Investor Attention and Actual Share Repurchases

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Date: September 2019

PREFACE AND ACKNOWLEDGEMENTS

I would like to express my sincere appreciation and gratitude to my thesis supervisor dr. J.J.G Lemmen for his guidance and feedback during this final phase of my academic career. Whenever I had questions, dr. Lemmen replied quickly and provided me with suggestions. On a different level, I want to thank my parents, little brother and girlfriend for supporting me throughout my studies. Lastly, by adding to the literature on Hong Kong, I want to give back to the city that gave me so much during the time I lived there.

ABSTRACT

This thesis examines the relationship between institutional investor attention on the day of an actual open-market share repurchase and the short-term price reaction afterwards. The sample consists of 3917 open-market share repurchases conducted on the Stock Exchange of Hong Kong during the period 2011 to 2018. By making use of the Bloomberg terminal's news searching and reading activity score for stocks, a direct measure for institutional investor attention is created. Evidence is found that investor attention has a negative effect on short-term price reactions after share buybacks. This result implies that the documented positive price developments after share repurchases are driven by repurchases that did not receive appropriate attention from institutional investors.

Keywords: Share repurchases, Institutional investor attention, Event study, Cumulative abnormal returns, Stock Exchange of Hong Kong

JEL Classification: G12, G14, G15

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1. Introduction

Open-market share buybacks have shown an explosive increase in the past decades. Bagwell and Shoven (1989) illustrate that this growth started at the beginning of the 1980s. While in the mid-1980s, buyback announcements in the United States were approximately US$25 billion per year, this increased to US$550 billion between 1996 and 1998. In contrast, for the same time period, cash dividends paid by New York Stock Exchange (NYSE) firms to their shareholders amounted US$490 billion (Ikenberry et al., 2000). Busch and Obernberger (2016) report that 6.8% of the monthly trading volume is represented by open-market share buybacks. Figure 1 displays the development of the S&P500 dividend and share repurchase indices over the past 20 years.

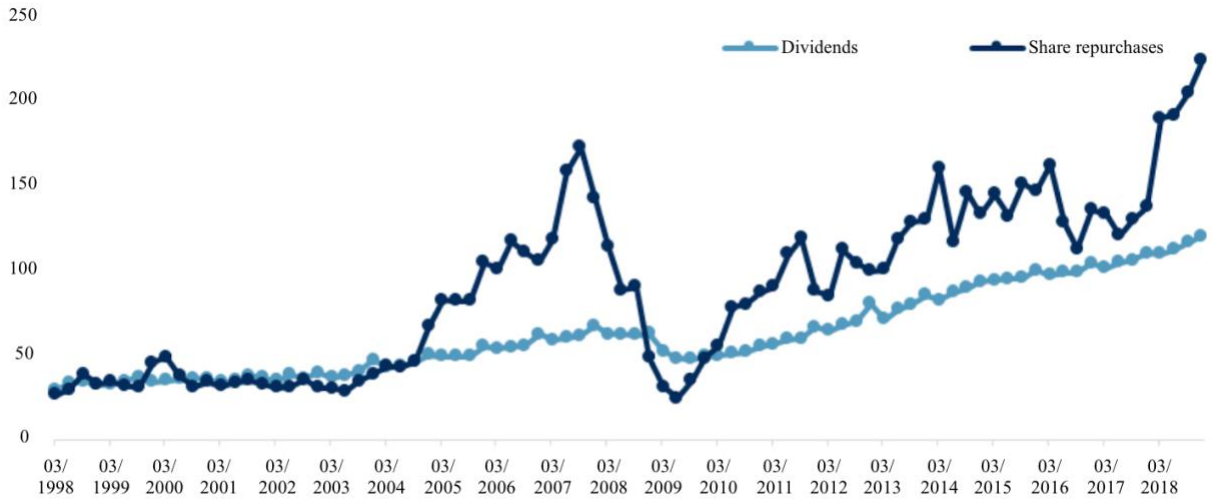

***Figure 1**: S&P500 Dividends and Share repurchases (in USD billion)*

The increasing trend of using share repurchases has not been limited to the United States. Studies have outlined the increase in buybacks in the UK (Lazonick and Mazzucato, 2013), Canada (Ikenberry et al., 2000), and Germany (El Houcine and Boubaker, 2013). In Hong Kong, share repurchases have been permitted since 1991, and are now a commonly used practice (Firth and Yeung, 2005).

The increased popularity of share repurchases suggests that it can substantially affect stock prices. Various papers have documented positive abnormal returns after actual share buybacks or buyback announcements, implying that markets react positively to them (Vermaelen, 1981; Comment and Jarrell, 1991; Zhang, 2005).

According to traditional models of asset pricing, information is immediately processed and integrated into prices by trading. However, in reality, the attention of investors first has to be attracted by information afore it can be incorporated into prices. Kahneman (1973) comments that attention is an inadequate cognitive resource and the attention of investors is finite. Previous studies have shown that limited attention of investors often influences asset pricing (Peng and Xiong, 2006; Hirshleifer and Teoh, 2003; Da et al., 2014).

Moreover, prior literature has often been confronted with the difficulty of not having a direct measure of investor attention when researching its effects. Indirect measures for investor attention like prior turnover, trading returns and advertising expenses have been used (Loh, 2010; Cheng et al., 2015). However, all of these measures share the assumption that they lead to higher investor attention, without directly measuring it. Da et al. (2011) introduce a direct attention proxy that makes use of Google's search activity. Nevertheless, this proxy mainly covers the attention of retail investors. Stambaugh (2014) outlines the dominance of institutional investors in common equity trading. Given the importance of institutional investors, it is crucial to measure their attention.

This thesis will use the novel proxy of institutional investor attention as proposed by Ben-Rephael et al. (2017). Their measure uses the Bloomberg terminal users' news searching and reading activity. Bloomberg creates a daily measure of attention based on these user activities. Moreover, the predominant users of the Bloomberg terminal are institutional investors.

To examine the effect of institutional investor attention on price developments after corporate events, I will focus on share repurchases. The information released in share repurchases is quantifiable. Therefore, it is possible for me to control for the information extent and implications, and detect the effect of attention. Furthermore, Porter (1992) outlines that institutional investors mainly focus on short-run price developments. Therefore, I will focus on the short-term price reaction after buybacks.

Moreover, this thesis will concentrate on share buybacks in Hong Kong. In many countries, firms can announce a repurchase without being obligated to fully exercise their announcement. Stephens and Weisbach (1998) document that when these firms are not obligated to exercise their announcement, they, on average, repurchase 74-82% of the initial amount announced. In Hong Kong, however, firms do not announce repurchases in advance since they are not obligated to. Nevertheless, after exercising the buyback, firms are required by law to disclose the details to the stock exchange before the start of the following trading day. The possibility to use actual repurchases instead of repurchase program announcements, and the completeness of data, makes the Hong Kong Stock Exchange a suitable market for researchers to investigate share buybacks.

