hypothesis is developed to study the short-term price performance for different timeframes. Previous studies have proven that buybacks are often followed by positive ARs in the short-term. To determine this, an event study is conducted. For each company in the sample, the CAR is calculated around the announcement date. The estimation window is 150 days, and a general event window of (-10, 10) is established, with the announcement date as day 0. The event windows (-10, -1), (0, 2), and (0, 10) are applied. It is expected that the Chinese firms which announce the intention to repurchase stock have significant positive ARs in the short-term following the announcement date, based on the studies stated in table 1. This results in the following hypothesis: *H1: Companies which announce repurchase programmes experience positive ARs in the short-term.*

The next hypothesis is constructed to focus on the first characteristic which indicates information signalling. The firm's size (*SIZE*) can be used as a proxy to determine if smaller firms more frequently experience a positive increase in stock returns after a share repurchase. It is expected that smaller Chinese firms will have higher returns in the short-term, based upon the literature explained in section 2.4.1. Additionally, the relationship with the short-term CARs is examined. Size is measured as the market value of the company. The market value is the stock price multiplied by the number of shares outstanding and is used accordingly in this thesis. It is expected that smaller companies have higher ARs and the relationship with the CARs is negative. This leads to the following hypothesis: *H2: The market value of a firm is negatively related to short-term ARs following a share repurchase programme announcement.*

The BTM ratio is the second factor used as an indicator for undervaluation, as described in section 2.4.2. Since it is expected that managers try to inform the market that their shares are undervalued, it is likely that value stocks have higher returns. This thesis studies the relationship between the BTM ratio and the short-term CARs in the cross-section as well. It is expected that this variable explains a significant part of the short-term CARs and that the relation is positive. The ratio is described as the balance sheet value of the ordinary equity divided by the market value of the ordinary equity. To test this information-signalling characteristic, the following hypothesis is developed: *H3: The BTM ratio of a firm is positively related to short-term ARs following a share repurchase programme announcement*

The prior-six-months variable is included as a measure of undervaluation and relates to the overreaction phenomenon explained by Peyer and Vermaelen (2009). Firms which experienced bad stock performance are expected to signal undervaluation by means of a buyback. This variable is constructed by calculating the rolling average of the return of the 150 trading days before the announcement. It is expected that firms with low returns in the previous months have higher ARs and vice versa. Moreover, the prior-six-months variable is expected to have a negative relationship with the short-term ARs: *H4: The prior return of a firm is negatively related to short-term ARs following a share repurchase programme announcement.*

In addition, Tobin's Q is incorporated as a proxy for overinvesting and to test the cashflow motivation. The indicator is computed by dividing the total market value of the company by the total asset replacement value. A low Tobin's Q suggests that the firm has not had many opportunities for investments and consequently has a high chance to overinvest. Overinvesting results in negative ARs, and therefore a positive relationship is expected in the cross-section. This leads to the following hypothesis: *H5: The Tobin's Q of a firm is positively related to short-term ARs following a share repurchase programme announcement.*

As explained in section 2.4.3, a proxy for cash is generated. This proxy is calculated by adding cash to the short-term investments and subsequently dividing this by the sum of the total assets. This proxy is included to test the effect of the cashflow motivation. Firms with high cash levels are more

likely to engage in overinvesting. It is expected that overinvesting firms have negative ARs. In addition, the relationship in the cross-section is expected to be negative: *H6: The cash ratio of a firm is negatively related to short-term ARs following a share repurchase programme announcement.*

Moreover, the effect of D/E levels is studied to investigate the capital structure motivation. It is assumed that firms with higher leverage levels have higher ARs since this reduces the chance of overinvesting, and the firms have already reached the optimal leverage ratio. Therefore, the relationship with the CAR is expected to be positive. This results in the following hypothesis: *H7: The D/E ratio of a firm is positively related to short-term ARs following a share repurchase programme announcement.*

Finally, to study the impact of dividends on stock prices and, in parallel, the dividend substitution motivation, the cash-dividend-to-cashflow ratio is observed. It is reasoned that firms with low dividend ratios have higher ARs in the short-term than firms with high dividend ratios. It is likely that the proxy has a negative relationship with the short-term ARs: *H8: The dividend ratio of a firm is negatively related to short-term ARs following a share repurchase programme announcement.*

2.5.2 Long-term

The Chinese market data provide announcement dates and actual repurchase dates. The combination of these event dates is interesting since many countries do not require registration of the actual repurchase dates. The information signal released by the announcement should adjust stock prices to their actual value, and therefore no long-term effects should be observed. To assess whether this expectation holds, it is necessary to consider the price behaviour over a more extended period and study this buyback anomaly. The mean ARs are thus calculated for a period up to 48 months, starting after the actual repurchase month. This leads to the following hypothesis: *H9: Companies which engage in repurchase programmes experience significant positive ARs in the long-term.*

Consequently, the information-signalling variables are also studied in the long-term. More specifically, Dittmar (2000) has stated that the undervaluation form of the information-signalling hypothesis is the main motivation for repurchasing. Prior studies have focussed on the BTM ratio and the size of companies, which provided significant explanatory power for market performance. However, this remains unstudied in the Chinese market. The results help to evaluate if managers have the ability to determine whether their own stocks are a good investment. This leads to *H11: The BTM ratio of a firm is positively related to long-term ARs following actual share repurchases* and *H12: The market value of a firm is negatively related to long-term ARs following actual share repurchases.*

Lastly, the dataset is split into subsets, with firms repurchasing multiple times and firms which have only made one repurchase, by using a dummy variable. This study compares the full sample ARs of the group of firms which have repurchased multiple times with the infrequent repurchasing companies to examine differences in variances. From this, the next hypothesis can be stated: *H13:*

Companies which repurchase infrequently obtain higher ARs than companies which repurchase frequently.

The data used to test these hypotheses and the method of collection are further explained in the following chapter.

3 Data

This section elaborates on the data collection and development for this thesis. In section 3.1, the data collection is explained, and section 3.2 describes the manipulation. Subsequently, in section 3.3, the descriptive statistics are discussed to develop an overview of the data used.

3.1 Data collection

This study concerns the price effects around repurchase announcements and the long-term price effects after actual share repurchases. In addition, several characteristics related to buyback motives are evaluated in the short-term. Concerning the long-term study, the frequency of buybacks and characteristics relating to information signalling are analysed. The timeframe of this sample is from 2010 to 2020, the period between the subprime mortgage crisis and the beginning of the Covid-19 pandemic. The sample focusses on A-shares of Chinese companies. My supervisor, PhD candidate Ms. Li, provided several data files downloaded from the China Stock Market and Accounting Research (CSMAR) database and used as a basis for this study. This includes all repurchase announcements and actual repurchase months from 2006 to 2021.

After collecting the event dates, returns must be acquired to research the effects around and after the event dates. Therefore, daily stock data were retrieved to examine the price effects in the short-term. To cover the estimation windows from announcements made in early 2010, daily price data have been gathered since January 2009. The stock data were downloaded from the Eikon database. Since the sample consists of firms trading on the SZSE and SSE, market data have been retrieved from the CSMAR database, accessible via WRDS. What have been chosen are he SSE Composite A-share Index (000002) and the SZSE Composite A-Share Index (399107). To test the hypotheses, firm-specific data were acquired. The variables market value, market-to-book (MTB) value, Tobin's Q, cash and short-term investments, total value of assets, D/E ratio, and cash-dividend as a percentage of cashflow were downloaded from Eikon. The prior-six-months variable has been calculated using Stata. Lastly, the MTB value is converted to the BTM value by inverting the variable, in line with prior literature.

Concerning the long-term, stock data have also been obtained from the CSMAR database. The Fama and French factors were downloaded from the Kenneth R. French Data Library website. The Fama/French Asia Pacific ex Japan 3 Factors data file has been selected to retrieve the different factors, as explained in section 4.2. In addition, the risk-free rate (Chinese treasury bond) has likewise been retrieved from CSMAR. Lastly, monthly data regarding the market value and MTB ratio was obtained from Eikon. With the data gathered, all the hypotheses concerning the short- and long-terms can be tested.

3.2 Data manipulation

The research question was considered using two datasets retrieved from the CSMAR repurchase database, consisting of 6,252 initial announcement dates and 4,677 initial actual repurchases. This set of announcements comprised 2,086 individual companies. After deleting announcements relating to B- and H-shares, 6,195 events remained. The research period in this thesis is from 2010 to 2020. Therefore, only announcements within this timeframe were included, resulting in 5,093 event dates in total. Thereafter, the returns were downloaded and trimmed at the first and ninety-ninth percentiles. Following Zhang (2005), the first announcement of a firm in the period was used as the event date. The estimation period of the second event must began at least 10 days after the first announcement. After correcting for overlapping estimation windows, this resulted in 1,311 remaining announcement dates. Subsequently, Stata matched the repurchase data to the prices and calculated the ARs and the CARs accordingly. Then the data for the cross-sectional regression was manipulated. After deleting CARs with missing firm characteristics, a sample remained of 935 announcement dates. The long-term actual repurchase sample consisted of 904 firms making 4,677 actual buybacks. After correcting for the timeframe, 4,007 A-share actual repurchase events remained.

Stata is used to link the stock returns to the buyback announcements. Furthermore, it processed the market data and the Fama and French factors. Stata constructed quintiles based on the different variables, and the regressions and tests are also performed in Stata.

3.3 Descriptive statistics

Table 2 provides an overview of the initial datasets used for the short- and long-terms in the timeframe 2010–2020. The short-term sample consists of 2,086 different firms which announced 6,195 repurchases. The actual repurchase sample comprises 904 different firms engaging in 5,677 buybacks. Table 3 presents an overview of the descriptive statistics.

Table 2: Initial sample descriptives

This table provides an outline of the initial sample. Panel A gives an overview of the dataset regarding the announcement dates (i.e. short-term dataset). Panel B gives an overview regarding the initial actual repurchase dates (i.e. long-term dataset).

