“Determinants of share returns following repurchase announcements in China”

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DETERMINANTS OF SHARE RETURNS FOLLOWING REPURCHASE ANNOUNCEMENTS IN CHINA

Abstract

By combining the market model with the three-factor model, this study investigates firms' share returns after the announcement of share repurchase. Employing data for China's A-share market, this study's sample utilizes 417 share repurchase announcements over the period of 2000 to 2012. Empirical results show that firms with higher sales growth rates are more likely to send a positive signal to the market through their share repurchase efforts. Analysis also shows that the higher a firm's price-to-earnings ratio (utilized as a measure of overvaluation), the lower the firm's cumulative abnormal returns. These results imply that Chinese share markets put more emphasis on the firm's future growth and share overvaluation.

Keywords leverage hypothesis, market response, operating performance, repurchase announcements, share repurchase, signaling hypothesis

JEL Classification G14, G23, G32

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INTRODUCTION

Previous studies have discovered that share repurchases typically lead to an increase in share prices (Vermaelen, 1981; Choi, 1997; Stephens & Weisbach, 1998; Born et al., 2004) and improvement in firms' operating performance (Nohel & Tarhan, 1998; Lamba & Luan, 2004). Firms repurchase shares for a variety of reasons; to take advantage of potential undervaluation, distribute excess capital, alter a leverage ratio, fend off takeovers, to change their capital structure and to counter dilution of share options (Dittmar, 2000; Billett & Xue, 2007). Further, repurchasing shares through debt financing could increase the firm's leverage and optimize its capital structure. This could result in the maximization of the firm's intrinsic value. In addition, a securities buyback could convey information that might change investors' expectations of the firm's performance and lead to an increase in share price (Dittmar, 2000).

The institutional environment in China provides a unique context for examining share repurchase motivations. Although the private sector has been growing rapidly (Allen et al., 2005), state-owned enterprises (SOEs) continue to play a dominant role in the Chinese share markets. For example, Chen et al. (2011) reported that 75% of their sample firms were SOEs and documented that 33% of listed SOEs have a chief executive officer (CEO) or chairman who was a current or former government official. Given this, one important motivation of Chinese firms' share repurchases is likely to be the segregation of state-held shares from privately-

held ones. When firms buy back shares from SOE shareholders, government ownership decreases. As the government ownership shrinks through share repurchase, the inefficiency of the firm's performance that results from the government's blockholding and potential intervention may decrease. As a result, investors may view share repurchase as a positive signal, with the firm's abnormal share returns more likely to increase.

This study aims to investigate effect of reduced government ownership through share repurchase on the firm's share returns. The study uses a model that combines the market model (Fama et al., 1969) with the three-factor model (Fama & French, 1992). Our study sample covers 417 share repurchase announcements for the period of 2000 to 2012. The empirical results did not find evidence that share repurchases from SOE shareholders yield higher cumulative abnormal returns (CARs). One likely explanation for this finding is that the size of share repurchases aiming at reducing SOE ownership (55 repurchase announcements) may not be large enough. On the other hand, our results reveal that firms with higher sales growth rate are more likely to send a positive signal to the market through share repurchase. In addition, the results show that the higher a firm's price-to-earnings ratio (measure of overvaluation), the lower the firm's CARs. The results imply that the Chinese share markets put more emphasis on the firm's future growth and share overvaluation.

The remainder of the paper is organized as follows. Section 1 provides the theoretical background of the study. Section 2 describes the data and methods. The econometric estimation results are presented in section 3. Final section concludes the paper with a presentation of limitations and suggestions for future.

1. RELATED LITERATURE AND HYPOTHESES DEVELOPMENT

There is a range of motives for a firm's repurchase of its shares. Born et al. (2004) and Gong (2013) argue that repurchasing typically leads to an increase in share prices, thus increasing the overall value of the firm. In general, firms repurchase their shares to take advantage of potential undervaluation (Jagannathan & Stephens, 2003), distribute excess capital (Skinner, 2008; Andriosopoulos & Hoque, 2013), alter their leverage ratio (Chen, 2013; Gong, 2013; Dobbs & Rehm, 2005), fend off takeovers (Billett & Xue, 2007; Bagnoli & Lipman, 1989) and counter the dilution of firm value by the exercise of share options (Dittmar, 2000). Previous studies have investigated the effects of share repurchase announcements on the firm's price return. These have suggested several hypotheses to explain the repurchase phenomenon: the signaling hypothesis, leverage ratio hypothesis, earning per share hypothesis and other hypotheses focused on government ownership of firms.

The signaling hypothesis proposes that firms repurchase shares to publicly convey the management expectation of improvement in the firm's earnings (Mitchell et al., 2001). Managers are thought to have more complete information about the company. They are more likely to have access to have proprietary data that would increase the accuracy of future cash flow and earnings predictions, as well as estimates of the fair valuation of shares traded in the share market (Grullon & Ikenberry, 2000). Thes share price usually fails to reflect this because investors only have access to the public information. Hence, Grullon and Ikenberry (2000) argue that in pursuing share repurchases, managers are not trying to send new information to the market but rather to express their disagreement with how the market is evaluating their current performance. By way of announcing share repurchases, managers are attempting to send a signal to the market that the firm's share prices are undervalued.