The main research question of this thesis can be formulated as follows:

What is the short-term price effect of institutional investor attention on open-market share repurchases in Hong Kong?

To address this question, my first objective is to analyze whether the investor attention measure proposed by Ben-Rephael et al. (2017) also holds for the dataset of repurchasing firms in Hong Kong by using several OLS regressions testing attention hypotheses. My second objective is to detect whether the anomaly of positive price reactions after buybacks is also persistent in my dataset. If so, possible motives behind share repurchases will be examined. This will be done by making use of the market model event study. Finally, the effect of attention, measured by the proxy of Ben-Rephael et al. (2017), on short-term

prices after buybacks will be examined to be able to conclude whether these price reactions are driven by buybacks that did not receive enough attention from institutional investors.

This thesis contributes to the current literature by, to the best of my knowledge, being the first to examine the effect of institutional investor attention on actual share repurchases. Also, by using a novel measure that directly reveals institutional investor attention, a contribution is made to the attention literature. Moreover, by investigating the Hong Kong market's most recent repurchases, which are not investigated yet, this paper adds to the broad literature on price responses after share buybacks. Furthermore, by focusing on actual buybacks instead of buyback announcements, a contribution is being made to the international body of research primarily concentrating on announcements of share buybacks.

In order to answer the abovementioned questions, the remainder of this thesis is structured as follows. In Chapter 2, a review of the existing literature regarding share repurchases and investor attention will be given. Subsequently, in Chapter 3, the hypotheses related to the research question are developed. After that, in Chapter 4 the data selection and in Chapter 5, the methodology will be provided. Then, the results are presented in Chapter 6. Finally, in Chapter 7, the conclusion will be provided together with suggestions for further research.

2. Theoretical Framework

In this chapter, a theoretical framework is presented to formulate this thesis' main hypotheses. First, investor attention and its determinants will be examined. Thereafter, investor attention's impact on prices after corporate events will be discussed. Then, share repurchases, price developments around share repurchases and its motives are examined. Finally, regulations in Hong Kong regarding share buybacks will be discussed.

2.1 Investor attention

Traditional models of asset pricing state that information is immediately processed and integrated into prices by trading. Nevertheless, investors' attention needs to be attracted by information afore it can be incorporated into prices. Kahneman (1973) claims that attention is an inadequate cognitive resource and the focus of investors is finite. Moreover, prior literature on psychology has examined that the capability of people to execute various tasks simultaneously has restrictions because of the constraint to the central cognitive processing capacity of the human brain (Pashler and Johnston, 1989).

Prior economic literature has shown that when investor attention is limited, this leads to information being dispersed slowly and news being underreacted to. Subsequently, limited attention leads to price underreaction. This underreaction is caused by the limitations of the magnitude of information that can be anticipated by investors. Huberman and Regev (2001) state that only when investors pay attention to new information, this information will affect prices. Prior literature broadly documents this relationship of biased reactions of investors to information (Da et al., 2014; Cohen and Frazzini, 2008; Peng and Xiong, 2006; Hirshleifer and Teoh, 2003). Barber et al. (2001) argue that stock prices are foreseeable based on publicly available information as a result of markets being semi-strong inefficient. Also, Cohen and Frazzini (2008) suggest that when investors are subject to restrictions of attention, asset prices do not directly process news regarding other companies that are economically related to the company of interest. When investor attention is small, this leads to a lower speed of price reaction to information.

2.1.1 Determinants of investor attention

A large body of literature has examined the factors affecting investor (in)attention. DellaVigna and Pollet (2009) document that announcements published by firms on a Friday attract lower short-term reaction and higher long-term reaction in comparison to other weekdays. The authors argue that investors are less focused on activities that are work-related on a Friday. Michaely et al. (2016) investigate this reduced market response in the context of share repurchases and, also, find a reduced market reaction on Friday. Furthermore, Hirshleifer et al. (2009) find that extraneous news distracts the attention of investors. The paper states that the number of earnings announcements done by other companies causes lower attention to the earnings announcement done by the firm of interest. Moreover,

Hou et al. (2009) show that trading volume is positively related to investor attention, they find that prices of stocks with a lower trading volume react less to earnings news than stocks with a higher trading volume. Also, Loh (2010) finds similar results with regards to the trading volume. The paper reasons that trading volume is a direct measurement of the level of attention that investors have for a company. When investors are actively buying and selling a particular stock, they need to pay attention to information concerning that stock. Similarly, Hou et al. (2009) and Gervais et al. (2001) employ trading volume as a determinant for attention. Next, Boehmer and Wu (2012) report that short-sellers being more active leads to intraday new information being faster incorporated into the stock price. Moreover, Yuan (2015) states that market-wide attention-grabbing events lead to investors paying more attention to the stocks they own. Consequently, causing higher trading activity and changes in stock prices. Drake et al. (2016) report that firm size is an indicator of individual investor attention, whereas institutional investor attention is less affected by firm size. Also, Brown et al. (1987) report that larger firms are usually followed by more financial analysts, which leads to more firm information becoming public. Also, Collins et al. (1987) find that firm size is a significant proxy for the level of available information and the level of investors on the market collecting and handling information. Finally, Barber and Odean (2008) state that stocks with extreme one-day returns are attention-grabbing stocks, leading to investors buying more of these stocks, regardless of firm size. All in all, several factors have an influence on investor attention according to prior studies.

2.1.2 Impact of investor attention on prices

Investor attention to events and its effect on stock prices have been examined by previous literature. Earnings announcements, mergers and acquisitions, share repurchases and analysts' stock recommendations are events that are examined. DellaVigna and Pollet (2009) document that share prices of firms making earnings announcements on a Friday have lower short-term reactions and higher post-announcement drifts in comparison to other weekday announcements. The authors argue that on Fridays, there is a greater probability of investors being busy with the weekend and, consequently, they do not pay the same amount of attention to investing as on other weekdays. Hirshleifer et al. (2009) report that short-term stock reactions are lower when firms make earnings announcements, while the attention of investors is distracted. The authors argue that when investors receive lots of information, they get overwhelmed. Moreover, Loh (2010) shows that after stock recommendations, the price reaction on the recommendation day is stronger when a stock has a high trading volume. Since stocks with high trading volume already have more attention, the speed of price reaction to information is faster. Fricke et al. (2014) find similar price results for earnings announcements by using Google's search volume index as a proxy for attention. Da et al. (2011) investigate the relationship between investor attention and initial public offerings. They conclude that higher investor attention, also proxied with Google's search volume index, strengthens the high short-term returns and long-term underperformance of firms conducting an IPO. However, Cheng et al. (2015) find contrary results when analyzing announcements of share

repurchases. The authors exploit prior turnover as a proxy for investor attention and find that low prior turnover firms document a bigger immediate price reaction to share buybacks in comparison to firms with high prior turnover. Also, Ikenberry et al. (1995) report that the average short -term market response to repurchases for glamour stocks, which can be considered to be high-attention stocks, is lower than the reaction for value stocks, which can be considered low-attention stocks. They determine the level of a stock being labeled as glamour by looking at its M/B ratio and argue that these stocks have lower undervaluation and, subsequently, lower short-term price reactions after a buyback. The theory behind this undervaluation theory will be explained in Section 2.2.1. To conclude, a broad range of literature agrees that that investor attention has an effect on stock prices after corporate events.