Panel A—Initial short-term sample

Number of different companies	2,086
Number of announcements	6,195
Number of different announcement dates	1,853
Average maximum number of shares to be repurchased	98,280,379
Average minimum number of shares to be repurchased	11,851,205
Average maximum amount of proposed capital for repurchase	CNY 57,540,861
Average minimum amount of proposed capital for repurchase	CNY 23,887,241
Average number of repurchase days*	172
Number of firms repurchasing in 1 day*	6
Number of firms repurchasing in 2–5 days*	3
Number of firms repurchasing in 5–20 days*	41
Number of firms repurchasing in 20–50 days*	46
Number of firms repurchasing in 50–100 days*	55
Number of firms repurchasing in 100–200 days*	121
Number of firms repurchasing in 200–300 days*	48
Number of firms repurchasing in > 300 days*	117

Panel B—Initial long-term sample

Number of different companies	904
Number of actual repurchases	4,677
Number of different announcement months	145
Average quantity of shares repurchased in first month	7,672,810
Average relative price (one month before and after repurchase)	-0.02781
Average repurchase value	CNY 1,268,180,942

** If date of first repurchase and completion date are both known.*

Table 3: Descriptive statistics short-term

This table outlines summarised statistics of the different variables used for the short-term regressions. It represents the total number of observations, the mean, standard deviation, minimum, and maximum. These variables are used to test hypotheses 1 to 8. CAR (0, 2) reflects the average CAR from the announcement to two days after the announcement. In addition, CAR (1, 10) represents the average CAR from one day to 10 days after the announcement. The variable size represents the size of the firm, measured in market value on the day of the repurchase announcement. BTM indicates the book-to-market value of the firm. The prior six months return covers the return in the previous 125 trading days. Tobin's Q is defined as the market value of assets to the replacement cost of assets. The cash ratio is the cash plus short-term investments, divided by the total assets. The D/E ratio represents the debt relative to the common equity of the company. The dividend pay-out ratio is defined as the cash dividend divided by the cashflow. Lastly, CAR (-20, -1) depicts the average CAR from 20 days to one day prior to the announcement. The long-term descriptive statistics show the return of the calendar-time method, the risk free-rate, and the SMB and HML data, as explained in the methodology. The ratios have been retrieved from the most recent quarterly or yearly reports. All variables are winsorised.

Variables	*N*	*mean*	*St. Dev.*	*min*	*max*
Short-term					
CAR(0,2)	1,149	0.00821	0.0692	-0.188	0.247
CAR(1,10)	1,149	0.00422	0.116	-0.317	0.43
Size	980	8.357	6.093	-0.329	18.08
BTM	1,140	0.396	0.244	0.0735	1.235
Prior 6 months return	1,149	-0.000436	0.00307	-0.00731	0.00905
Tobin' s Q	1,065	922.9	1,985	-0.0107	7,417
Cash ratio	1,149	0.406	0.462	0	1
D/E ratio	1,149	0.921	0.262	0	1
Dividend pay-out ratio	1,065	267	558.5	-11.11	2,133
CAR(-10,-1)	1,149	-0.00727	0.126	-0.389	0.353
Long-term					
Return	1,236	0.011	0.119	-0.517	0.715
Risk-free rate	1,236	0.504	3.740	-15.790	12.840
SMB	1,236	-0.343	2.098	-6.190	10.720
HML	1,236	-0.295	1.862	-4.360	4.420

4 Methodology

This chapter describes the methods and analyses used to test the hypotheses and consequently answer the main research question. Section 4.1 discusses the short-term methodology, whilst section 4.2 elaborates on the long-term methodology.

4.1 Short-term

An event study approach is applied to study the short-term price performance and assess the first hypothesis (MacKinlay, 1997). The returns are estimated by the market model, as explained by Brown and Warner (1985), and then the CARs are calculated. Thereafter, an ordinary least squares (OLS) regression is run using the CARs as dependent variables.

4.1.1 Univariate analysis

As described by MacKinlay (1997), the event study methodology calculates the short-term effects after the repurchase announcement. First, the returns relative to the previous day are computed for both the stocks and the market, as described by equation (1). The Shenzhen and Shanghai Composite Indices are used as proxies for the market.

$$R_{it} = \log\left(\frac{TotRet_t}{TotRet_{t-1}}\right) \qquad R_{SZE} = \log\left(\frac{SZE_t}{SZE_{t-1}}\right) \qquad R_{SHZE} = \log\left(\frac{SHZE_t}{SHZE_{t-1}}\right) \tag{1}$$

As reflected in equation (2), the market model is used to estimate ARs. Since outliers could affect the sample, the returns are winsorised at the 1% level.

$$R_{it} = a_i + \beta_i R_{mt} + \epsilon_{it}$$
$$E(\epsilon_{it}) = 0 \qquad var(\epsilon_{it}) = \sigma_{\epsilon i}^2 \tag{2}$$

Where R_{it} – return for security *i* on day *t*;
β_i – the slope of the market model for stock *i*;
R_{mt} – return for the market index on day *t*;
ϵ_{it} – random error term for stock *i* on day *t*

Through an OLS regression, the model's parameters are estimated. The estimation window starts 150 days before the announcement. For the calculation of the parameters of the market model, the repurchase announcement is set as day 0. A data proximity problem occurs when firms announce a buyback multiple times within the 150-day estimation window. The announcements are too close to each other, which leads to problems in the dataset. One option is to choose one announcement date per

company, in line with the study by Grullon and Michaely (2004). This would drastically decrease the number of events in the dataset as some companies in the sample have 10 or more announcement dates in the period. The option to delete announcement dates which have overlapping estimation windows was chosen. Therefore, the dataset remains as accurate as possible. Following this adjustment in the data, the ARs are calculated. This is presented in the following equation:

$$AR_{it} = R_{it} - \hat{a}_i - \hat{\beta}_i R_{mt}$$
$$E(\epsilon_{it}) = 0 \qquad var(\epsilon_{it}) = \sigma^2_{\epsilon i} \tag{3}$$

In this study, the ARs following an announcement are researched in a timeframe of 21 days. A CAR window of two trading days (0, 2) and two trading weeks (0, 10) after the announcement was implemented. This covers one month around the repurchase announcement. The CAR before the announcement (-10, -1) is calculated as well. Moreover, this analysis regresses these two post-event CARs on several firm characteristics. To calculate the CARs, the sum of the ARs is taken, as stated in equation (4).

$$CAR_i(t_1, t_2) = \sum_{t_1}^{t_2} AR_{it} \tag{4}$$

4.1.2 Significance of CARs

The CARs are tested for significance using a t-test. Zhang (2005) has stated that the short-term reaction can best be measured by the CAR (0, 2). To determine whether this event window is indeed most suitable, a t-test is performed. This is also done to check the validity of the results, which imply whether or not buybacks are followed by abnormal stock returns.

$$t_{CAR_{t1,t2}} = \frac{CAR(t_1,t_2)}{SE_{CAR(t_1,t_2)}} \tag{5}$$

Where $t_{CAR_{t1,t2}}$ – the obtained t-value of the cumulative abnormal return;

$CAR(t_1, t_2)$ – the cumulative abnormal return from day t_1 to t_2;

$SE_{CAR(t_1,t_2)}$ – the standard error of the CAR from day t_1 to t_2

4.1.3 Cross-sectional analysis

To test the hypotheses stated in section 2.5, a multivariate OLS regression is performed. The dependent variable is $CAR(t_1, t_2)$, which is regressed on several firm-specific characteristics, as described in equation (6). Both the CAR (0, 2) and CAR (1, 10) are used as dependent variables.

$$CAR(t_1, t_2) = \alpha + \beta_1 ln(SIZE_{i,t_1}) + \beta_2 BTM_{i,t_1} + \beta_3 Prior6m_{i,t_1} + \beta_4 TobinsQ_{i,t_1} + \beta_5 Cashratio_{i,t_1} + \beta_6 DE_{i,t_1} + \beta_7 DividendPayout_{i,t_1} + \beta_8 CAR(-10,-1)_{i,t_1} \quad (6)$$

Where $CAR(t_1, t_2)$ – CAR of a firm over the event window;

α – intercept coefficient;

$\ln(SIZE_{i,t_1})$ – natural logarithm of the market cap for firm *i* at announcement date;

BTM_{i,t_1}- Book-to-market ratio of firm *i* at the announcement date;

$Prior6m_{i,t_1}$ – Return of prior 125 trading days of firm *i* at the announcement date;

$TobinsQ_{i,t_1}$- Tobin's Q of firm *i* at the announcement date;

$CashRatio_{i,t_1}$- Cash ratio of firm *i* at the announcement date;

DE_{i,t_1}- D/E ratio of firm *i* at the announcement date;

$DividendPayout_{i,t_1}$- Dividend ratio of firm *i* at the announcement date;

$CAR(-10,-1)_{i,t_1}$- CAR of firm *i* starting 10 days prior to announcement date;

CAR (-10,-1) is included in the regression as control variable to check if the stock performed poorly in the 10 days prior to the announcement. This phenomenon is called mean reversion.

4.2 Long-term

Different methods have been discussed in the literature to study the long-term effects. According to Fama (1992), long-term return anomalies depend on which method is used. However, there is no clear consensus on which method is most sufficient.

4.2.1 BHAR, CAR, and the calendar-time method

Barber and Lyon (1997) and Kothari and Warner (1997) have stipulated the advantages of the buy-and-hold abnormal return approach (BHAR) in that it accounts for the experience of investors in the long-term. However, Fama (1998) has documented that the long-term ARs measured by the BHAR method are exposed to imperfect expected return proxies (i.e. the bad-model problem). The use of this model can lead to biases over a longer period since spurious ARs are compounded. Additionally, Mitchell and Stafford (2000) have stated that the BHARs and CARs are exposed to the problem of cross-correlation, which occurs due to the matching of firm characteristics as the correlation between the event firms' returns cannot exactly be removed. The BHAR method mainly finds positive returns, in contrast to the calendar-time method, which fails to find these positive returns. For this study, the Fama and French 3-factor model (1998) has been selected due to the critiques about other techniques.

This thesis follows the approach by Peyer and Vermaelen (2009) and calculates the ARs by using portfolios. The method's estimations are outlined by a single time-series regression (Dittmar and Field, 2015). These equally weighted portfolios are formed based on the month in which the

repurchase has occurred in calendar time; portfolios are constructed if the company repurchased shares in the prior year (or two, three, or four years). Firms are added based on the month in which they engage in a buyback programme. The company is included in the portfolio 1 (2, 3, or 4) years. Therefore, the composition of the portfolio is rebalanced every month. Subsequently, a single OLS regression is run where the dependent variable is the average AR of the portfolio (Peyer and Vermaelen, 2009). Afterwards, quintiles based on size and BTM are formed to find evidence of the undervaluation form of the information-signalling hypothesis. This method controls the cross-sectional dependence of firms which engage in repurchase events (Peyer and Vermaelen, 2009). On the other hand, opponents of this method have argued that it does not include investor experience (Lyon et al., 1999).