Firms also repurchase shares to express their disagreement with the way the market is interpreting the available public information (Jagannathan & Stephens, 2003). This view suggests that in a market where information asymmetry exists, managers are better informed than shareholders – managers can use share repurchase to signal better future prospects or undervalu-

ation shareholders (Grullon & Ikenberry, 2000; Grullon & Michaely, 2004). Dann et al. (1991) suggested that undervaluation is suspected when there appears to be poor price performance prior to share repurchases as well. Stephens and Weisbach (1998) documented negative abnormal returns prior to repurchase announcements. This suggests that firms repurchase shares when managers think they are undervalued. Consistent with the undervaluation view, Ikenberry et al. (1995) found negative returns following prior announcements, which indicates that these firms were undervalued at the time of the announcement of repurchase programs.

Peyer and Vermaelen (2009) argued that managers initiate share repurchase programs not because they think the future prospects are improving, but because they disagree with the market's assessment that the firm's performance is falling. The authors challenge that share repurchase is driven by the management belief that the market has overreacted to some past publicly accessible information. This implies that abnormal returns prior to the share repurchase should be the best predictor of long-term abnormal returns. Ikenberry and Vermaelen (1996) suggested that a repurchase program is an option that gives a firm the ability to swap its market value for its true intrinsic value if the future market prices are lower than the true intrinsic value. Thus, a firm grants itself an option through announcing a share repurchase program, and the positive value of this option can be reflected in the abnormal returns accruing from the announcement (Oded, 2005).

In support of the signaling hypothesis, Padgett and Wang (2007) documented information leakages before the announcements of share repurchases in Thailand, while providing evidence of positive abnormal returns on announcement days. Using Canadian data, Li and McNally (2007) found that firms are more likely to buy back shares if insiders have large holdings, greater free cash flows, lower market-to-book ratios and have suffered poor prior share market performance. They also found that the volume of private information is positively associated with the announcements returns. Using a sample of 185 Chinese mainland share repurchases, Gong (2013) found that the higher a firm's growth rate and the smaller the size of the company's holding is likely to bring higher abnormal returns. Flannery et al. (2013) observed that information asymmetry between bank managers and outside investors sharply increased during the 2008 global financial crisis. They suggested that a share's bid-ask spread must compensate for the market maker's information asymmetry.

The information signaling hypothesis indicates that the market is more likely to respond positively to small firms' share repurchase announcements. This is probably because small firms are more likely to send a positive signal to the market and their share repurchase announcements tended to contain more information than those released by large firms (Vermaelen, 1981). In addition, firms with higher sales growth rates and greater profitability are more likely to send a positive signal to the market through share repurchase efforts. In his study of a sample of Chinese public firms' share repurchases, Gong (2013) found that both firm growth rate and smaller volumes of firm holdings bring higher abnormal returns, thus supporting the signaling hypothesis. Given these empirical results, the current study hypothesized the following relationships:

H (1): The higher a firm's sales growth rate, the higher the firm's cumulative abnormal returns (CARs);

H (2): The higher a firm's profitability, the higher the firm's CARs; and

H (3): The smaller the size of a firm, the higher the firm's CARs.

The leverage ratio hypothesis posits that repurchasing shares through debt financing could increase the debt ratio and optimize the capital structure of the firm (Dittmar, 2000). Dittmar argued that if a firm has a low level of debt in its capital structure, then share repurchase with debt financing could increase debt and reduce equity. This would push the firm's debt-to-equity ratio toward the firm's presumed optimal ratio. Similarly, Chan et al. (2004) argued that managers try to increase the leverage ratios by buying back shares. In addition, leveraged share repurchases could send investors the message that the acquisition of more debt indicates greater managerial confidence in the firm's

future (Gong, 2013). Park and Jung (2005) used a sample of Korean firms for the period 1994 to 2000 to test this leverage ratio hypothesis. The study's results demonstrated that share repurchases by firms with high leverage ratios experienced higher abnormal returns. Lo et al. (2008) found that firms that repurchase shares though borrowing tend to increase agency problems. Hence, firms that use debt to implement share repurchase would be expected to have higher cumulative abnormal returns. The following relationship is thus hypothesized:

H (4): The higher the leverage ratio, the higher the CARs to the firm.

The 'undervaluation' hypothesis implies that firms repurchase shares to express their disagreement on how the market prices existing public information (Jagannathan & Stephens, 2003). The undervaluation view suggests that in a market where information asymmetry exists, managers are better informed than shareholders, and managers can use share repurchase to signal better future prospects or undervaluation to shareholders (Grullon & Ikenberry, 2000; Grullon & Michaely, 2004). Both Ginglinger & L'her (2006) and Grullon & Ikenberry (2000) found a positive association between CAR and the undervaluation of the firm's share prices based on the information signaling hypothesis. Consistent with Grullon and Michaely (2004), we use price-earnings (PE) ratio to measure the degree of overvaluation of a firm's share. The higher the PE, the higher the overvaluation of the firm's shares, and thus the lower CAR. The following relationship is hypothesized:

H (5): The higher a firm's price-earnings ratio (overvaluation), the lower the firm's CARs.

The social hypothesis states that maximizing social welfare is the government's main role and SOEs should help the government by allocating resources to socially beneficial projects and firms in certain industries which have limited access to funds (Dey and Nair, 2013; Gerschenkron, 1962). If the social hypothesis holds, then higher government ownership of firms will be positivity associated with higher long-run economic growth rates. Based on the social hypothesis, Chen et al. (2006) argued that SOEs tend to have social and political objectives such as increasing the employment rate, owing to their political connections. SOEs are thereby more likely to be seen to have a wealth redistribution orientation rather than one of wealth creation.