Table 1: Indirect proxies for attention

This table shows an overview of papers in previous literature that made use of indirect proxies for investor attention to assess the short-term price response after a corporate event. Some proxies capture investor *attention*, whereas others capture investor *inattention*. Also, the effect of the proxy on short-term price changes is displayed.

Paper	Event	Type	Proxy	Short-term price reaction
DellaVigna and Pollet (2009)	Earnings announcement	Inattention	Friday announcement	Weaker
Louis and Sun (2010)	Merger announcement	Inattention	Friday announcement	Weaker
Hirshleifer et al. (2009)	Earnings announcement	Inattention	Number of same-day announcements made by other firms	Weaker
Cheng et al. (2015)	Share repurchase announcement	Attention	Prior turnover	Weaker
Loh (2010)	Analysts' stock recommendation	Attention	Prior turnover	Stronger

Next to the indirect proxies for investor attention presented in Table 1, literature has also used direct proxies for investor attention. Choi and Varian (2009) show that search volume is a good measure for the level of economic activity in given industries, more specifically in predicting outcomes like unemployment levels, industry sales and tourism. Furthermore, Goel et al. (2010) report that search query volume predicts movies' weekend box-office revenue, video games' first-month sales and songs' ranks on the Billboard Hot 100 chart. Also, Da et al. (2011) used search volume to predict earnings announcements returns. The authors exploit Google's Search Volume Index (GSVI) of search terms such as stock ticker symbols and find that it predicts announcement-window abnormal returns. Moreover, Ungeheuer (2017) makes use of Wikipedia firm page views as a direct investor attention proxy while examining the relationship between stock returns and investor attention.

Another recent paper, by Ben-Rephael et al. (2017), introduces a new direct proxy for investor attention applying the activity of news searching and reading for firms on the Bloomberg terminal. Whereas the measures Google Search Volume Index and Wikipedia firm page views mostly capture retail investor attention, Bloomberg terminal data primarily captures institutional investor attention (Ungeheuer, 2017). There are approximately 325,000 Bloomberg subscriptions, and the terminal's users consist for 80% of individuals working in financial industries (Ben-Rephael et al., 2017).

In comparison to indirect measures of investor attention like trading volume, turnover or number of announcements and direct investor attention measures like GSVI and Wikipedia firm page views, Bloomberg's news searching and reading activity directly presents the attention of institutional investors. Ben-Rephael et al. (2007) document that although Abnormal Institutional Attention (AIA) and GSVI are positively and significantly correlated with each other, they describe below 2% of each other's variation. Also, their results prove that the attention of institutional trading is directly measured by AIA, whereas GSVI does not.

2.2 Share buybacks: price reaction and motives

Companies extensively conduct share buybacks. Most of the research done on share repurchases looks at the response of share prices on share buyback announcements or actual share buybacks, depending on the data available in the researched market. It is widely accepted that share repurchase announcements or actual share repurchases lead to positive abnormal returns. Most studies investigated this anomaly by making use of the cumulative average abnormal return (CAR) around the buyback event. Zhang (2005) finds a CAR of 0.429% in its sample of 800 actual repurchases in Hong Kong between 1993 and 1997 over the event window (0, +2), where t=0 is the repurchase day, and a CAR of 0.688% for the event window (0, +20). Other specific event windows covering the short-term price reaction to buybacks are not documented by the author. Moreover, studies conducted on American (Comment and Jarell, 1991; Ikenberry et al., 1995; Lie, 2005), German (Seifert and Stehle, 2003; Hackethal and Zdantchouck, 2006; Andriosopoulos and Lasfer, 2015), French (Ginglinger and L'Her, 2006) and Japanese (Zhang, 2002) share buyback announcements gave similar positive results. Furthermore, it is documented that value firms, using M/B ratio as an undervaluation proxy, have higher abnormal returns after buyback announcements; therefore implying that markets immediately react to a mispricing signal (Ikenberry et al., 1995). Tables 2 summarizes the CAR results of prior literature; all papers use the market model as the event study method.

Table 2: Short-term CARs of actual buybacks

This table shows the findings of previous literature. Previous literature is separated in two classes: papers investigating the impact of actual share buybacks and papers investigating the impact of share buyback announcements. Panel A presents the results of papers focusing on actual share repurchases, whereas Panel B presents the results of papers focusing on share repurchase announcements.

Panel A: Actual share repurchases

Country	Author(s)	Sample period	Estimation window	Event window	CAR %
Hong Kong	Zhang (2005)	1993-1997	(-250, -2)	(0, +2)	0.43%
US	Obernberger (2014)	2004-2010	(-42, -6)	(-1, +1)	0.65%
Norway	Skjeltorp (2004)	1999-2000	(-571, -1)	(-1, +1)	0.88%
Australia	Akyol and Foo (2013)	1998-2008	(-300, -46)	(0, +1)	0.43%

Panel B: Share repurchase announcements

Country	Author(s)	Sample period	Estimation window	Event window	CAR %
US	Comment and Jarell (1991)	1994-1989	(-100, -51)	(-1, +1)	2.30%
	Ikenberry et al. (1995)	1980-1990	(-250, -21)	(-2, +2)	3.54%
	Lie (2005)	1981-2000	(-250. -10)	(-1, +2)	3.00%
	Yook and Gangopadhyay (2011)	1994-2007	(-406, -151)	(0, +2)	2.62%
	Lee et al. (2015)	2007-2011	(-36, -1)	(-2, +2)	1.37%
Germany	Seifert and Stehle (2003)	1998-2003	(-75, -25)	(-1, +2)	5,86%
	Andriosopoulos and Lasfer (2015)	1997-2006	(-255, -21)	(-1, +1)	2.32%
UK	Andriosopoulos and Lasfer (2015)	1997-2006	(-255, -21)	(-1, +1)	1.68%
France	Ginglinger and L'Her (2006)	1998-1999	(-230,+5)	(0. +1)	0.57%
	Andriosopoulos and Lasfer (2015)	1997-2006	(-255, -21)	(-1, +1)	0.80%
Japan	Zhang (2002)	1995-1999	(-250, -61)	(-1, +2)	4.58%