In addition, equally weighted portfolios have been selected instead of value-weighted portfolios. A motive for this choice is that the power of recognising the AR becomes smaller due to mispricing; larger firms are less likely to be mispriced, which is more expected amongst smaller firms. When using the value-weighted approach, smaller (and mispriced) firms would be underrepresented (Loughran and Ritter, 2000). The second reason for using equally weighted portfolios is that the focus of this research is the returns of the repurchasing companies and not particularly the efficiency of the market. This thesis does not research macro-economic factors or study how efficient the Chinese stock market is but instead explores a systematic continuity about the exceptions (Peyer and Vermaelen, 2009).

Two problems arise in literature regarding these long-term techniques. Many papers have based their studies on announcements, so it could be the case that the firm only announces a buyback programme and does not actually continue with it. Since the long-term sample for this thesis only consists of actual repurchases, this problem is dealt with. The second issue arises when firms have multiple buyback events. If every repurchase day would be considered as an event day in a month, then the risk would emerge that frequent repurchasing firms will have undue weighting in the sample of portfolio returns. This relates to restricted versus unrestricted portfolios.

4.2.2 Restricted versus unrestricted portfolios

Differences can be seen between restricted and unrestricted portfolios. Peyer and Vermaelen (2009) do not show if their portfolios are restricted or unrestricted, and thus that must be determined. The difference between the portfolios is best described by an example: Firm Alpha and Firm Beta hypothetically have the same market value. The former repurchases stock in eight of 12 months of the previous year, whereas the latter bought back only in one month. In an unrestricted portfolio, Firm Alpha is included eight times and Firm Beta only once. The restricted approach does not accept duplicates and therefore only incorporates both firms once. Now suppose that Firm Alpha repurchased 1% of their outstanding shares per month. Firm Beta, however, repurchased 8% in one month. The

former will be overrepresented in an unrestricted portfolio since both firms repurchase the same amount in a year.

Dittmar and Field (2015) have found that firms which repurchase infrequently are outperforming firms which repurchase less. Moreover, infrequently repurchasing firms are underrepresented in unrestricted portfolios. In this thesis, an unrestricted portfolio is used. However, to study the differences between these portfolios, a dummy variable is created when firms have repurchased multiple times. Consequently, an analysis is performed to test the differences between portfolios, with the expectation that the unrestricted approach underperforms the restricted approach.

4.2.3 Analysis

Equation (7) can be constructed to obtain the ARs. Monthly returns are used.

$$AR_{p,t} = R_{p,t} - R_{f,t} \tag{7}$$

Where $AR_{p,t}$– the abnormal return of the portfolio *p* in month *t;*

$R_{p,t}$ – return of portfolio *p* in month *t;*

$R_{f,t}$ – government treasury bond's return in month *t*

Consequently, the ARs are regressed against the market risk premium, return on the size factor and the return on the value factor (Fama and French, 1992). This is summarised in the following equation:

$$AR_{p,t} = a_t + b_t(R_{m,t} - R_{f,t}) + c_t SMB_t + d_t HML_t + \epsilon_t \tag{8}$$

Where $AR_{p,t}$ – the abnormal return of the portfolio *p* in month *t;*

$R_{m,t}$ – the market return

$R_{f,t}$ – the risk-free rate

SMB_t – return of a small firm portfolio minus the return of a large firm portfolio at month *t;*

HML_t – return of a high book-to-market portfolio minus the return of a low book-to-market portfolio in month *t;*

α_t – mean monthly excess return in the period that cannot be related to the factors stated above (Peyer & Vermaelen, 2009)

4.3 Quintiles

Quintiles are constructed to study the cross-sectional differences in the short-term. To test the hypotheses in a structured manner, the CARs are computed and compared based upon quintiles. More specifically, quintiles are constructed based on the distribution of the year in which the repurchase is

announced and are formed by the different characteristics discussed in section 2.4: size, BTM ratio, Tobin's Q, prior six months return, cash ratio, D/E ratio, and the dividend ratio. The firms engaging in buybacks in the dataset are then allocated to the proper quintile. For example, the MTB ratios are determined over a fiscal year. Based on the data available in the dataset, quintile scores are constructed over that specific year, and the scores are assigned automatically for that year. Lastly, based on the BTM ratio, the event is assigned to the specific quintile for a year. This mechanism is identical when forming the BTM and size quintiles in the long-term. This is automatically performed in Stata.

5 Results

This chapter analyses the short- and the long-term results based upon the models, as explained in the methodology. First, the daily average ARs are studied, and the CARs are examined. Then the full sample results and the results based on the quintiles are discussed. Lastly, the cross-section is studied.

In section 5.2, the long-term results are analysed, beginning with the full sample. The second part describes the comparison between the results of firms which have made one repurchase and those which have made multiple repurchases. The last section describes the long-term results relating to the size and BTM quintiles.

5.1 Short-term

5.1.1 CARs

In this thesis, an estimation window is applied from 150 to 11 trading days before the announcement day. As described in section 4.1, both the market and stock returns are used to estimate returns for non-event days. The disparity between the actual returns and the predicted returns can be defined as the ARs.

Table 4 describes the ARs on a daily basis with the announcement day as day 0. Until two days prior to the event date, the average ARs are negative. Starting at day -2, for most days the average ARs are positive. Multiple trading days before the announcement show significant results (day -7, -6, -5, -2, -1, 0). A relatively sharp increase in ARs starting two days prior to the announcement is observed, as seen in figure 2. From days 2 to 10, the ARs are mostly positive and close to zero.

Figure 2: Average ARs per day (-10, 10)

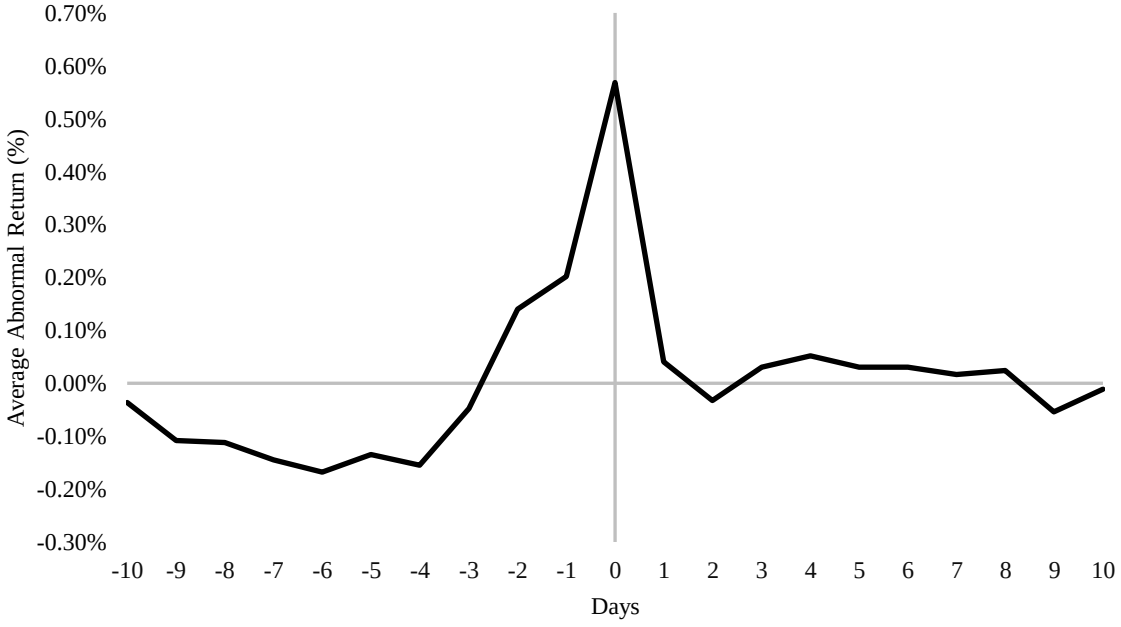


Table 4: Daily ARs and CARs

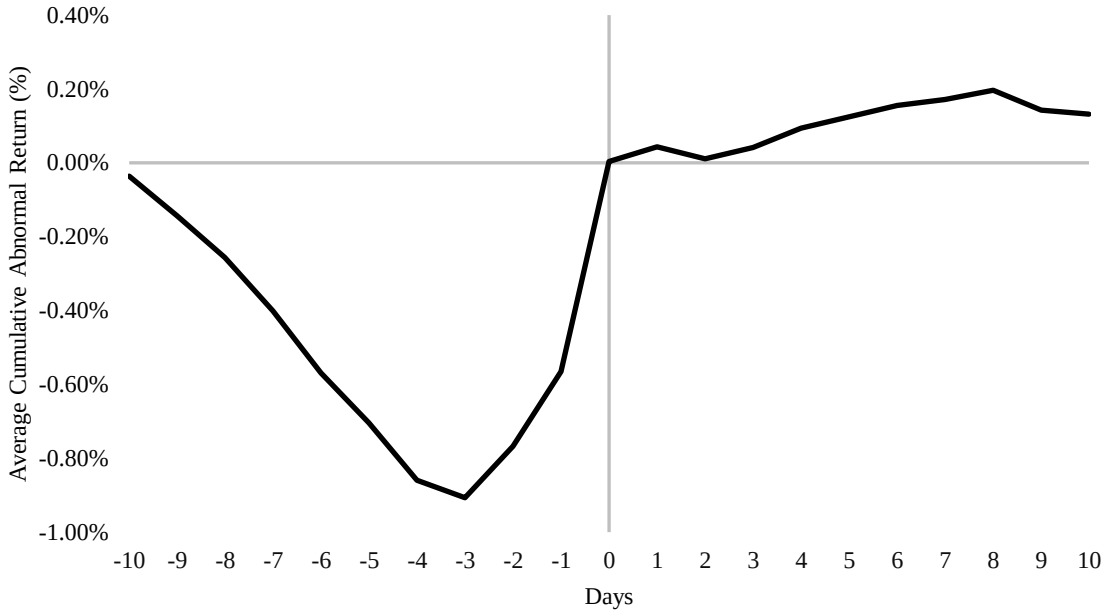
This table represents the daily mean ARs, given in percentages. The p-values are also provided, and the CARs in percentages are determined. The sample consists of 1,311 observations in the period 2010–2020. As explained in the methodology, the cumulative abnormal returns are calculated using the market model and are averaged per day. A t-test is performed. The estimation window starts 150 days to 11 days prior to the announcement. ***, **, and * denote the statistical significance at the 1%, 5%, and 10% levels, respectively.