Using a large data set drawn from Chinese public firms for the period 1994 to 2004, Tian and Estrin (2008) examined how government ownership influenced firms' market performance. The authors find the effect of government ownership on corporate value to be curvilinear, up to a certain threshold; as government shareholding increases firms' value decreases; beyond this threshold, the value of firms increases. Tian and Estrin suggest that the value of a firm actually increases when government shareholding is relatively large. The authors also advance the notion that ownership concentration and government partiality may explain their findings.

Another strand of literature is built on the government ownership view (Tirole, 1994), which states that the lack of oversight makes it possible for SOE managers to choose appropriate resources for their personal use. In addition, politicians are able to use SOEs as a tool for gaining political leverage. Based on the government ownership view, Sun and Tong (2003) used market-to-book ratio, net income to sales and operating income to measure the performance of Chinese public firms. They found a significant negative relationship (at the 10% level) between government ownership and firm value. Based on this reasoning, when firms buy back shares from government shareholders, both the degree of government ownership and influence they have over the firm's operations are likely to decrease. In addition, the repurchasing firm's operating efficiency may increase as a consequence of reduced government ownership. As a result, investors view share repurchasing as a positive signal and a firm's abnormal share returns are thus more likely to increase. Based on the above arguments, the following relationship is hypothesized:

H (6): Repurchasing from SOE shareholders will yield higher CARs to the firm.

2. METHODS

2.1. Data collection

The history of share repurchase in China can be separated into three stages: an early stage from 1992 to 2005, a transitional stage from 2005 to 2008 and a continuing developmental stage after 2008 (Gong, 2013). Our initial sample time frame spans from 1992 to 2012 in order to capture all three share repurchase stages. However, prior to 2000, only one firm announced a share repurchase program. We therefore dropped the years prior to 2000. Our sample thus includes 417 share repurchase announcements for the period of 2000 to 2012.

The name of the repurchasing firm, the day of repurchase, the number of shares repurchased and other details relevant to the repurchase of shares were obtained from the China Stock Market and Accounting Research (CSMAR) database. Firm characteristics used in the multi-factor regression models were also retrieved from the CSMAR database.

The Chinese stock market is unique because of its triple-trading scheme. Domestic investors can only trade A (local) shares. Foreign investors are restricted to trading B (foreign) shares, which are denominated in US dollars, whilst investors in Hong Kong (and elsewhere) trade H shares denominated in Hong Kong dollars (Wang & Jiang, 2004). Fernald and Rogers (1998) suggested that although the two share types (A and B) have the same characteristics such as voting and profit-sharing rights, foreign investors pay a smaller price for B shares than for the equivalent A shares. One important characteristic of the B shares is that they are traded at an average discount of about 60% to the prices at which domestic A shares are traded (Chakravarty et al., 1998). This is because foreign investors have less information about Chinese shares than domestic investors. Therefore, we deleted 12 B share repurchase announcements in our analysis. We also deleted 15 H share announcements because these shares are only available to Hong Kong and international investors. Moreover, Wang and Jiang (2004) found that H shares are more exposed to Hong Kong market risks and display behaviors similar to other shares traded in the Hong Kong market. This resulted in a final sample size of 364 repurchase announcements for the period of 2000 to 2012.

Following Grullon and Michaely's (2004) method, we use the first announcement in the month as the data event, when a firm issues multiple repurchase announcements during the same month. This is a data proximity problem, because if two repurchase announcements are very close to each other (say, within the same month), then it will be very difficult to distinguish the cumulative abnormal returns of the two (or more) such adjacent announcements.

2.2. Calculation of cumulative abnormal returns

Fama et al. (1969) studied stock splits using the market model to examine abnormal returns. The intercept and slope from the regression of a stock's return on the market return, estimated outside the event period, were used to estimate the stock's expected returns conditional on market returns during the event. The market model regresses a share's returns and returns on the market via ordinary least squares (OLS) and uses this relationship to produce the fitted or expected returns during the estimation window. In the present case, the model can be written as:

$$R_{i,t} = \beta_0 + \beta_1 R_{m,t} + e_{i,t} \quad (1)$$

where $R_{i,t}$ – return for security i on day t;

$R_{m,t}$ – return for the market index on day t;

β_i – the market model slope for security i;

$e_{i,t}$ – random error term for security i on day t.

According to equation (1), once the fitted value $(\widehat{R_{i,t}})$ is obtained from the market model, the abnormal return (AR) for firm i on day t through the event window can be calculated as:

$$AR_{i,t} = R_{i,t} - \widehat{R_{i,t}}. \quad (2)$$

Banz (1981) argued that the market model failed to include anomalies in the cross-section of average returns. Fama (1998) suggested that event study methods should address the issue of anomalies in the cross-section of average returns. Further, Fama pointed out that the cross-section of expected returns could produce imperfect descriptions of average returns, which might then lead to biased estimations.