2.2.1 Signaling hypothesis

The most dominant motive for share buybacks according to prior literature, is signaling undervaluation. The signaling hypothesis leans on the assumption of asymmetric information. Asymmetric information occurs when one party (the manager) has more complete and better information than the other party (the investors), this occurs because investors are not able to monitor a firm as good as managers since they can only rely on public information. According to Spence (2002), the primary purpose of signaling is to reduce the information asymmetry between the two parties. The assumption is that managers think that the company's present stock price does not represent the future cash flows and earnings, and therefore

conduct share repurchases in order to signal that the stock price should be different. As summarized in Tables 2 and 3, prior literature proves this hypothesis and indicates that asset prices have a positive sign after repurchase announcements and actual repurchases. However, the outcome effect of signaling after announcements depends on the signal's credibility. Grullon and Michaely (2004) state that investors perceive share buyback announcements as credible since such announcements are a costly signal. Also, Babenko et al. (2012) document that a larger repurchase program size, which is a firm's announced target repurchase value normalized by its equity's market value, gives more credibility. However, the credibility issue does not occur in countries where firms do not need to announce share repurchases, and instead directly conduct *actual* share repurchases. Nevertheless, criticism on the signaling hypothesis is also documented in prior literature. Chan et al. (2010) state that buyback announcements do not need commitment in certain countries, and therefore are a weak and costless signal. The authors look for cases in which managers were under pressure to increase share prices and, consequently, announced buyback programs in order to give false signals to the market. Their results show that only a small part of managers may have used buybacks to mislead investors. A possible reason for this could be that a manager could harm his reputation by false signaling (Peyer and Vermaelen, 2008). Moreover, Vermaelen (1981) claims that smaller firms are more exposed to asymmetric information, which leads to a higher probability of small firms buying back shares. The author mentions that small companies use share repurchases as a way to give signals to the market regarding the real value of their stock. Also, Corwin (2003) states that large firms commonly receive more media coverage and attract more institutional investor attention, which leads to them experiencing less information asymmetries. Mishra et al. (2010) document that smaller firms have larger short-term abnormal returns after buyback announcements. All in all, signaling is often being documented as the most popular argument for stock buyback programs (Vermaelen, 1981; Dittmar, 2000).

2.2.2 Dividend substitution hypothesis

The dividend substitution hypothesis relies on the assumption that there is a trade-off for firms between buying back shares and paying out dividends. Miller and Modigliani (1961), document that firms are indifferent between the two when redistributing excessive cash, thus, stating that share buybacks and dividend payouts are perfect substitutes. However, DeAngelo (1991) finds that the taxes paid by investors on selling stock is lower than taxes paid on dividends. Therefore, share buybacks and dividends are no perfect substitutes, and share buybacks may be favored. Also, Blouin et al. (2007), document that companies substitute dividends for buybacks because the reduction in tax rates of dividends is higher than the reduction in tax rates of capital gains. Also, they reason that there is a substitution because taxes on dividends have to be paid at the moment of the distribution, while selling shares can be postponed by investors, thereby offsetting capital losses with capital gains. Lastly, Brav et al. (2005) find that tax considerations do drive managers' dividend and share buyback decisions, but conclude that they have a secondary role and that they are not a first-order concern for managers.

2.2.3 Free cash flow hypothesis

The free cash flow hypothesis, also, captures the agency conflict between shareholders (principal) and companies (agent). This hypothesis, which was introduced by Jensen (1986), states that the segregation of ownership and control causes that shareholders have little influence in decision-making due to their limited role. Subsequently, the interests of shareholders and investors may not be the same, and an agency problem may occur where both groups might act in their own interest.

In a situation in which a company has excess cash and without proper opportunities of investment available, an agency problem can appear. Jensen (1986) states that managers have the incentive to let their company grow beyond the size that is optimal. By "building an empire", managers can aim to strengthen their authority because they then have more resources under control. Moreover, this growth can lead to higher compensations for managers since compensation transformations may depend on the sales increases of a company (Murphy, 1985). Since it can be attractive for managers to make investments with negative net present values in order to "build an empire" instead of paying it out to shareholders, a company might want to lower the firm's cash available.

Because share buybacks are particularly done with cash, they decrease a firm's excessive cash, and may therefore reduce agency costs. Oswald and Young (2004) and Nohel and Tarhan (1998) document that the distribution of excessive cash by share buybacks reduces agency costs as well as risks. Previous literature documents that if firms have more free cash flows, this leads to a higher probability of them conducting share buyback programs (Stephens and Weisbach, 1998; Vafeas and Joy, 1995; Busch and Obernberger, 2016). Next to looking at a firm's excessive cash ratio, defined as the cash to assets ratio, previous literature has also used Tobin's Q ratio, defined as assets' market value to assets' replacement cost ratio, to capture overinvesting by firms. Finally, Dittmar (2000) confirms that allocating cash to shareholders is a key driver of share buybacks.

2.2.4 Capital structure hypothesis

The capital structure hypothesis assumes that companies have an optimal leverage ratio. When companies buy back shares, they finance this by either decreasing their assets or increasing their debt. Consequently, the total number of shares outstanding reduces, while the leverage ratio increases (Bagwell and Shoven, 1989). Dittmar (2000) documents that firms can use share buybacks in order to alter their capital structure, and reach the leverage ratio level they aim for. Also, Hovakimian et al. (2001) confirm that one of the key drivers of firms buying back shares is their capital structure. Additionally, Busch and Obernberger (2016) find that high leverage companies have a lower probability of buying back shares. A company's cost of capital can decrease by reaching the optimal leverage ratio, possibly resulting in a higher share price and market value.

2.3 Hong Kong

Repurchase activities in Hong Kong are regulated by *the Codes on Takeovers and Mergers and Share Buy-backs* (the Codes)[1]. These codes are formed by the Securities and Futures Commission (SFC) in cooperation with the Takeovers and Merger Panel. Founded in 1989, The SFC is an independent statutory established in order to regulate the securities and futures markets of Hong Kong.

However, the codes do not have a force of law; they do embody an accord of views between market participants and the SFC with respect to share buyback behavior that is seen as acceptable. Moreover, the codes apply to public firms in Hong Kong, primary listed firms in Hong Kong and investment trusts active in real estate that have a primary listing in Hong Kong.