Day	*Abnormal Returns*	*p-value*	*Cumulative Abnormal Returns*
-10	-0.037	(0.609)	-0.037
-9	-0.108	(0.118)	-0.145
-8	-0.112	(0.120)	-0.257
-7	-0.145**	(0.043)	-0.402
-6	-0.168**	(0.017)	-0.569
-5	-0.135*	(0.057)	-0.704
-4	-0.154**	(0.040)	-0.859
-3	-0.048	(0.524)	-0.907
-2	0.140*	(0.088)	-0.767
-1	0.202**	(0.018)	-0.565
0	0.568***	(0.000)	0.003
1	0.040	(0.625)	0.044
2	-0.032	(0.669)	0.011
3	0.031	(0.666)	0.042
4	0.052	(0.455)	0.094
5	0.031	(0.644)	0.125
6	0.031	(0.650)	0.155
7	0.017	(0.808)	0.172
8	0.025	(0.711)	0.196
9	-0.053	(0.421)	0.143
10	-0.012	(0.867)	0.131

Figure 3 visualises the development of the average CAR over the period starting 10 days prior to the announcement to 10 days after the announcement. It shows a negative development in the days prior to the event date. The mean CAR in the period (-10, -1) equals -0.57%. More specifically, it can be noted that all CARs until the event date are negative. At day 0, a turning point is observed due to the relatively large positive average ARs at days -2 and -1. In the days following the announcement, the average AR remains positive on most days, and therefore a positive average CAR is seen. The CAR over the period (1, 10) equals 0.13%, which indicates a positive market performance following repurchase announcements, as expected from previous research. Based upon prior literature, a negative pre-announcement performance is expected as opposed to a positive post-announcement performance, both confirmed by these results.

Figure 3: Average CARs (-10, 10)

This figure visualises the CARs, displayed in percentages. The sample consists of 1,311 observations. The CARs are calculated using the market model and are averaged per day. The estimation window starts 150 days to 11 days prior to the announcement.



This study focusses on three event windows: (-10, -1), (0, 2), and (1, 10). The period (-10, 10) covers one month around the repurchase announcement. Following Zhang (2005), the event window (0, 2) covers the period in which the information signal is released and the public is informed. According to his research, this is the period most suitable to study the short-term effects after an event date. The event window (1, 10) covers the second half of the month after the announcement has been done.

Table 5 exhibits information concerning the three event windows, focussing on different quintiles based on the firm characteristics. The first panel covers the full sample, showing the CAR for the different event windows. This confirms Zhang's statement (2005) which declares that the CAR (0, 2) is best to use. Thereafter, the different quintiles are shown based upon the firm characteristics discussed in section 2.4. Thus, the second panel is constructed to test hypothesis 2. The following panels have identical structures and are constructed to evaluate hypotheses 3 to 8. Using table 5, the hypotheses can be assessed, and conclusions can be drawn.

5.1.2 Full sample

In table 5, panel A, the full sample results of CAR (-10, -1), CAR (0, 2), and CAR (1, 10) are given. The results of CAR (1, 10) for the full sample are insignificant, in contrast to the other significant CARs. The average CAR in the event window before the announcement reveals a coefficient of -1.99, significant at the 5% level. A possible explanation for this negative result is that the management of the company announces buying back stock when the firm has obtained underperforming results

(Ikenberry and Vermaelen, 1996). A second possible reason is that executives try to signal to the market that the stock price is too low and that investing in the firm is appealing (Wansley et al., 1989).

The CAR over the event window following the repurchase (0, 2) shows an average of 3.78, significant at the 1% level. Gan et al. (2017) have found for all post-announcement windows insignificant positive CARs. In addition, they saw positive significant CARs before the announcement. However, Yang et al. (2020) have shown a positive significant coefficient for the CAR (0, 2). The full sample results of this thesis are thus in agreement with the findings of Yang et al. (2020). This indicates a positive market reaction in the period after the repurchase announcement.

Hypothesis 1 is stated as follows: *Companies which announce repurchase programmes experience positive ARs in the short-term.* The hypothesis is not rejected as a result of the positive coefficient of 3.78, significant at the 1% level, concerning the event window (0, 2). Additionally, due to the insignificant positive CAR (1, 10), the hypothesis is not statistically different from zero. This is in line with the literature overview presented in table 1, panel A.

5.1.3 Quintiles per characteristic

Panel B of table 5 shows the outcomes of the size quintiles. Regarding the event window (-10, -1), larger firms experience negative pre-announcement CARs. Quintiles 4 and 5 report coefficients of -1.83 and -1.98, which are significant at the 10% and 5% confidence levels. In addition, the coefficients of the event window (0, 2) show positive results for the two largest quintiles, significant at the 1% confidence level. This is in contrast to the smaller quintiles, which do not show significant results. The table reports coefficients of 3.55 and 5.03 for the quintiles 4 and 5. Lastly, similar results are observed for the event window (1, 10) as the results for quintiles 4 and 5 are positive and significant at the 10% and 1% levels, accordingly.

Hypothesis 2 is stated as follows: *The market value of a firm is negatively related to short-term ARs following a share repurchase programme announcement*. The statement cannot be rejected due to the insignificant results of the lower size quintiles. Prior literature focussing on markets other than the Chinese market has found higher returns for smaller companies (Ikenberry, 1995; Otchere and Ross, 2002; Zhang, 2002; Firth and Yeung, 2005), which is not confirmed by the results of this thesis.

Panel C reports the findings for the BTM quintiles. Regarding the period before the announcement, a negative significant CAR is observed for quintile 5. This indicates that value stocks have negative performance before the announcement. In the event window (0, 2), the three largest quintiles show positive results, significant at the 10%, 1%, and 5% levels, respectively. From this, it can be assumed that the returns for value stocks are relatively large and positive. Regarding the period (1, 10), quintile 4 shows a coefficient of 2.48, significant at the 5% level. Hypothesis 3 was formulated as: *The BTM ratio of a firm is positively related to short-term ARs following a share repurchase programme announcement.* Due to the insignificant coefficients for the smallest quintiles in the post-announcement period, this hypothesis is not rejected.

Panel D depicts the results of prior return quintiles. Firms in the event window (1, 10) are most interesting to focus on. Quintile 5 shows a coefficient of -2.91, which is significant at the 1% level. Quintile 1 has a coefficient of 3.79, also significant at the 1% level. Therefore, it can be concluded that firms with high prior returns have a lower CAR than firms with low prior returns. Hypothesis 4 is stated as follows: *The prior return of a firm is negatively related to short-term ARs following a share repurchase programme announcement.* Thus, it is supported. The findings are further in line with the overreaction hypothesis (Peyer and Vermaelen, 2009). Moreover, Ikenberry et al. (2000) have concluded that companies making buybacks in the lowest prior returns quintiles have the highest results in the long-term. This study finds similar results for the event window (1, 10) and is therefore in agreement with the findings of Ikenberry et al. (2000). CAR(0, 2) is ignored in this review due to the insignificance of quintile 5.

In panel E, the quintiles relating to Tobin's Q are shown. In the pre-announcement period, the quintile with the lowest Tobin's Q shows a negative coefficient of -3.03, significant at the 1% confidence level. This indicates that firms having low Tobin's Q experience negative pre-announcement performance. This is in contrast to the findings for the event window (0, 2). Quintiles 2, 3, 4, and 5 show significant results, all of which are positive. Firms attributed to the lower quintiles have a higher chance of overinvesting, which is expected to result in lower ARs. This is described by hypothesis 5: *The Tobin's Q of a firm is positively related to short-term ARs following a share repurchase programme announcement.* This hypothesis cannot be rejected based on the event window (0, 2) since the largest quintile has the highest coefficient. Due to the insignificance of the coefficients in the event window (1, 10), the hypothesis can also not be rejected.

Panel F shows the findings of the different quintiles relating to the cash ratio. Quintile 4 of the pre-announcement window reflects a negative coefficient of 1.83, significant at the 10% confidence level. All quintiles in the event window (0, 2) are positive and significant at the 5% or 10% level. It can be stated that firms in quintile 5 have higher ARs than firms in quintile 1. Concerning the post-announcement window (1, 10), quintile 2 also shows a positive coefficient, significant at the 10% level. Hypothesis 6 was documented as follows: *The cash ratio of a firm is negatively related to short-term ARs following a share repurchase programme announcement.* Based on the results in panel F, no coherent results have been found to reject this hypothesis, so it is upheld.

Panel G presents the findings of the D/E ratio quintiles for the three event windows. In the pre-announcement period, a coefficient of -2.29 is reported for quintile 3, significant at the 5% confidence level. All coefficients in the event window (0, 2) are significant at the 10% or 5% level, except quintile 4. Quintile 5 has a coefficient of 2.16 and quintile 1 of 1.79, significant at the 5% and 10% levels, respectively. The post-announcement period (1, 10) does not show significant results. Hypothesis 7 is stated as follows: *The D/E ratio of a firm is positively related to short-term ARs following a share repurchase programme announcement.* Thus, it is not rejected.

Lastly, panel H documents the returns for the five dividend ratio quintiles over the three event windows. Regarding the pre-announcement period, quintile 4 shows a negative coefficient of -3.02, significant at the 1% level. In addition, quintile 5 reflects a negative value of 1.7, significant at the 10% level. Based upon these results, it can be concluded that firms which have high dividend ratios experience negative returns before the announcement. Concerning the event window (0, 2), all coefficients are significant at the 5% level. Quintile 5 reports a coefficient of 2.11 and quintile 1 a coefficient of 2.24. The coefficients relating to the event window (1, 10) do not show significant results. Hypothesis 8, *The dividend ratio of a firm is negatively related to short-term ARs following a share repurchase programme announcement*, is therefore confirmed.

Table 5: Full sample and quintile CARs

In this overview, the CARs are shown for the three event windows of interest throughout this study. The total sample consists of 1,149 share repurchase announcements. As explained in the methodology, the CARs are calculated using the market model and are averaged per day. The first panel shows the CAR of the full sample. In addition, the following panels indicate the different quintiles per variable/firm characteristic in percentages. The standard error is displayed in parentheses. ***, **, and * denote the statistical significance at the 1%, 5%, and 10% levels, respectively.