Other studies have used an asset pricing model to estimate abnormal returns (Fama, 1998; Gong, 2013). Some earlier studies use the capital asset pricing model (CAPM) to estimate the long-term abnormal returns (Jaffe, 1974; Asquith et al., 1983). For example, Asquith et al. (1983) calculate the excess return for an asset *i* as the difference between the actual return to the asset *i* and the return to its control portfolio. Asquith et al. grouped all securities listed on the New York Stock Exchange into ten equal control portfolios ranked according to their betas. The observed returns to the control portfolio have approximately the same beta as the asset *i*. However, Fama and French (1992) suggested that the CAPM of Sharpe (1964) and Lintner (1965) did not describe expected returns on small-capitalization shares, arguing this was due to the bias of the sample towards large firms. They further argue, as did Fama (1998), that the risk adjustment with the CAPM can produce inaccurate abnormal returns when an event sample comprises mainly small-capitalization shares.

Fama and French (1992) argued that average stock returns are also related to book-to-market equity (BE/ME) and firm size. The authors also emphasized that it is inappropriate to use the three-factor model to estimate the reaction of stock prices to firm-specific events such as share repurchases or splits. Later, Fama (1998) maintained that the market model was appropriate for estimating the reaction of stock prices to firm-specific events, but the market model failed to produce perfect descriptions of average returns, which could lead to biased estimation. Therefore, we add the firm's book-to-market equity (BM) and firm size (Size) to the market model in equation (1).

$$R_{i,t} = \beta_0 + \beta_1 R_{m,t} + \beta_2 BM_{i,t} + \beta_3 Size_{i,t} + e_{i,t}. \quad (3)$$

The next step is to obtain the fitted value ($\widehat{R_{i,t}}$) from equation (3), and use equation (2) to calculate AR for firm *i* on day *t* through the event window. Next, we calculate the CARs during the event window (-20, 20) as follows:

$$CAR(-20,20) = \sum_{t=-20}^{20} AR_{i,t}. \quad (4)$$

Prior studies generally used event windows of a month or wider, in order to capture more share return behavior before and after the share repurchase agreement event. For example, Grullon and Michaely (2004) collected monthly data across 73 months to estimate their model. Hatakeda and Isagawa (2004) gathered daily stock return data on each of their sample firms for periods that began 20 days before and 20 days after repurchase. Consistent with Hatakeda and Isagawa (2004), our event window ranges from 20 days prior to the repurchase announcements to 20 days after repurchase, a total of 40 days.

2.3. Multi-factor model

Gong (2013) includes other variables in the regression model to test factors that may affect abnormal returns during the event window. These variables include sales growth rate (SGR), return on equity (ROE), liabilities-to-assets rate (LAR), company size (SIZE), price-to-earnings rate (PE), and the largest shareholder's share-holding rate (LSSR). Gong's results show positive associations between SGR, ROE and CAR, which imply that Chinese investors put more emphasis on the firm's future growth and profitability. Further, the analysis shows a negative association between firm size and CAR, which suggests that the smaller the company, the bigger the repurchase announcement effect. There was also a positive relationship between LSSR and CAR reported, which suggests the more confidence large blockholders have in the firm's future, the higher the abnormal return earned. Gong failed to find any relationship between the liabilities-to-assets rate and price-to-earnings rate.

We use equation (5) to test hypotheses (1) to (6)

$$\begin{aligned} CAR(-20,20) &= \beta_0 + \beta_1 SG_i + \beta_2 ROE_i + \\ &+ \beta_3 lnLEVERAGE_i + \beta_4 SIZE_i + \beta_5 PE_i + \\ &+ \beta_6 GOV_SELL_i + \beta_7 ESOP_i + E_{i,t}. \end{aligned} \quad (5)$$

Equation (5) uses sales growth rate (*SG*) and return on equity (*ROE*) to capture the firm's future earning ability. Ho et al. (1997) found that a firm's abnormal stock return following a share repurchase announcement is positively related to preceding sales growth. Gong (2013) studied the share repurchases of a sample of Chinese public firms, finding that greater profits, measured by *ROE*, lead to higher abnormal returns.

In equation (5), *lnLEVERAGE* is the natural logarithm of book leverage. Dittmar (2000) argued that if a firm has a low level of debt in its capital structure, then share repurchase with debt financing could increase debt, reduce equity and thus increase the firm's debt-to-equity ratio toward the optimal ratio. Chan et al. (2004) argue that managers do attempt to increase the leverage ratios by buying back shares. In addition, share repurchases with leverage send investors the message that the more debt a firm incurs, the more confident are the mangers about the firm's future (Gong, 2013).

SIZE in equation (5) represents firm size and is measured by the firm's logarithm of gross sales. Vermaelen (1981) suggests that small firms' repurchases contain more information than large firms, thus the abnormal returns should be large for small firms compared to large firms. Zhang (2005) uses actual share repurchase data from the Hong Kong market to investigate share price returns, finding that the market appears to favor most share repurchases made by small firms.

We use price-to-earnings ratio (*PE*) to measure overvaluation. *PE* measures the discrepancy between the firm's market price (*P*) and intrinsic value (*E*) (Grullon & Ikenberry, 2000). If the *PE* equals 5, it implies that it takes five years for the firm's investor to return the initial investment (market price), assuming the current firm's earnings are constant. Hence, the higher the PE, the higher the overvaluation of the firm's shares (Grullon & Michaely, 2004). If the company decides to buy back shares in order to deliver the message of stock price undervaluation, then the *CAR*s (-20, 20) should be negative with the independent variable, *PE*.