2.3.1 Methods of share buybacks in Hong Kong

According to rule 1 of the Code on share buybacks, there are four methods of repurchases a company may engage in: (1) an on-market (or open-market) share repurchase; (2) an off-market share repurchase allowed in line with Rule 2 of the Code, (3) an exempt share repurchase and (4) a general offer share repurchase in line with the General Principles and Rules of the Codes.

According to Firth and Yeung (2005), 98% of all buybacks done in Hong Kong are on-market share repurchases. In the on-market share repurchase method, the buyback is made by a firm with a listing on the Stock Exchange by making use of the exchange's facilities. In one calendar month, firms are not allowed to buy back more than 25% of the number of stocks traded in the preceding month. Also, annual share buybacks can ultimately be 10% of the firm's shares outstanding. Moreover, after a buyback, the proportion of stocks owned by the general public may not be lower than 25%. Additionally, firms are restrained from repurchasing stock when; buying stock from connected persons, during times in which price-sensitive information is not yet publicly available and in a month directly following the announcement of their annual results or interim reports.

Furthermore, if managers want to do a repurchase, they need approval from the board at the annual meeting as well as from the SFC. When approved, they need to conduct the repurchase within 12 months, otherwise, a new approval is needed. Companies do not need to make a public share repurchase announcement, and therefore they usually do not announce their buybacks (Zhang, 2005). The repurchase method of Hong Kong allows companies to repurchase their own stocks without exposing their identity. However, before 9:30 am of the trading day following the repurchase, the company has to disclose the details to the Stock Exchange, then the transaction details become publicly available.

Prior literature broadly documented share repurchase *announcements* in the US. However, studying announcements has the drawback that they are not commitments. Only 74-82% of the share

1 https://www.sfc.hk/web/EN/assets/components/codes/files-current/web/codes/the-codes-on-takeovers-and-mergers-and-share-buy-backs/the-codes-on-takeovers-and-mergers-and-share-buy-backs.pdf

repurchase announcements are actually conducted (Stephens and Weisbach, 1998). By making use of the facilities offered by the Hong Kong Stock Exchange, this thesis researches actual share repurchases.

3. Hypotheses development

Following the literature examined in the previous chapter, this chapter presents the constructed hypotheses. First, the hypotheses regarding investor attention will be discussed. Thereafter, hypotheses regarding the short-term price development after share repurchases will be elaborated.

3.1 Hypotheses regarding investor attention

As explained in the previous chapter, there are several factors influencing investor attention. In order to examine whether the determinants of investor attention according to prior literature also hold when taking the direct investor attention proxy used in this thesis, namely the Bloomberg terminal's Abnormal Institutional Attention, which will be further elaborated in Section 5.1, as the dependent variable, a couple of hypotheses are designed. Based on these hypotheses, a conclusion can be drawn whether the measure used in this thesis is an appropriate measure for investor attention in Hong Kong.

Hypothesis 1.1: *Abnormal Institutional Attention is lower on Friday*

It is expected that the attention of investors is lower on a Friday. As explained in the previous chapter, DellaVigna and Pollet (2009) document a within-week attention seasonality and argue that on Fridays the probability of investors being concerned with the approaching weekend is higher and, consequently, investors do not pay the same level of attention to investing as on other weekdays.

Hypothesis 1.2: *Firm size has a positive impact on Abnormal Institutional Attention*

Moreover, firm size is expected to have a positive impact on investor attention. This hypothesis is based on the paper of Drake et al. (2016), that states there is more information available about larger firms leading to the attraction of higher investor attention, and Brown et al. (1987), who argue that commonly more financial analysts are following larger firms, which leads to more information becoming public and the attraction of investor attention.

Hypothesis 1.3: *Trading volume has a positive impact on Abnormal Institutional Attention*

Also, I expect that when a firm experiences a higher trading volume, the attention paid to it will be higher. This hypothesis resulted from the findings of Loh (2010) and Hou et al. (2009), that state that when investors are actively buying and selling a particular stock, they need to pay attention to information concerning that stock.

Hypothesis 1.4: *The number of firms doing a same day share repurchase has a negative impact on Abnormal Institutional Attention*

Furthermore, it is expected that on a day with more repurchases, the attention of investors will be distracted, and therefore the attention paid by investors on a single firm will be lower. This hypothesis is based on the paper of Hirshleifer et al. (2009), which states that other activities on the same day lead to investors receiving lots of information and, consequently, result in them being distracted from the event.

Table 3: Summary of Investor attention hypotheses

This table gives a summary of the investor attention hypotheses, and shows the variables used in each hypothesis. In all hypotheses, the dependent variable is Abnormal Institutional Attention. Also, the effect of each hypothesis' variable of interest on Abnormal Institutional Attention is displayed.

#	Hypothesis name	Dependent Variable	Variable of interest	Predicted Sign
1.1	Weekday hypothesis	Abnormal Institutional Attention	Share repurchase on Friday	Negative
1.2	Size hypothesis	Abnormal Institutional Attention	Firm size	Positive
1.3	Trading volume hypothesis	Abnormal Institutional Attention	Trading volume	Positive
1.4	Distraction hypothesis	Abnormal Institutional Attention	Number of firms doing a share repurchase on the same day	Negative

3.2 Hypotheses regarding short-term price effect

It is broadly documented in prior literature that share buybacks lead to positive abnormal returns. Before examining the impact of attention on repurchases, I first need to test whether this anomaly is also present in my dataset. Therefore, the following hypothesis is designed:

Hypothesis 2: *Actual share buybacks have a positive effect on prices in the short-term*

In case this hypothesis holds, the following hypotheses are tested:

Hypothesis 2.1: *The positive impact of share repurchases on prices is explained by the signaling hypothesis*

As discussed in the previous chapter, the most popular argument for share buybacks is signaling undervaluation. According to this hypothesis, managers buy back stocks when prices are in decline to

signal the market that the present market price of their company is too low and, consequently, their firm is an attractive investment (Ikenberry and Vermaelen, 1996; Wansley et al., 1989). A proxy for this price decline can be the pre-share repurchase price development. It is predicted that this price development is negatively related to share buybacks (Ikenberry and Vermaelen, 1996; Wansley et al., 1989). Moreover, we expect that firm size has a negative impact on share repurchases. This expectation is based on Vermaelen (1981), who claims that smaller firms are more exposed to asymmetric information and, consequently, use buybacks more often as a way to signal the market that their stock is undervalued. Also, we expect that the M/B ratio has a negative association with buybacks. This expectation is based on Comment and Jarell (1991), who use this ratio as a proxy for undervaluation. The authors argue that managers buy back shares when they believe their company is undervalued. After analyzing the results of all the above-mentioned proxies for the signaling theory, a conclusion regarding the hypothesis can be drawn.