			Window		
	Observations	*Quintile*	*(-10, -1)*	*(0, 2)*	*(1, 10)*
Panel A: Full sample					
CAR	1149		-1.994**	3.78***	1.22
Std. Error			(0.004)	(0.002)	(0.004)
Panel B: Size					
CAR	234	1 (small)	0.100	0.253	-1.247
Std. Error			(0.010)	(0.005)	(0.010)
CAR	225	2	-0.412	0.209	0.516
Std. Error			(0.009)	(0.005)	(0.011)
CAR	224	3	-0.640	-0.229	-0.821
Std. Error			(0.011)	(0.005)	(0.007)
CAR	220	4	-1.828*	3.549***	1.855*
Std. Error			(0.007)	(0.005)	(0.007)
CAR	237	5 (large)	-1.978**	5.027***	3.385***
Std. Error			(0.009)	(0.005)	(0.007)

Table 5 continued

Panel C: BTM ratio					
CAR	198	1 (glamour)	-1.312	1.127	-0.100
Std. Error			(0.009)	(0.005)	(0.009)
CAR	197	2	-1.357	-0.343	-0.156
Std. Error			(0.011)	(0.005)	(0.009)
CAR	196	3	-0.678	1.637*	0.637
Std. Error			(0.009)	(0.005)	(0.010)
CAR	197	4	0.388	3.635***	2.482**
Std. Error			(0.010)	(0.005)	(0.010)
CAR	192	5 (value)	-1.879*	2.399**	-0.044
Std. Error			(0.011)	(0.006)	(0.009)
Panel D: Prior six months return					
CAR	233	1 (low)	-3.131***	1.838*	3.788***
Std. Error			0.011	0.005	0.009
CAR	230	2	-1.486	1.949*	0.923
Std. Error			0.009	0.005	0.009
CAR	230	3	-1.052	1.608	1.553
Std. Error			0.007	0.005	0.007
CAR	230	4	-0.127	1.966**	0.397
Std. Error			0.007	0.004	0.007
CAR	226	5 (high)	1.423	1.220	-2.910***
Std. Error			0.011	0.005	0.011
Panel E: Tobin's Q					
CAR	218	1 (small)	-3.031***	-0.24	0.682
Std. Error			(0.011)	(0.005)	(0.008)
CAR	216	2	-0.996	1.705*	-0.64
Std. Error			(0.009)	(0.005)	(0.009)
CAR	212	3	-0.43	2.154***	0.458
Std. Error			(0.009)	(0.005)	(0.007)
CAR	216	4	0.177	2.373**	1.502
Std. Error			(0.008)	(0.005)	(0.008)
CAR	210	5 (high)	-0.204	2.425**	0.398
Std. Error			(0.009)	(0.005)	(0.010)
Panel F: Cash ratio					
CAR	211	1 (small)	-1.639	0.395*	-1.240
Std. Error			(0.009)	(0.005)	(0.007)
CAR	208	2	0.135	2.367**	1.732*
Std. Error			(0.009)	(0.005)	(0.010)
CAR	208	3	-0.731	1.786*	-0.112
Std. Error			(0.011)	(0.005)	(0.009)
CAR	208	4	-1.834*	2.285**	0.796
Std. Error			(0.011)	(0.005)	(0.009)
CAR	202	5 (high)	-1.191	2.886**	1.133
Std. Error			(0.007)	(0.005)	(0.008)

Table 5 continued

Panel G: D/E ratio					
CAR	222	1 (small)	-1.350	1.794*	0.771
Std. Error			(0.008)	(0.004)	(0.008)
CAR	215	2	-0.872	1.736*	0.680
Std. Error			(0.011)	(0.005)	(0.009)
CAR	218	3	-2.291**	2.030**	-0.033
Std. Error			(0.009)	(0.005)	(0.007)
CAR	216	4	0.661	1.643	0.348
Std. Error			(0.010)	(0.005)	(0.009)
CAR	211	5 (high)	-0.525	2.160**	0.935
Std. Error			(0.009)	(0.005)	(0.009)
Panel H: Dividend ratio					
CAR	217	1 (small)	-1.062	2.238**	1.493
Std. Error			(0.009)	(0.005)	(0.008)
CAR	212	2	0.908	2.147**	1.548
Std. Error			(0.010)	(0.006)	(0.009)
CAR	215	3	0.005	2.131**	-0.334
Std. Error			(0.009)	(0.004)	(0.008)
CAR	212	4	-3.022***	-0.035	-0.800
Std. Error			(0.011)	(0.005)	(0.009)
CAR	209	5 (high)	-1.742*	2.110**	-0.014
Std. Error			(0.009)	(0.005)	(0.007)

5.1.4 Cross-sectional results

The first panel of table 5 shows a positive CAR for the event window (0, 2), which is significant at the 1% level. To study different hypotheses in the cross-section, it was chosen to perform an OLS regression. The dependent variables are the CARs with event windows (0, 2) and (1, 10), and the independent variables are the discussed firm characteristics. The results can be found in table 7. Robust standard errors are used in the cross-sectional regression since the data in the model is subject to heteroscedasticity problems. Table A2 shows the results from the performed multicollinearity test. In addition, table A3 exhibits the correlations amongst the different variables. The correlation between control variable CAR(-10, -1) and the post-announcement CARs is, as expected according to prior literature, relatively high and significant.

Table 7 shows the coefficients for the CAR (0, 2) and CAR (1, 10) relating to the different firm characteristics. The R-squared of 3.9% and 3.0% is relatively low; however, it is in line with the R-squared scores found by Zhang (2005), Yang (2020), and Gan et al. (2017). The cross-section does not show significant results for the variables Tobin's Q, D/E ratio, and dividend pay-out ratio. The control variable CAR (-10, -1) shows positive results for both CARs and is significant at the 1% level

for the coefficient relating to CAR (0, 2). This is in accordance with the findings of Zhang (2005). The sample consists of 935 observations in the period 2010–2020.

Table 6: Cross-sectional results for CARs

This overview indicates the results following the cross-sectional ordinary least squares (OLS) regression. The CAR (0, 2) and CAR (1, 10) are regressed on the different firm characteristics studied throughout this thesis. The coefficients are given, and the robust standard errors are in parentheses. Ln(size) is the size of the firm, measured in market value on the day of the repurchase announcement, having a natural logarithm scale. BTM indicates the book-to-market value of the firm. The prior six months return indicates the return of the previous 125 trading days. Tobin's Q is defined as the market value of assets to the replacement costs of assets. The cash ratio is the cash plus short-term investments, divided by the total assets. The D/E ratio represents the debt relative to the common equity. The dividend pay-out ratio is defined as the cash dividend divided by the cashflow. The values have been retrieved from the most recent quarterly or yearly reports before the announcement. As a control variable, CAR (-20, -1) is added in the regression. The sample consists of 935 announcements, and all variables are winsorised. ***, **, and * denote the statistical significance at the 1%, 5%, and 10% levels, respectively.

Variables	*CAR(0, 2)*	*CAR(1, 10)*
Size	0.001**	0.001
	(0.001)	(0.001)
BTM	0.027***	0.037***
	(-0.008)	(0.013)
Prior six months return	-0.606	-4.716***
	(0.880)	(1.621)
Tobin's Q	1.20e-7	-4.-4e-7
	(0.000)	(0.000)
Cash ratio	0.007	0.012
	(0.006)	(0.010)
D/E ratio	-0.001	-0.014
	(0.008)	(0.015)
Dividend pay-out ratio	-6.05e-6	-4.38e-6
	(0.000)	(0.000)
CAR(-10,-1)	0.078***	0.034
	(0.024)	(0.040)
Constant	-0.012	-0.010
	(0.010)	(0.019)
Observations	935	935
R-squared	0.039	0.030

Hypothesis 2 is formulated as follows: *The market value of a firm is negatively related to short-term ARs following a share repurchase programme announcement*. To assess the hypothesis based on the cross-section, the size factor is regressed on both short-term CARs. For the CAR (0, 2), a positive coefficient of 0.001 is found, significant at the 5% level. Nevertheless, this thesis does not find significant results for the size factor coefficient related to CAR (1, 10). These findings are partly

in line with Yang et al. (2020), who showed a positive result for coefficient between the size factor and the CAR (0, 2); however, their results were not significant. In addition, the study by Gan et. al (2017) has found insignificant positive returns relating to the size factor. Hypothesis 2 can thus be rejected for the CAR (0, 2) since the coefficient is positive. This finding is contrary to the finding of Vermaelen (1981), which expects positive returns for smaller firms (i.e. a negative relationship). However, it should be noted that the coefficients are close to 0 and thus are relatively small. The hypothesis cannot be rejected for the CAR (1, 10) since this coefficient is not statistically different from 0.

The next hypothesis is stated as follows: *The BTM ratio of a firm is positively related to short-term ARs following a share repurchase programme announcement.* The coefficient for both CARs are positive and significant at the 1% level. This is in accordance with the study by Zhang (2005), which found positive significant results for the CAR (0, 2) and the CAR over the longer period. Since this study finds significant positive coefficients related to the BTM ratio, hypothesis 3 holds. This is in line with prior literature, as explained in section 2.4.2.

The third variable studied in the cross-section is the return of the prior six months. This variable is incorporated to study the effects of return reversal, as explained in section 2.3.3. It is constructed by computing the returns of the previous 125 trading days. The returns are regressed on both the short-term CARs to test hypothesis 4: *The prior return of a firm is negatively related to short-term ARs following a share repurchase programme announcement.* For both coefficients, a negative value is found. However, this coefficient is not significant for the CAR (0, 2). This is in contrast to the CAR (1, 10), which has a coefficient of -4.72, significant at the 1% level. The coefficient implies that stocks having negative performance in the period before the event experience positive performance after the announcement over the event window (1, 10). The significant results for the CAR (1, 10) are negative, and therefore the hypothesis is supported. For the CAR (0, 2), this hypothesis also holds since the coefficient is not statistically different from 0.

The fourth variable was incorporated to study the relationship between the Tobin's Q and the short-term CARs. Hypothesis 5 was formulated as follows: *The Tobin's Q of a firm is positively related to short-term ARs following a share repurchase programme announcement.* The ratio implies the physical asset's market value and its replacement value and does not have a significant positive relation with either the CAR (0, 2) or CAR (1, 10). Therefore, the hypothesis is upheld.

The fifth variable relates to the cash proxy, and hypothesis 6 is formulated as follows: *The cash ratio of a firm is negatively related to short-term ARs following a share repurchase programme announcement.* When studying the coefficient of the cash ratio and the CAR for both windows, relatively small and positive values are observed. However, both values are insignificant. Since the coefficients have insignificant values, the hypothesis cannot be rejected.

In addition, the D/E ratio is incorporated to test the cross-sectional effect of the leverage ratio and the short-term CARs. Hypothesis 7 was expressed as follows: *The D/E ratio of a firm is positively related to short-term ARs following a share repurchase programme announcement.* For both the CAR

(0, 2) and CAR (1, 10), negative returns are observed. However, both these coefficients are insignificant, as expected according to the results of Zhang et al. (2005). Since the results are not significant, hypothesis 7 is upheld.