Bens et al. (2002) show that share repurchase announcements often coincide with the exercise of an executive stock option (*ESOP*). Grullon and Ikenberry (2000) argued that the impact of *ESOP*s on the firm's capital structure can be substantial. Fenn and Liang (2001) also found a strong negative relationship between dividends and management stock options and a positive relationship between share repurchases and management stock options. Hence, when an *ESOP* is close to expiration, the firm is obligated to buy shares from the manager to exercise his/her options. The market is likely to view the share repurchase as a negative signal, since the interest-aligning effect of *ESOP* has come to an end. We use *ESOP* as a dummy variable in equation (5), which takes a value of 1 when the motivation of share repurchase is to meet the demand from the *ESOP* holders to exercise their options; 0 otherwise.

We also include *GOV_SELL* as a dummy variable in order to test the effect of reduced government holdings on the market response (in this case, firms buy back shares from the government agencies or *SOE* shareholders). When firms buy back shares from government shareholders, both government ownership and influence over the firm's operations decrease. The repurchasing firm's operating efficiency may thus increase owing to reduced government ownership. As a result, investors view share repurchases as a positive signal and firms' abnormal share returns are more likely to increase

LEVERAGE, ROE, SIZE and *PE* are obtained from the firm's most recent quarterly report following the repurchase announcement. We take the natural logarithm of leverage and gross sales to ensure the two variables are normally distributed. Table 1 provides the definitions of the variables used in equation (5).

Table 1. Variable definitions (for equation (5))

Variable name	Variable definition
Dependent variable	
CAR	Cumulative abnormal return (CAR) during the event window (-20, 20)
Independent variable	
SG	Firm's sales growth rate (average grow rate of sales the past two years)
ROE	Return on equity
LEVERAGE	Firms' leverage ratio (book debt/ market value of equity)
SIZE	Ln (firms' gross sales in millions)
PE	Price-earnings ratio
ESOP	ESOP equals 1 when the motivation of share repurchase is for the ESOP holders to exercise their options; 0 otherwise
GOV_SELL	Government seller equals 1 when firms buy back shares from the government agencies or SOE shareholders; 0 otherwise

3. RESULTS

3.1. Descriptive statistics

Table 2 presents the summary of the share repurchase activities in both Shanghai and Shenzhen share markets for the period 2000 to 2012. The table includes the number of firms engaged in repurchase, number of share repurchase announcements and total shares repurchased in China across the study period. The table documents relatively low frequencies of repurchase announcements for the five years of the study period, with a greater reliance on the strategy in more recent years. Though there is a degree of variability across the years, there is also a general trend toward increasing numbers of announcements. The last year in the study, 2012 was atypical, provided a nearly three-fold increase over the previous year. The mean shares purchased, however, display an interesting and relatively consistent average volume after 2003 (excepting 2007, which provided a dramatic increase over the previous year).

Table 2. Summary for share repurchases in Chinese share markets (2000–2012)

Year	No. of firms engaged in repurchase	No. of repurchase announcements	Total shares repurchased	Mean shares repurchased per announcement
2000	6	6	312,062,753	52,010,459
2001	2	2	5,371,056	2,685,528
2002	3	5	4,874,700	974,940
2003	3	3	12,457,112	4,152,371
2004	1	1	45,960,000	45,960,000
2005	11	15	684,300,000	45,620,000
2006	30	33	1,879,869,418	56,965,740
2007	19	23	1,616,840,594	70,297,417
2008	32	36	1,860,081,200	51,668,922
2009	19	24	1,035,519,740	43,146,239
2010	39	42	1,913,524,551	45,560,108
2011	46	48	2,349,275,089	48,943,231
2012	96	126	5,130,733,035	40,720,103

Source: CSMAR database and author's calculation.

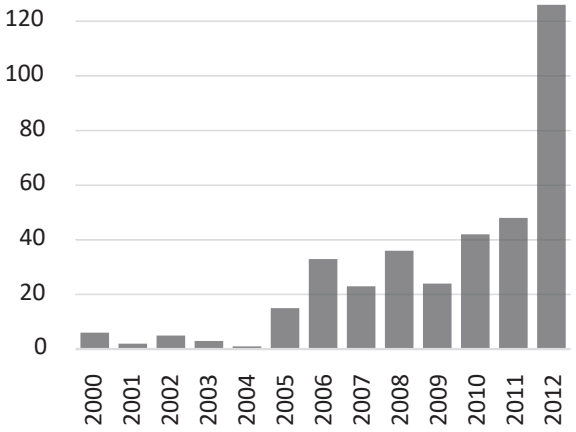

Figure 1. Frequencies of share repurchase announcements (2000–2012)

Figure 1 shows the number of share repurchase announcements over the study period. Both Table 2 and Figure 1 document that share repurchases were not particularly popular as a payout method until 2006. This is likely because share market reform in China began on April 29, 2005, when the Chinese government implemented reforms aimed at eliminating the non-tradable shares (NTS) typically held by the state or by politically connected institutional investors. Such NTS vehicles were issued at an early stage of China's modern financial market development process (Bortolotti et al., 2011). In 2005, the China Securities Regulatory Commission (CSRC) implemented the Administration of Repurchase of Public Shares by Listed Companies Procedures, which relaxed the restrictions on public firms repurchasing their shares on the open market (CSRC, 2005). Share repurchases have remained an active and increasingly relied upon strategy since then, as evidenced by the generally upward trajectory of repurchase announcements.