Hypothesis 2.2: *The positive impact of share repurchases on prices is explained by the dividend substitution hypothesis*

Next, as explained in the previous chapter, according to the dividend hypothesis, price reactions are higher when share buybacks have more beneficial tax advantages than dividends have. Therefore, it is expected that the cash dividends to net income ratio has a negative impact on share buybacks. The expectation is consistent with Blouin et al. (2007), who document that companies substitute dividends for buybacks, and explain this by stating that the reduction in tax rates of dividends is higher than the reduction in tax rates of capital gains.

Hypothesis 2.3: *The positive impact of share repurchases on prices is explained by the free cash flow hypothesis*

Under the free cash flow hypothesis, allocating cash to shareholders is the driver of share buybacks. As described in Section 2.2.3, this hypothesis relies on the agency conflict between shareholders and managers and states that since it can be attractive for managers to "build an empire" and make wasteful investments, a company might want to lower the firm's cash available. Because share buybacks are particularly done with cash, they lower a firm's excessive cash, and may therefore reduce agency costs. Consequently, I expect a firm's cash to assets ratio to have a positive impact on share buybacks.

Hypothesis 2.4: *The positive impact of share repurchases on prices is explained by the capital structure hypothesis*

Under the capital structure hypothesis, the assumption is made that companies have an optimal leverage ratio. When companies conduct a buyback, their total number of shares outstanding reduces while the irleverage ratio increases because the repurchase is either financed by decreasing the asset level or increasing the debt level. Dittmar (2000) argues that companies use share buybacks in order to alter their capital structure and reach their target leverage ratio level. Therefore, it is expected that a company's net debt to total assets ratio, as a measurement for debt, is positively related to share buybacks.

Table 4: Summary of Price effect hypotheses

This table gives an overview of the hypotheses regarding the short-term price effect. Based on previous literature each hypothesis is captured by one or more variables. In all hypotheses, the dependent variable is short-term cumulative abnormal returns. Also, the effect of each hypothesis' independent variable on cumulative abnormal returns is displayed.

#	Hypothesis	Dependent Variable	Variable of interest	Predicted Sign
2.1	Signaling Hypothesis	Cumulative abnormal returns	Pre-event price development	Negative
			Firm size	Negative
			Market-to-book	Negative
2.2	Dividend substitution hypothesis	Cumulative abnormal returns	Ratio of cash dividends to net income	Negative
2.3	Free cash flow hypothesis	Cumulative abnormal returns	Ratio of cash & cash equivalents to total assets	Positive
2.4	Capital structure hypothesis	Cumulative abnormal returns	Ratio of net debt to total assets	Positive

After having tested these hypotheses, I can proceed to find the answer to the main question of this thesis:

What is the short-term price effect of institutional investor attention on open-market share repurchases in Hong Kong?

More specifically, to address this question, I look at the well-documented positive short-term price developments after share buybacks and investigate whether these price developments are driven by buybacks that did not receive enough attention from institutional investors.

As examined in the previous chapter, prior literature broadly documented that investor attention strengthens the price development after an event (Hirshleifer and Teoh, 2003; Peng and Xiong, 2006; Cohen and Frazzini, 2008; Da et al., 2014). Traditional models of asset pricing argue that information is immediately processed and integrated into prices by trading. Nevertheless, in reality, investors' attention needs to be attracted by information afore it can be incorporated into prices. High investor attention leads to a higher speed of price reaction to information.

Consistent with prior literature, I expect that the signaling hypothesis is the main explanation for share buybacks. By conducting a repurchase, managers, who believe that their stock price is undervalued, aim to signal that their stock price should be different. In line with prior studies, I expect

that when investors do not pay appropriate attention to a firm, they may ignore the signaling of managers, leading to a weaker short-term stock price reaction after share buybacks.

4. Data

This chapter describes how and from which databases the data is collected. Furthermore, the construction of the dataset is examined. Also, the summary statistics are provided.

4.1 Data collection

This thesis investigates the relationship between institutional investor attention and open-market share buybacks in Hong Kong. The time frame of this thesis starts on 1-1-2011 and ends on 31-12-2018. In order to conduct research, data is collected from several databases. On the Stock Exchange of Hong Kong, firms are required by law to disclose details of their actual repurchase before the start of the business day following the repurchase. As a result, in contrast to many other stock exchanges, actual repurchase data is available. Separate daily excel files of repurchase data, which are publicly available on HKEXnews.hk, and include, amongst other information, the number of shares repurchased and the repurchase price, are collected by me.

Furthermore, time-series data of repurchasing firms, such as prices, market capitalizations, shares outstanding, market to book ratios, cash and cash equivalents, debt and asset levels are obtained from Datastream and Worldscope. Also, The Hang Seng Index is obtained from Datastream.

Moreover, the Bloomberg terminal's transformed measure of news reading and searching activity is obtained in order to measure institutional investor attention. By searching for the repurchasing companies by typing their company number together with the words "HK" and "Equity" (e.g., 1070 HK Equity), the Bloomberg attention data is obtained.

4.2 Sample construction

The initial sample of firms that bought back stocks between 1-1-2011 and 31-12-2018 consists of 531 firms that made a total of 21417 share repurchases. Repurchases that were not labeled with the security type Ordinary, such as preference shares, warrants and convertible bonds are removed, which resulted in 20409 repurchases remaining. Moreover, only the method type exchange is kept, resulting in 19449 repurchases conducted by 486 firms.

Of these 486 firms, the attention data is obtained from a Bloomberg Terminal. The Bloomberg data that is needed in order to get the Abnormal Institutional Attention, which will be further elaborated in the Methodology section, is named "News Heat – Daily Max Readership" in the terminal. Out of the 486 firms, 449 had news-searching and news-reading data available in Bloomberg. A sum of 314317 daily measures for 449 firms was collected. Furthermore, the company codes of 11 firms were not recognized by Bloomberg. Moreover, most firms did not have repurchase data available for the whole time period, resulting in repurchase dates having no attention data. Also, six Bloomberg measures were manually marked as missing because their outcome was negative, while this is not possible according

to Bloomberg's description of the measure. In the end, out of the 19449 repurchases, 4721 had a needed attention measure on the repurchase day.

Of these 4721 repurchases, only 3917 repurchases conducted by 311 firms remain after removing repurchases without stock data such as prices, market capitalization, number of shares traded, shares outstanding, market to book ratio, dividends, net income, cash and cash equivalents, net debt and total assets. All accounting variables have been winsorized at the 5% level in order to control for outliers. Table 5 gives an overview of the repurchase sample construction.