Lastly, the dividend pay-out ratio is examined in the cross-section. Hypothesis 8 is defined as: *The dividend ratio of a firm is negatively related to short-term ARs following a share repurchase programme announcement.* For CAR (0, 2), a small negative value is found, in line with the negative value for the CAR (1, 10). Since both coefficients are insignificant, this hypothesis cannot be rejected.

5.2 Long-term

5.2.1 Full sample

Table 7 represents the full sample results based on the calendar-time method, as explained in the methodology. The 12- and 24-month mean ARs are significant at the 1% confidence level and show a positive coefficient of 7.54 and 3.06, accordingly. These findings are in line with those of Peyer and Vermaelen (2009), which also present significant positive returns. However, the coefficients of the 36 and 48 monthly mean ARs are not significant.

Hypothesis 9 was formulated as follows*: Companies which engage in repurchase programmes experience significant positive ARs in the long-term.* Due to the positive mean ARs obtained for 12- and 24-month portfolios, this hypothesis holds. The 36- and 48-month portfolios show insignificant results. Therefore, hypothesis 9 is not rejected.

Table 7: Full sample results based on calendar-time method

This table represents the results of the monthly mean ARs relating to the total sample. The results are given for the different portfolios. The overview shows the standard error and the total observations of the full sample. ***, **, and * denote the statistical significance at the 1%, 5%, and 10% levels, respectively.

	Full sample	
	Monthly mean AR	*Std. Err.*
12 mos.	7.544***	0.003
24 mos.	3.059***	0.005
36 mos.	0.959	0.007
48 mos.	-0.626	0.007
obs.	1232	

5.2.2 Quintiles per characteristic

Table 8 shows the results relating to BTM quintiles and the size quintiles. The firms included in quintile 1 have low BTM values and are referred to as glamour stocks. In contrast, the firms in BTM quintile 5 have the largest values and are referred to as value stocks. All the 12-month average ARs show significant results at the 1% level. When comparing quintiles 1 and 5, it can be concluded that value stocks obtain higher monthly ARs. When studying the results relating to the 24-month portfolio, both the coefficient of BTM quintiles 1 and 5 are not significant. Therefore, no conclusions can be drawn from these results. The coefficient of the 36-month BTM quintile 5 is significant at the 5% level and shows the highest coefficient compared to the other quintiles. When evaluating the 48-month portfolios, only quintile 3 is significant. Hypothesis 11, *The BTM ratio of a firm is positively related to long-term ARs following an actual share repurchase,* is not rejected according to the results.

The second variable studied in the long-term is the market value of the firm, indicated throughout this thesis as size. In line with the BTM quintiles, size quintiles are constructed to compare the mean ARs of small firms with the mean ARs of large firms in the long-term. The coefficients relating to the 12-month ARs are significant over all the size quintiles. Quintile 1 reveals a coefficient of 3.55, opposed to the coefficient 4.11 of the largest quintile. When studying the different values of the quintiles, no consistent pattern can be discovered. Hypothesis 12 was formulated as follows: *The market value of a firm is negatively related to long-term ARs following actual share repurchases.* Based upon the 12-month mean ARs, this hypothesis is rejected. However, based on the 24-, 36-, and 48-month portfolios, the hypothesis cannot be rejected since no clear consistent pattern can be discovered.

Table 8: Quintile results based on calendar-time method

This table represents the results of the long-term mean ARs relating to the BTM quintiles. Quintiles are formed as explained in the methodology. The table represents the monthly mean ARs, the standard error, and the total observations of the quintile. For constructing the monthly mean AR, the calendar-time method is used. Equally weighted unrestricted portfolios are formed, and firms which repurchased shares in the past year (or two, three, or four years) are the basis of the unrestricted portfolios. As explained in the methodology, a regression has been run using the Fama and French (1992) factors as independent variables and the excess return as a dependent variable. Table A4 in the appendix shows the R-squared. ***, **, and * denote the statistical significance at the 1%, 5%, and 10% levels, respectively.

	BTM (1)			BTM (2)			BTM (3)			BTM (4)			BTM (5)	
	Monthly Mean AR	*Std. Err.*		*Monthly Mean AR*	*Std. Err.*		*Monthly Mean AR*	*Std. Err.*		*Monthly Mean AR*	*Std. Err.*		*Monthly Mean AR*	*Std. Err.*
12 mts.	3.115***	(0.005)	12 mts.	3.124***	(0.005)	12 mts.	2.821***	(0.005)	12 mts.	3.594***	(0.006)	12 mts.	3.425***	(0.005)
24 mts.	0.325	(0.007)	24 mts.	1.327	(0.012)	24 mts.	2.123**	(0.013)	24 mts.	2.420**	(0.011)	24 mts.	0.347	(0.012)
36 mts.	0.164	(0.011)	36 mts.	0.260	(0.018)	36 mts.	-0.468	(0.019)	36 mts.	0.226	(0.018)	36 mts.	2.430**	(0.014)
48 mts.	0.165	(0.011)	48 mts.	1.038	(0.017)	48 mts.	-0.162	(0.014)	48 mts.	2.215**	(0.011)	48 mts.	-0.917	(0.009)
obs.	247		obs.	227		obs.	232		obs.	225		obs.	226	

	Size (1)			Size (2)			Size (3)			Size (4)			Size (5)	
	Monthly Mean AR	*Std. Err.*		*Monthly Mean AR*	*Std. Err.*		*Monthly Mean AR*	*Std. Err.*		*Monthly Mean AR*	*Std. Err.*		*Monthly Mean AR*	*Std. Err.*
12 mts.	3.545***	(0.005)	12 mts.	3.119***	(0.005)	12 mts.	3.498***	(0.005)	12 mts.	2.594***	(0.005)	12 mts.	4.112***	(0.006)
24 mts.	1.556	(0.009)	24 mts.	1.999*	(0.011)	24 mts.	1.339	(0.012)	24 mts.	0.476	(0.011)	24 mts.	1.337	(0.009)
36 mts.	-0.976	(0.015)	36 mts.	1.537	(0.017)	36 mts.	-1.151	(0.022)	36 mts.	2.436**	(0.008)	36 mts.	2.296**	(0.013)
48 mts.	0.165	(0.013)	48 mts.	0.382	(0.012)	48 mts.	0.259	(0.015)	48 mts.	1.330	(0.011)	48 mts.	1.780*	(0.015)
obs.	259		obs.	252		obs.	216		obs.	232		obs.	220	

5.2.3 Experienced firms versus non-experienced firms

The sample can be split into two subsamples: one with firms having experience in repurchasing versus those without experience. To research if the experienced sample differs from the non-experienced sample, an independent sample t-test is performed between the two groups, which indirectly tests the difference between unrestricted and restricted portfolios. The two average returns are compared. Table 9 reflects the results.

Table 9: Two-sample t-test for restricted versus unrestricted portfolios

This table reports the results of the two-sample t-test, which indicates if the variance of the unrestricted portfolio is equal to the variance of the restricted portfolio in the full sample. The observation and mean AR for both groups are given. In addition, the obtained t-value and the standard error are displayed in the table. ***, **, and * denote the statistical significance at the 1%, 5%, and 10% levels, respectively.

	Full sample			
	Obs.	*Mean AR*	*t-value*	*Std. Error*
Non-experienced sample	44	0.024	1.05	0.011
Experienced sample	1,188	0.013		

Since the t-value is not significant, it cannot be stated that one group obtains higher returns than the other group. It should also be noted that the non-experienced group is much smaller than the experienced group. Hypothesis 13, *Companies which repurchase infrequently obtain higher ARs than companies which repurchase frequently*, is supported by the results.

6 Conclusion

Due to regulation changes in the Chinese market, an increase in actual repurchases can be observed. This thesis studied the short- and long-term effects and whether the identified repurchase motives hold for Chinese managers. In section 6.1, the conclusions are presented. To answer the research question in a structured manner, section 6.1.1 provides the short-term results and section 6.1.2 the long-term findings. Lastly, in section 6.2, the study limitations and recommendations for further research are described.

6.1 Conclusions

6.1.1 Short-term

To study the short-term price performance, several analyses were performed. In general, it can be concluded that Chinese firms experience lower price performance before a buyback is announced. The average AR becomes positive two days before the announcement, which can possibly indicate insider trading. In the period before a repurchase is announced, negative ARs can be observed. This can be a signal to increase the stock price or to take advantage of the undervaluation of the stock. After the announcement, positive ARs are shown, as expected based on prior literature. This is in accordance with the findings of Zhang (2005) and Yang et al. (2020), for the Chinese market specifically.

The efficient market hypothesis states that the market is not expected to react to new information published by firms as all information is already incorporated in market prices (Ikenberry et al., 2000). The results of this thesis are not in line with this hypothesis. However, the overreaction hypothesis is confirmed based on the results. Chinese firms with high negative prior returns have high positive post-announcement ARs and vice versa. Evidence is also found for the concept of return reversal. Finally, the best predictor of short-term post-announcement results is the CAR relating to the event window (0, 2), in line with Zhang (2005).

Moreover, evidence for the information-signalling theory is found when studying the BTM quintiles, which is in line with prior literature. Value stocks show better post-event market performance in the short-term than glamour stocks. However, this is not confirmed by the size quintiles. Gan et al. (2017) and Yang et al. (2020) have found that the size factor explaining the CARs was not significantly different from 0 for their Chinese sample. This study finds a significant positive coefficient in the cross-sectional regression. Nonetheless, this coefficient is almost equal to 0.

Firms with higher cash ratios and low Tobin's Q are more likely to engage in overinvesting (Nohel and Tarhan, 1998). When such firms announce a repurchase programme, the AR should be more positive than for firms which are less likely to overinvest. This is confirmed by the results when comparing the cash ratio quintiles. However, the findings of the quintiles related to Tobin's Q do not support this. Based on the cash ratio results, the cashflow hypothesis can be argued as valid.

To research the capital structure hypothesis, the D/E ratio was studied, and the results show that firms with high D/E ratios have higher returns. Therefore, it could be concluded that Chinese firms with high D/E ratios experience higher returns. However, by studying the D/E ratio, it has not been proven that firms move to an optimal capital structure. Furthermore, it should be noted that the result in the cross-section regression was not significant.

Lastly, the dividend pay-out ratio was incorporated to study the dividend substitution theory. The negative short-term results found in the cross-sectional regression were not significant. However, firms with lower dividend pay-out ratios obtained higher ARs than firms with high dividend pay-out ratios.

6.1.2 Long-term

When examining the full-sample long-term results, positive ARs are found. This provides evidence of the buyback anomaly, which is best described by positive returns which continue to exist in the long-term after repurchase announcements. These findings are in line with prior literature. In addition, value stocks obtain higher results than glamour stocks for the 12-month ARs, supporting the undervaluation form of the information-signalling hypothesis.