Figure 2 shows that investors suffered generally negative or near-zero (including slightly positive) abnormal returns before repurchase announcement day (day 0). Following on from day 0, the average CARs becomes increasingly positive. The positive CARs after day 0 shows that investors react in a positive way to the firm's share repurchase announcement, though the CARs reaches a peak of 16% on about day 16, declining thereafter (see Figure 2). This implies that the further the share price is depressed, the higher the abnormal returns in the long run (Peyer & Vermaelen, 2009).

Source: CSMAR database and author's calculation

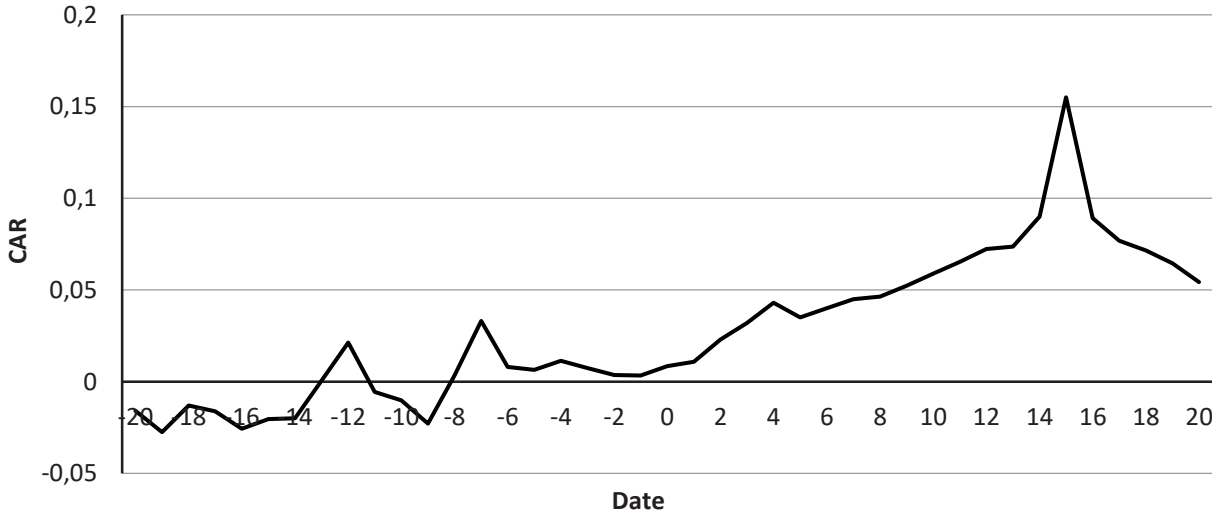

Figure 2. Average cumulative abnormal returns (with event window (-20, 20))

Table 3 presents the descriptive statistics of the variables used in the equation (5). The negative median CARs implies that share markets do not favour the repurchase announcements as a method for bidding up share prices. The median CARs (-0.013) for our sample suggests that on average, the Chinese public firm cumulative abnormal returns decrease by 1.3% during the 20 days before and 20 days after the share repurchase agreement. The median sales growth rate of 0.108 suggests that, on average, Chinese public firm exhibits a growth rate of nearly 11%. The median return on equity is 0.019, indicating that the return of shareholders' equity for an average Chinese public firm is about 2 cents per share. The median leverage of 0.313 suggests that an average Chinese public firm has a debt equity ratio of about 31%. The median firm size measured by gross sales is 0.812 or 812,000 RMB. The median price-to-earnings ratio is 32.559 infers on average, an investor has to use about 33 years to recover the share price.

Table 4 shows the CARs remain positive with the event window during the repurchase announcement (-20, 20) period we focused upon. The CARs under the symmetrical conditions of (-1, 1), (-5, 5), (-10, 10), (-15, 15) and (-20, 20) are 2.64%, 5.28%, 6.63%, 9.02% and 5.43%, respectively. These are all positive and significant at the 5% level, showing that the market perceives repurchase announcements as conveying positive and meaningful information about the firm's future performance over these intervals. This has the impact of driving share prices upwards.

Table 3. Descriptive statistics during the event window (-20, 20)

Source: CSMAR database and authors' calculations.

Variables	Mean	SD.	Min.	Median	Max.	Obs.
CARs	-0.018	0.160	-0.730	-0.013	0.292	364
Book-to-market equity	0.658	0.401	0.012	0.667	3.251	364
Gross sales	0.975	11.401	0.301	0.812	79.427	364
Sales growth rate	0.157	0.241	-0.654	0.108	1.178	364
Return on equity	0.018	0.068	-0.341	0.019	0.226	364
Leverage	0.522	0.544	0.026	0.313	2.018	364
Price-to-earnings ratio	145.648	418.075	-16.728	32.559	2103.970	364

Table 4. Break-down of cumulative abnormal returns

Source: CSMAR database and authors' calculations.

Window	CARs (%)	t-value
(-1, 1)	2.64	2.560**
(-5, 5)	5.28	3.540***
(-10, 10)	6.63	3.149***
(-15, 15)	9.02	3.634***
(-20, 20)	5.43	3.178***
(-5, -1)	2.88	3.075***
(-10, -1)	3. 08	3.282***
(-15, -1)	3.54	3.101***
(-20, -1)	3.85	3.287***
(0, 1)	2.07	0.758
(0, 5)	1.98	0.815
(0, 10)	1.64	0.645
(0, 15)	10.28	0.473
(0, 20)	1.24	0.501

Notes: ** , and *** significant at the 5% and 1% level, respectively.