Table 5: Repurchase sample construction

This table shows the steps conducted to get the final data set of 3917 share repurchases. Share repurchase data was obtained by downloading all daily excel files on HKEXnews.hk between 1-1-2011 and 31-12-2018

Sample construction	# share repurchases removed	# share repurchases remaining
All share repurchases reported on HKSE between 1-1-2011 and 31-12-2018		21417
Remove share repurchases not labeled as Ordinary shares	1008	20409
Remove share repurchases not labeled as Exchange	960	19449
Remove repurchases without Bloomberg news-searching and news-reading measure	14728	4721
Remove repurchases without stock data such as prices, market capitalization, number of shares traded, shares outstanding, market to book ratio, dividends, net income, cash and cash equivalents, net debt and total assets	804	3917

In order to test Hypotheses 1.1 to 1.4 regarding the factors generally having an association with investor attention, an analysis is made of the attention on all trading days between 1-1-2011 and 31-12-2018, without focusing on only the repurchase event days. Therefore, the analyses in this part use 240175 observations, containing all days of firms with attention data available.

From Hypothesis 2 onwards, this thesis makes use of an event study and focusses on the repurchase event dates. The analyses here make use of 3917 observations, as examined in Table 5. The descriptive statistics of both samples are presented in Table 6 below. The correlation matrix is presented in Table A1 in the appendix.

Table 6: Summary statistics variables

This table gives the mean, standard deviation, minimum value, maximum value and percentiles of the dependent and independent variables used in this thesis. Panel A gives these statistics for the sample used to analyze Hypotheses 1.1 to 1.4, taking observations for all trading days between 2011 and 2018 for companies with investor attention data available. Panel B gives the statistics for the sample used for Hypotheses 2 onwards, using data focusing on the event dates on which repurchases were conducted. *Bloomberg Output* is the measure provided by the Bloomberg terminal. The Bloomberg terminal creates a measure of attention by counting the reading and searching volume of specific stocks' news articles by users of the terminal. Users can specifically search for news about a particular company by typing the company's stock code accompanied by the module "CN" (company news). Bloomberg gives scores based on whether users actively search for company news or only read company news articles. Ten is given as a score if investors actively search for news about a firm, and a score of one is given in case investors read an article. Subsequently, Bloomberg aggregates these scores to hourly levels. Then, the average hourly score is calculated in segments of eight hours. Thereafter, the average score of these eight hours is compared to the average hourly score of the prior 30 days. When the average score of eight hours is higher than 96% of the hourly scores of the prior 30 days, a new score of 4 is given. Likewise, when the average eight hour score is between 94%-96%, 90%-94%, 80%-90% or 0%-80% a new score is given of 3, 2, 1 or 0 respectively. In the end, by aggregating these new scores to daily levels, Bloomberg comes up with a final transformed daily score, which correspondingly ranges between 0 and 4. *AIA* is a dummy measure of abnormal institutional attention which is equal to 1 when the Bloomberg outputs is 2, 3 or 4, and equal to 0 when the Bloomberg outputs is 0 or 1. *AIAC* is a variable that is more continuous than the Bloomberg outputs. Its values are transformed from the 0 to 4 Bloomberg outputs by making use of conditional means of truncated normal distribution. AIAC's equivalent scores are -0.350, 1.045, 1.409, 1.647 and 2.154. *Tuesday - Friday* are dummy variables which take the value 1 when the weekday is on Tuesday-Friday, and take the value 0 otherwise. *Firm size* is the log of a firm's market capitalization. *Trading volume* is the number of shares traded divided by the current number of shares outstanding. *Same day repurchase* is obtained after dividing the repurchasing days into four quartiles based on the number of firms buying back shares on that particular day. Depending on the quartile, $SameDayRepurchase_i$ is a variable which has a value from 1 to 4. *CAR(0, +2)* is the cumulative abnormal return in the window t=0 to t=2, where t=0 is the repurchase date. *CAR(-10, -2)* is the cumulative abnormal return in the event window t=-10 to t=-2, where t=0 is the repurchase date. It captures the pre-event price changes. *Market to book* is the market to book ratio, *Dividends* is the ratio of cash dividends to net income, *Cash* is the cash to assets ratio and *Leverage* is the net debt to total assets ratio. *Repurchase size* is the number of shares repurchased divided by the number of shares outstanding.

Panel A: All daily observations for companies with attention data available *(Hypotheses 1.1-1.4)*

	N	Mean	St.Dev	min	max	p25	Median	p75
Bloomberg output	240294	0.492	1.137	0.000	4.000	0.000	0.000	0.000
AIA	240294	0.091	0.287	0.000	1.000	0.000	0.000	0.000
AIAC	240294	0.036	0.796	-0.350	2.154	-0.350	-0.350	-0.350
Tuesday	240294	0.198	0.398	0.000	1.000	0.000	0.000	0.000
Wednesday	240294	0.203	0.403	0.000	1.000	0.000	0.000	0.000
Thursday	240294	0.206	0.405	0.000	1.000	0.000	0.000	0.000
Friday	240294	0.202	0.401	0.000	1.000	0.000	0.000	0.000
Firm size	240294	16.822	1.585	10.738	23.648	15.735	16.846	17.792
Trading volume	240294	2.536	4.579	0.000	348.518	0.719	1.423	2.804
Same day repurchase	240294	2.219	1.213	1.000	4.000	1.000	2.000	3.000

Panel B: Repurchase data *(Hypothesis 2 onwards)*

	N	Mean	St.Dev	min	max	p25	Median	p75
CAR(0, +2)	3917	0.003	0.043	-0.392	0.342	-0.017	0.003	0.024
CAR(-10, -2)	3917	-0.011	0.079	-0.556	0.359	-0.045	-0.005	0.031
Bloomberg output	3917	0.521	1.177	0.000	4.000	0.000	0.000	0.000
AIA	3917	0.136	0.343	0.000	1.000	0.000	0.000	0.000
AIAC	3917	0.054	0.817	-0.350	2.154	-0.350	-0.350	-0.350
Firm size	3917	16.769	1.393	12.868	22.741	15.735	16.930	17.624
Market to book	3917	1.957	1.787	0.200	18.790	0.850	1.360	2.440
Dividends	3917	0.284	1.484	-3.610	19.999	0.083	0.152	0.245
Cash	3917	0.162	0.119	0.000	0.756	0.086	0.123	0.213
Leverage	3917	0.098	0.202	-0.756	0.703	0.007	0.135	0.225
Repurchase size	3917	0.308	0.245	0.000	1.000	0.113	0.235	0.451

Next, Table 7 summarizes the number of repurchases over the years used in this thesis. Repurchases per year fluctuate between 430 and 580, with an exception for 2017. It remains unclear why the number of repurchases in 2017 was lower. Nevertheless, the total repurchase value in 2017 was high. Furthermore, Figure A1 in the appendix presents the number of repurchases per weekday. The data sample distribution within my time frame follows the trend of increasing repurchase values over time, as described in Chapter 1.