The good investment hypothesis states that executives make actual repurchases when they perceive their shares as undervalued. Based on the results, evidence is found to confirm this hypothesis. However, it has been found that larger firms experience larger ARs than smaller firms, which is in contrast to prior literature and does not provide evidence for the information-signalling theory. A possible explanation for the insignificance of the results of the 36- and 48-month portfolios is that firms were started to be encouraged to make buybacks after 2018. As visualised in figure 1, relatively numerous firms began to repurchase stocks after these changes in legislation. Since the sample covers the period until 2020, the sample for the 36- and 48-month portfolios was smaller, possibly leading to insignificant results.

Finally, the quintiles were constructed based upon unrestricted portfolios. The difference between restricted and unrestricted portfolios was tested for the full sample; however, this did not show significant results. This can possibly be attributed to the low number of observations in the non-experienced group. It could also indicate that it does not matter which type of portfolio is used for this sample. Furthermore, it can be noted that a large percentage of the total sample has repurchased shares frequently, making it more difficult to find a large enough sample of inexperienced companies.

6.1.3 Robustness

To validate the results of the research, a robustness checks has been performed. These tests double-check the validity of the results found during research and confirm whether or not the dependent and independent variables have the relationship described by the thesis. By constructing quintiles, a first check of the full sample results is done. Although this is a part of the main analysis, splitting the

dataset can be seen as a robustness check as the model is tested for different portfolios. In addition to the quintiles, extra regressions with a randomly chosen subsample of the main dataset were performed. The analysis was identical to the regressions discussed throughout this study. Tables A5, A6, and A7 represent the findings of the short-term, cross-sectional, and long-term results with smaller samples.

Concerning the short-term outcomes, the result relating to the event window (0, 2) remains significant at the 1% level, as expected based on Zhang (2005). However, the result for the pre-announcement period becomes less significant. The BTM variable in the cross-section also becomes less significant, which is in contrast to the coefficients of Tobin's Q and cash ratio. These ratios become significant at the 10% confidence level. The long-term results are almost identical to the full-sample results; however, it should be noted that the confidence level of the 24-month portfolio decreases to the 5% level. These findings indicate that the model holds true but benefits from a larger sample size to be more reliable in estimating the expected relationships.

6.2 Limitations and further research

This study is subject to several limitations. To begin, the sample covers the period 2010–2020. During this time, interest rates were low, and therefore debt was cheap to obtain, which stimulated the world economy and, by extension, the Chinese economy. During this period, the longest bull market in history was recorded. This could have positively influenced the results as it would be more beneficial to make repurchases under these circumstances.

As shown in the methodology, different short- and long-term methods can be used to measure abnormal stock returns. Every method has advantages and disadvantages; for instance, the cross-sectional regression ignores the time series. In addition, the model does not consider that firms can have extra money available for additional repurchases. Lastly, the regulatory conditions changed over time, which is not studied specifically. Thus, future research can analyse the Chinese market using different methods.

In addition, the complete sample had to be trimmed because of missing data in the firm characteristics. When more data are available, the dataset would be more complete and consequently be larger, including potentially less successful attempts at buybacks. Moreover, many firms started repurchasing after 2018, resulting in the fact that mainly the 36- and 48-month portfolios did not show significant results. It would be interesting to study the long-term results in the future, when an up-to-date dataset is available. It would also be insightful to further study the concept of insider trading before repurchase announcements by adding trade volume in the pre-event windows. In addition, the size factor could be studied more thoroughly by, for example, adding total assets. Lastly, state ownership could be incorporated in future studies since no firms in this sample had 50% or more shares owned by the government.

Finally, for this thesis, several firm characteristics were chosen to determine the motivations. Additional research can study these motivations more thoroughly by examining additional

characteristics using different analyses. Moreover, due to relatively low R-squared values in the cross-section, it is important to interpret the results with caution.

Overall, this study is the first to examine the short- and long-term results for this sample in the Chinese market. This is especially important since Chinese samples in the prior literature were mostly obtained from the period before 2018. It could be argued that this study was done too early as the long-term effects cannot be fully explored yet, but the results show promising signals that the expected long-term effects also apply to this market. Further research could study the long-term differences in ARs before, and the differences in returns before and after, changes in legislation.

References

Akyol, A. C., & Foo, C. C. (2013). Share Repurchase Reasons and the Market Reaction to Actual Share Repurchases: Evidence from Australia. *International Review of Finance*, *13*(1), 1-37

Allen, F., Bernardo, A. E., & Welch, I. (2000). A theory of dividends based on tax clienteles. The journal of finance, 55(6), 2499-2536.

Bagwell, Laurie S. 1991. Share repurchase and takeover deterrence. RAND Journal of Economics 22:72–88.

Beltratti, A., Bortolotti, B., & Caccavaio, M. (2012). The stock market reaction to the 2005 split share structure reform in China. Pacific-Basin Finance Journal, 20(4), 543-560.

Ben-David, I., Graham, J. R., & Harvey, C. R. (2007). Managerial overconfidence and corporate policies (No. w13711). National Bureau of Economic Research.

Bloomberg. (2019) Companies Use Borrowed Billions to Buy Back Stock, Not to Invest. Retrieved from: https://www.bloomberg.com/news/articles/2019-08-08/companies-use-borrowed-billions-to-buy-back-stock-not-to-invest

Brown, S. J., & Warner, J. B. (1985). Using daily stock returns: The case of event studies. Journal of financial economics, 14(1), 3-31.

Busch, P., & Obernberger, S. (2017). Actual share repurchases, price efficiency, and the information content of stock prices. The review of financial studies, 30(1), 324-362.

Comment, R., & Jarrell, G. A. (1991). The relative signalling power of Dutch-auction and fixed-price self-tender offers and open-market share repurchases. The Journal of Finance, 46(4), 1243-1271.

De Cesari, A., Espenlaub, S., & Khurshed, A. (2011). Stock repurchases and treasury share sales: Do they stabilise price and enhance liquidity?. Journal of Corporate Finance, 17(5), 1558-1579.

Dittmar, A. K. (2000). Why do firms repurchase stock. The journal of Business, 73(3), 331-355.

Dittmar, A., & Field, L. C. (2015). Can managers time the market? Evidence using repurchase price data. Journal of Financial Economics, 115(2), 261-282.

Faccio, M., & Lang, L. H. (2002). The ultimate ownership of Western European corporations. Journal of financial economics, 65(3), 365-395.

Fama, E. F., & French, K. R. (1992). The cross-section of expected stock returns (pp. 349-391). University of Chicago Press.

Firth, M., & Yeung, C. S. (2005). An empirical investigation of share buybacks in Hong Kong. Journal of Emerging Market Finance, 4(3), 207-225.

Fu, F., & Huang, S. (2016). The persistence of long-run abnormal returns following stock repurchases and offerings. Management Science, 62(4), 964-984.

Gan, C., Bian, C., Wu, D., & Cohen, D. A. (2017). Determinants of share returns following repurchase announcements in China.

Ginglinger, E., & L'her, J. F. (2006). Ownership structure and open market stock repurchases in France. European Journal of Finance, 12(1), 77-94.

Grullon, G., & Ikenberry, D. L. (2000). What do we know about stock repurchases?. Journal of Applied Corporate Finance, 13(1), 31-51.

Grullon, G., & Michaely, R. (2004). The information content of share repurchase programs. The Journal of Finance, 59(2), 651-680.

Grullon, G., & Ikenberry, D. L. (2000). What do we know about stock repurchases? Journal of Applied Corporate Finance, 13(1), 31-51.

Grullon, Gustavo and Roni Michaely (2002) Dividends, share repurchases, and the substitution hypothesis. The Journal of Finance 57, no. 4 (August): 1649-1684.

Hillert, A., Maug, E., & Obernberger, S. (2016). Stock repurchases and liquidity. Journal of financial economics, 119(1), 186-209.

Huang, H. (2010, August). Stock Repurchase Motivation and Effect of signalling: A Comparative Analysis between U.S. and China. In 2010 International Conference on Management and Service Science (pp. 1-5).

Ikenberry, D., Lakonishok, J., & Vermaelen, T. (1995). Market underreaction to open market share repurchases. Journal of financial economics, 39(2-3), 181-208.

Jagannathan, M., & Stephens, C. (2003). Motives for multiple open-market repurchase programs. Financial management, 71-91.

Jensen, M. C. (1986). Agency costs of free cash flow, corporate finance, and takeovers. The American economic review, 76(2), 323-329.

Jiang, F., Jiang, Z., & Kim, K. A. (2020). Capital markets, financial institutions, and corporate finance in China. Journal of Corporate Finance, 63, 101309.

John, K., & Williams, J. (1985). Dividends, dilution, and taxes: A signalling equilibrium. the Journal of Finance, 40(4), 1053-1070.

Lakonishok, J., Shleifer, A., & Vishny, R. W. (1994). Contrarian investment, extrapolation, and risk. The journal of finance, 49(5), 1541-1578.

Lang, L. H., & Litzenberger, R. H. (1989). Dividend announcements: cash flow signalling vs. free cash flow hypothesis?. Journal of financial economics, 24(1), 181-191.

Lee, Y. G., Jung, S. C., & Thornton Jr, J. H. (2005). Long-term stock performance after open-market repurchases in Korea. Global Finance Journal, 16(2), 191-209.

Lie, Erik, 2000, Excess funds and agency problems: An empirical study of incremental cash disbursements, Review of Financial Studies 13, 219–247.

Lo, K. H., Wang, K., & Yeh, C. T. (2008). Stock repurchase and agency problems: New evidence in Taiwan's stock market. Emerging Markets Finance and Trade, 44(1), 84-94.

Loughran, T., & Ritter, J. R. (2000). Uniformly least powerful tests of market efficiency. Journal of financial economics, 55(3), 361-389.

Lyon, J. D., Barber, B. M., & Tsai, C. L. (1999). Improved methods for tests of long-run abnormal stock returns. The Journal of Finance, 54(1), 165-201.

MacKinlay, A. C. (1997). Event studies in economics and finance. Journal of economic literature, 35(1), 13-39.

Miller, M. H., & Modigliani, F. (1961). Dividend policy, growth, and the valuation of shares. the Journal of Business, 34(4), 411-433.

Mitchell, J. D., Dharmawan, G. V., & Clarke, A. W. (2001). Managements' views on share buybacks: an Australian survey. Accounting & Finance, 41(1-2), 93-129.