Table 4 also breaks down CARs (-20, 20) into pre-announcement dates (-5, -1), (-10, -1), (-15, -1), and (-20, -1) and post-announcement dates (0, 1), (0, 5), (0, 10), (0, 15), and (0, 20). The CARs for each of the four pre-announcement are positive and significant at the 1% level, implying that the shareholders could make abnormal returns even before release of the share repurchase announcement. Consistent with Gong (2013) and Quan and Wu (2010), our finding provides evidence of information leakage and insider dealing in Chinese share markets.

In contrast, though the post-announcement CARs are positive, they are insignificant for all five combinations. This provides evidence that a positive market reaction towards repurchase announcements would not persist. This finding is consistent with the argument presented by Evans and Evans (2001), who suggested that the implementation of a repurchasing strategy cannot guarantee the firm's superior long-run performance. The non-persistence of CARs is likely due to market uncertainties over the managers' ability to time repurchase announcements, where managers only buy back shares following declines in the prices for the stocks covered by their options agreements (Brockman & Chung, 2001; Cook et al., 2004).

3.2. Estimated results of the multi-factor model

This section investigates the factors that affect the firm's CARs within the event window (-20, 20). We estimate equation (5) using the OLS procedure. To address the potential heteroskedasticity problem, we employ White's (1980) heteroskedasticity-robust *t*-values in our estimation. Column (1) in Table 5 reports the results with the dummy *GOV_SELL*, column (2) with the dummy *ESOP* and column (3) with both *GOV_SELL* and *ESOP* in the model.

Consistent with Ho et al. (1997), the results presented in Table 5 show that high levels of sales growth rates lead to higher CARs across columns (1) to (3). Specifically, the SG coefficient is 0.190 in both columns (2) and (3), which implies that a 1% increase in the sales growth rate of the firm lead to a nearly 0.2% increase in the firm's cumulative abnormal returns, with the SG reported in column only very slightly less. Similarly, Gong (2013) finds a positive effect of the sales growth rate on CAR in his study.

Table 5. Estimated results of multi-factor model (equation (5))

Source: authors' calculations.

Dependent variable: CARs (-20, 20)				
Variable	**Expected sign**	**(1)**	**(2)**	**(3)**
SG	+	0.184	0.190	0.190
		(0.092)**	(0.092)**	(0.093)**
ROE	+	-0.214	-0.216	-0.211
		(0.324)	(0.324)	(0.325)
lnLEVERAGE	+	-0.026	-0.023	-0.027
		(0.019)	(0.018)	(0.019)
SIZE	-	0.002	0.002	0.002
		(0.003)	(0.003)	(0.003)
PE	-	-0.003	-0.003	-0.003
		(0.001)***	(0.001)***	(0.001)***
GOV_SELL	+	0.024		0.043
		(0.043)		(0.048)
ESOP	-		0.038	0.064
			(0.063)	(0.070)
R^2_*Adjusted*		0.56	0.56	0.56
n		364	364	364

Notes: standard errors are in parentheses. **, and *** significant at the 5% and 1% level. Coefficients on intercepts are not reported. Blank in column (1) indicates that *ESOP* is not in the model. Blank in column (2) means that *GOV_SELL* is not in the model. In column (3), we run our model with both variables.

However, Gong's coefficient estimate on the sales growth rate, 0.014, is somewhat smaller than our SG coefficients. This is probably because Gong used a shorter event window (-5, 5) than our study (-20, 20). Our longer event window allows us to generate more robust results. Hence, our findings add new support to notion that firms with higher sales growth rates are more likely to send a positive signal to the market though share repurchase in the Chinese share market. These findings thus support H (1).

Consistent with both Ginglinger and L'her' (2006) and Grullon and Ikenberry' (2000) results, we find strong evidence to support H (5), that firms with overvalued shares are more likely to send a negative signal to the market through share repurchases. Columns (1) to (3) in Table 5 present a *PE* coefficient of 0.003 for each, implying that a 1-unit increase in the price-to-earnings ratio of the firm may lead to a 0.003-unit decrease in the firm's cumulative abnormal returns.

One of the more important characteristics of the Chinese capital market is that government ownership of firms is delegated to different agencies. The objectives of these agencies affect the degree of political intervention and the degree of commercialization of the listed companies these government agencies own (Tian & Estrin, 2008). Under the agency view of government ownership (Tirole, 1994), the subsequent lack of incentive leads SOE mangers to misallocate resources for their personal use. In addition, politicians use SOEs as a tool to serve their political interests. Hence, when firms buy back shares from government shareholders, both the degree of government ownership and its influence over the firm's operations are expected to decrease. Thus the repurchasing firm's operating efficiency and cumulative abnormal returns may increase due to the reduced government ownership. However, the results in Table 5 reveal that the coefficient estimates of *GOV_SELL* are insignificant. Thus, we did not find evidence to support H (6), that repurchases from SOE shareholders bring higher cumulative abnormal returns. One likely explanation for this contrary finding is that the size of share repurchases aimed at reducing SOE ownership (55 repurchase announcements) may not be large enough to substantially reduce the government's ownership interest in the firm. In essence, while the government may sell off shares, it retains a large enough volume to control the business, thus sending a 'business as usual' signal to the market.