Nohel, T., & Tarhan, V. (1998). Share repurchases and firm performance:: new evidence on the agency costs of free cash flow. Journal of Financial Economics, 49(2), 187-222.

Otchere, I., & Ross, M. (2002). Do share buyback announcements convey firm-specific or industry-wide information?: A test of the undervaluation hypothesis. International Review of Financial Analysis, 11(4), 511-531.

Peyer, U., & Vermaelen, T. (2009). The nature and persistence of buyback anomalies. The Review of Financial Studies, 22(4), 1693-1745.

Rau, P. R., & Vermaelen, T. (2002). Regulation, taxes, and share repurchases in the United Kingdom. The Journal of Business, 75(2), 245-282.

Rees, W. (1996). The impact of open market equity repurchases on UK equity prices. The European Journal of Finance, 2(4), 353-370.

Shiller, R. J. (1984). Smoothness priors and nonlinear regression. Journal of the American Statistical Association, 79(387), 609-615.

Skjeltorp, J. A. (2004). The market impact and timing of open market share repurchases in Norway. Norges Bank.

Stephens, Clifford P., and Weisbach, Michael J. 1998. Actual share reacquisitions in open-market repurchase programs. Journal of Finance 53:313–34.

Stiglitz, J. E. (1989). Financial markets and development. Oxford Review of Economic Policy, 5(4), 55-68.

Su, N. H., & Lin, C. J. (2012). The impact of open-market share repurchases on long-term stock returns: evidence from the Taiwanese market. Emerging Markets Finance and Trade, 48(sup2), 200-229.

Tian, L., & Estrin, S. (2008). Retained state shareholding in Chinese PLCs: does government ownership always reduce corporate value? Journal of Comparative Economics, 36(1), 74-89.

Vafeas, N., & Joy, O. M. (1995). Open market share repurchases and the free cash flow hypothesis G35. Economics letters, 48(3-4), 405-410.

Vermaelen, T. (1981). Common stock repurchases and market signalling: An empirical study. Journal of financial economics, 9(2), 139-183.

Voss, J. (2012). Why do Firms Repurchase Stock? Major Themes in Economics, 14(1), 55-75.

Wansley, J. W., Lane, W. R., & Sarkar, S. (1989). Managements' view on share repurchase and tender offer premiums. Financial Management, 97-110.

Warr, R. S., Elliott, W. B., Koëter-Kant, J., & Öztekin, Ö. (2012). Equity mispricing and leverage adjustment costs. Journal of Financial and Quantitative Analysis, 47(3), 589-616.

Yang, D., Wang, G., & Wang, Y. (2020). Does the new round of Company Law revision in China affect market reaction to share repurchase announcements? Applied Economics Letters, 27(15), 1229-1233.

Yelin, Z., Yunying, W., & Jiaming, Z. (2016, June). Research on Share Repurchase of Chinese Listed Company. In 7th International Conference on Education, Management, Information and Computer Science (ICEMC 2017) (pp. 560-565). Atlantis Press.

Zhang, H. (2002). Share repurchases under the commercial law 212-2 in Japan: Market reaction and actual implementation. Pacific-Basin Finance Journal, 10(3), 287-305.

Zhang, H. (2005). Share price performance following actual share repurchases. Journal of Banking & Finance, 29(7), 1887-1901.

Appendix

Table A1: Definitions

This overview depicts all the variables used in the various analyses throughout this study.

Variable	*Description of variable*
AR	Abnormal return in % calculated by the market model.
CAR (-10, -1)	Cumulative abnormal return in % from 10 days prior to 1 day prior to the repurchase event.
CAR (0, 2)	Cumulative abnormal return in % from the event date to 2 days after the event date.
CAR (0, 10)	Cumulative abnormal return in % from the event date to 10 days after the event date.
Ln (SIZE)	Natural logarithm of the market value of a company on the event date.
BTM	Book-to-market ratio of a firm on the event date, calculated by dividing the balance sheet value of the ordinary equity of the company by the market value of the ordinary equity.
Prior six months	Returns from 125 trading days before the announcement date
Tobin's Q	Tobin's Q is calculated by dividing the total market value of the firm by the total replacement costs of the assets.
Cash ratio	The cash ratio is calculated by adding cash to short-term investments and consequently dividing the total by the total assets.
DE ratio	The D/E ratio is calculated by dividing the long-term debt, short-term debt, and current portion of long-term debt by the common equity.
Dividend pay-out	The dividend pay-out ratio is defined as the cash dividend divided by the cashflow.

Table A2: Multicollinearity test

This table shows the results of the multicollinearity test. The test is incorporated to check the variables used in the cross-sectional regression on the post-event CARs.

Multicollinearity test on the cross-sectional regression	*VIF*	*1/VIF*
Ln (size)	1.07	0.93
BTM	1.05	0.95
Prior six months return	1.06	0.95
Tobin's Q	7.52	0.13
Cash ratio	1.05	0.95
D/E ratio	7.51	0.13
Dividend pay-out ratio	1.02	0.98
CAR (-10, -1)	1.01	0.99

Table A3: Correlation matrix of cross-sectional variables

This table shows the correlations between the different variables used in the cross-sectional ordinary least squares (OLS) regression. Ln(size) is the size of the firm, measured in market value on the day of the repurchase announcement, having a natural logarithm scale. BTM indicates the book-to-market value of the firm, published in the most recent prior report. The prior six months return indicates the return in the previous 125 trading days. Tobin's Q is defined as the market value of assets to the replacement cost of assets. The cash ratio is the cash plus short-term investments, divided by the total assets. The D/E ratio represents the debt relative to the common equity in the most recent report of the company. The dividend pay-out ratio is defined as the cash dividend divided by the cashflow. As a control variable, CAR (-20,-1) is added in the regression. ***, **, and * denote the statistical significance at the 1%, 5%, and 10% levels, respectively.

Variables	*(1)*	*(2)*	*(3)*	*(4)*	*(5)*	*(6)*	*(7)*	*(8)*	*(9)*	*(10)*
(1) CAR (0, 2)	1									
(2) CAR (1, 10)	0.514*	1								
(3) Size	0.071*	0.024	1							
(4) BTM	0.116*	0.082*	-0.001	1						
(5) Prior six months	-0.062*	-0.151*	0.011	-0.230*	1					
(6) Tobin's Q	-0.023	-0.003	-0.614*	0.044	0.058	1				
(7) Cash ratio	-0.005	0.026	-0.537*	0.012	0.022	0.497*	1			
(8) D/E ratio	-0.006	-0.037	-0.207*	0.014	-0.017	0.122*	0.138*	1		
(9) Dividend pay-out	-0.031	-0.023	0.223*	0.059	0.009	-0.109*	-0.028	0.105*	1	
(10) CAR (-10,-1)	0.130*	0.028	-0.004	-0.035	0.085*	0	0.003	0.007	-0.024	1

Table A4: R-squared of long-term regression model

This table depicts the R-squared values obtained by the long-term calendar time method.

BTM (1)		BTM (2)		BTM (3)		BTM (4)		BTM (5)	
	R2		*R2*		*R2*		*R2*		*R2*
12 mos.	0.213	12 mos.	0.200	12 mos.	0.186	12 mos.	0.182	12 mos.	0.173
24 mos.	0.227	24 mos.	0.225	24 mos.	0.168	24 mos.	0.208	24 mos.	0.274
36 mos.	0.270	36 mos.	0.272	36 mos.	0.445	36 mos.	0.317	36 mos.	0.355
48 mos.	0.197	48 mos.	0.248	48 mos.	0.233	48 mos.	0.255	48 mos.	0.200

Size (1)		Size (2)		Size (3)		Size (4)		Size (5)	
	R2		*R2*		*R2*		*R2*		*R2*
12 mos.	0.217	12 mos.	0.199	12 mos.	0.220	12 mos.	0.210	12 mos.	0.230
24 mos.	0.174	24 mos.	0.163	24 mos.	0.184	24 mos.	0.300	24 mos.	0.270
36 mos.	0.271	36 mos.	0.398	36 mos.	0.377	36 mos.	0.298	36 mos.	0.293
48 mos.	0.202	48 mos.	0.169	48 mos.	0.363	48 mos.	0.176	48 mos.	0.313

Table A5: Robustness check short-term sample

This table provides an overview of the three different event windows of interest throughout this study. The total sample consists of 566 share repurchase announcements. This smaller sample is randomly chosen to test robustness of the full sample. As explained in the methodology, the CARs are calculated using the market model and are averaged per day. The standard error is displayed in parentheses. ***, **, and * denote the statistical significance at the 1%, 5%, and 10% levels, respectively.

		Window		
	Observations	*(-10, -1)*	*(0, 2)*	*(1, 10)*
CAR	566	-1.21	2.77***	0.639
Std. Error		(0.006)	(0.003)	(0.004)

Table A6: Robustness check cross-section

This table is identical to table 6; however a smaller, randomly chosen sample is used to test robustness. The results follow from the cross-sectional ordinary least squares (OLS) regression. The CAR (0, 2) and CAR (1, 10) are regressed on the different firm characteristics studied throughout this thesis. The coefficients are given, and the robust standard errors are in parentheses. The smaller sample consists of 444 announcements, and all variables are winsorised. ***, **, and * denote the statistical significance at the 1%, 5%, and 10% levels, respectively.

Variables	*CAR(0,2)*	*CAR(1,10)*
Size	0.001*	0.001
	(0.001)	(0.001)
BTM	0.012	0.028
	(0.013)	(0.021)
Prior 6 months return	-0.882	-5.616**
	(1.243)	(2.218)
Tobin's Q	7.05e-10*	1.37e-09
	(0.000)	(0.000)
Cash ratio	1.85e-09	3.77e-09*
	(0.000)	(0.000)
D/E ratio	-1.66e-10	-2.29e-10
	(0.000)	(0.000)
Dividend pay-out ratio	3.11e-10	-3.6e-10
	(0.000)	(0.000)
CAR(-10,-1)	0.090***	0.0517
	(0.034)	(0.057)
Constant	-0.004	-0.016
	(0.008)	(0.014)
Observations	444	444
R-squared	0.049	0.045

Table A7: Robustness check long-term sample

This table is incorporated to test the robustness of table 7. The monthly mean ARs are given for the portfolios. The overview shows the standard error and the total observations of the full sample. *** * denote the statistical significance at the 1%, 5%, and 10% levels, respectively.

	Full sample	
	Monthly mean AR	*Std. err.*
12 mos.	5.047***	0.004
24 mos.	1.913**	0.007
36 mos.	-0.464	0.009
48 mos.	0.069	0.007
obs.	631	