Defusco et al. (1990) and Brickley et al. (1999) found markets responded positively when there is an announcement of *ESOPs*. Such announcements are intended to counter the potential dilution caused by *ESOPs*. To date, there is no empirical evidence on how markets respond to an announcement of share repurchase. We expect that firms have the motive to repurchase their shares to counter the potential dilution caused by the execution of the employee and executive share options incentive plans (Grullon & Ikenberry, 2000). When an *ESOP* reaches maturity, the firm is obligated to buy shares for the firm's managers to exercise their options. Thus, the market is likely to view the share repurchase as a negative signal, since the interest-aligning effect of *ESOP* comes to an end. The results presented in Table 5 show the coefficient estimate on the dummy *ESOP* is insignificant. This implies that *ESOP*-motivated share repurchases have no effect on the firm's cumulative abnormal returns.

The results in Table 5 further show the *ROE, SIZE* and *LnLEVERAGE* coefficients as statistically insignificant. We use *ROE* to capture the firm's future earning ability, as it indicates the past earning ability of the firm. This should be positively related with the market's response to the share repurchase announcement (Ikenberry et al., 1986). In Table 5, the *ROE* coefficient is insignificant, which suggests that higher profitability fails to send a positive signal to the market through share repurchases. This result is consistent with the finding of Gong (2013), who also found *ROE* to have an insignificant impact in his study of 185 Chinese mainland share repurchases during the period between 2003 and 2013.

The information signaling hypothesis suggests that small firms making fixed-price repurchase offers are likely to be sending a private information-signal to the market (Louis & White, 2007) and their repurchases should contain more information than large firm (Vermaelen, 1981). However, in our study the *SIZE* coefficient is insignificant, which suggests that there is no association between the firm's cumulative abnormal returns and firm size, as measured by gross sales. Thus, our results do not support H (2) or H (3).

The leverage ratio hypothesis proposes that repurchasing shares through debt financing would increase the debt ratio and helps the firm optimize its capital structure (Dittmar, 2000). Specifically, if a firm has a low level of debt, then share repurchases via financing would increas debt, reduce equity and thus increases the firm's debt-to-equity ratio toward the presumed optimal ratio. It is possible that such debt-leveraged repurchases might signal that acquiring more debt indicates management's confidence in the future success of the firm (Gong, 2013). However, our results show no evidence to support H (4).

3.3. Robustness tests

To address the heteroskedasticity problem in our multi-factor regression results (see Table 5), we employ White's (1980) heteroskedasticity-robust *t*-values in our estimation. Beaver (1968) pointed out that event-induced heteroskedasticity can generate biased estimates. The event-induced heteroskedasticity refers to a situation where the abnormal return estimator will likely exhibit greater variance during the event period than in the periods both before and after the announcement. Binder (1998) argued that this is because the event day share return is affected by the announcement's random shock as well as by other shocks peculiar to the firm. To address this event-induced heteroskedasticity issue, we employ the system dynamic system Generalized Method of Moments (GMM) estimator. Further, we use total assets as an alternative specification for firm size. The robustness test results remained unchanged[1].

CONCLUSION AND IMPLICATIONS

The present study investigates the motivations behind share repurchases and the firms' operating performance surrounding share repurchase announcements in the Chinese share markets. The empirical results show the market responds most favorably to repurchases that are made by high-growth and undervalued firms. Similar to Ginglinger and L'her (2006) and Grullon and Ikenberry (2000), we find strong evidence that firms with overvalued shares with high price-to earnings ratios are more likely to send a negative signal to the market through share repurchase efforts.

Government intervention is a unique characteristic of the Chinese capital market, where the state-owned enterprises (SOEs) have a dominant role in the share market (Huang et al., 2011). However, our results failed to support the hypothesis that the repurchasing firm's CARs may increase due to the reduction in government ownership when firms buy back shares from government shareholders. One likely explanation is that the size of share repurchase aimed at reducing SOE ownership (represented by 55 repurchase announcements in our study) may not be large enough to substantially reduce government ownership in the firm. Moreover, we expect that ESOP-related repurchases will send conflicting signals to the market. However, we have found an insignificant effect of the ESOP-related repurchases on the firm's CARs.

We find no evidence to support the leverage hypothesis. Our results show that the market did not respond to the firms changing its leverage ratio. Hence, altering capital structure was not a motivation behind open market repurchases. In addition, we found no evidence that small firms are more likely to signal to the market nor that their repurchases should contain more information than large firm. Thus the information signaling hypothesis based on firm size was not supported.

The results of this study have implications for policy development and redesign. First, CSRC should modify share buy-back requirements, perhaps reducing their complexity or the number of regulations that apply to the practice. In addition, it might be prudent to simplify the procedures necessary for firms to buy back their shares. For example, regulations might prohibit the filing for a share repurchase if the firm had issued an IPO within the previous year. Second, CSRC might adopt a 'zero-tolerance' policy on insiders' transactions and information leakage, to eliminate the chance of internal share owners

1 The robustness test results are available upon request.

taking advantage of the information they have about the company's health and performance. This is particularly important because unscrupulous insiders could make 'individualized abnormal returns' before the share repurchase announcement is made public; such activities are clearly unfair and disadvantage other investors who do not have access to inside information. Finally, the repurchasing firm's public image is likely to suffer from revelations of information leakage. Policies should thus be designed that enhance the potential for identifying and censuring the sources of such leaks and to minimize the potential for leakages to occur.

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