Table 7: Summary statistics of share repurchases

This table provides a yearly overview of the number of firms that conducted a buyback, the number of conducted buybacks, the total number of shares bought back and the total value of the repurchased shares (in HKD) between 2011 and 2018.

	Firms	Repurchases	Number of shares repurchased (in bn)	Total value repurchased (in HKD bn)
2011	47	534	1.03	3.28
2012	32	439	0.98	2.76
2013	35	518	1.24	7.70
2014	50	573	2.67	10.50
2015	45	551	3.86	19.00
2016	38	577	2.42	13.90
2017	22	273	1.88	18.40
2018	42	451	1.22	14.80

5. Methodology

This chapter gives and evaluates the used methodologies in order to determine the outcomes of the hypotheses. In Section 5.1, the novel attention measure proposed by Ben-Rephael et al. (2017) will be examined. In Section 5.2, the methodology used for Hypotheses 1.1-1.4 will be elaborated. Thereafter, in Section 5.3, the market model used for Hypotheses 2.1-2.4 will be discussed. Finally, in Section 5.4, the multivariate OLS regression conducted to give an answer to this thesis' main question will be provided.

5.1 Bloomberg's Abnormal Institutional Attention measure

As described in the Theoretical Framework section, there are several measures of investor attention that can be used, such as turnover, trading volume and day of the week. Also, the direct attention proxy Google Search Volume Index can be used. The issue, however, is that these measures are either indirect or capture retail investor attention instead of directly measuring institutional investor attention. Ben-Rephael et al. (2017) find that important events of companies have a greater probability to immediately catch institutional attention than retail attention. Furthermore, they state that institutional attention is more proactive, making it more important than retail attention. Consistent with the method used by Ben-Rephael et al. (2017), this thesis uses the Bloomberg terminal's news searching and reading activity for individual stocks to directly measure institutional investor attention. Ben-Rephael et al. (2017) outline that the majority of the users of the Bloomberg terminal are presumably institutional investors that have the motivations as well as the financial resources to immediately respond to critical news about companies.

The Bloomberg terminal creates a measure of attention by counting the reading and searching volume of specific stocks' news articles by users of the terminal. Users can specifically search for news about a particular company by typing the company's stock code accompanied by the module "CN" (company news). Bloomberg gives scores based on whether users actively search for company news or only read company news articles. Ten is given as a score if investors actively search for news about a firm, and a score of one is given in case investors read an article. Subsequently, Bloomberg aggregates these scores to hourly levels. Then, the average hourly score is calculated in segments of eight hours. Thereafter, the average score of these eight hours is compared to the average hourly score of the prior 30 days. When the average score of eight hours is higher than 96% of the hourly scores of the prior 30 days, a new score of 4 is given. Likewise, when the average eight hour score is between 94%-96%, 90%-94%, 80%-90% or 0%-80% a new score is given of 3, 2, 1 or 0 respectively. In the end, by aggregating these new scores to daily levels, Bloomberg comes up with a final transformed daily score, which correspondingly ranges between 0 and 4. Only these final daily scores are provided by Bloomberg to its users.

Considering that this thesis aims to have a measure for abnormal institutional attention (AIA) in order to point out the days on which there is high attention, consistent with Ben-Rephael et al. (2017), a dummy variable *AIA* is created. This dummy measure of abnormal institutional attention is assigned the value 1 when Bloomberg's daily score is 2, 3, or 4. If Bloomberg's daily score is 0 or 1, the dummy variable takes the value 0. By creating these dummies, it gets easier to interpret the effect that high institutional attention has on share repurchases. Moreover, for additional regressions, the variable *AIAC* is created. *AIAC* is a variable that is more continuous than the Bloomberg outputs that range from 0 to 4. Its values are transformed from the 0 to 4 Bloomberg outputs by making use of conditional means of truncated normal distribution. *AIAC*'s equivalent scores are -0.350, 1.045, 1.409, 1.647 and 2.154. In line with Ben-Rephael et al. (2017), additional regressions using the Bloomberg output, ranging from 0 to 4, and its equivalent AIAC scores are conducted to test whether the outcome of the analyses, that make use of AIA, are not based on the tail of the attention shock distribution, since AIA captures shocks.

5.2 Associations with AIA

In line with Ben-Rephael et al. (2017), this section explains the analysis conducted to answer Hypotheses 1.1 to 1.4 regarding the factors having an association with investor attention in general, without focusing on only repurchases. The abovementioned dummy AIA is taken as the dependent variable, and several regressions are conducted by making use of the sample as described in Table 6 Panel A.

Based on the outcome of these hypotheses, a conclusion can be drawn whether the AIA in my sample in line with previous literature and, subsequently, appropriate to use as a measure for investor attention. First, the hypotheses are tested separately using OLS regressions:

$$AIA_{i,t} = \beta_0 + \beta_1 Tuesday_{i,t} + \beta_2 Wednesday_{i,t} + \beta_3 Thursday_{i,t} + \beta_4 Friday_{i,t} + \varepsilon_{i,t} \quad (1)$$

Where variables $Tuesday_{i,t}$, $Wednesday_{i,t}$, $Thursday_{i,t}$ and $Friday_{i,t}$ are dummy variables denoting whether the stock's day of the day of interest is on that particular day.

$$AIA_{i,t} = \beta_0 + \beta_1 FirmSize_{i,t} + \varepsilon_{i,t} \quad (2)$$

Where $FirmSize_{i,t}$ captures firm size by taking the log of the firm's market capitalization.

$$AIA_{i,t} = \beta_0 + \beta_1 TradingVolume_{i,t} + \varepsilon_{i,t} \quad (3)$$

Where $TradingVolume_{i,t}$ is determined by the number of shares traded on that particular day divided by the current number of shares outstanding.

$$AIA_{i,t} = \beta_0 + \beta_1 SameDayRepurchase_{i,t} + \varepsilon_{i,t} \quad (4)$$

Where $SameDayRepurchase_{i,t}$ which is obtained after dividing the repurchasing days into four quartiles based on the number of firms buying back shares on that particular day. Depending on the quartile, $SameDayRepurchase_{i,t}$ is a variable which has a value from 1 to 4.

Finally, a multivariate OLS regression controlling for year effects is conducted in which all variables capturing the attention hypotheses are included:

$$\begin{aligned} AIA_{i,t} = \beta_0 &+ \beta_1 Tuesday_{i,t} + \beta_2 Wednesday_{i,t} + \beta_3 Thursday_{i,t} \\ &+ \beta_4 Friday_{i,t} + \beta_5 FirmSize_{i,t} + \beta_6 TradingVolume_{i,t} \\ &+ \beta_7 SameDayRepurchase_{i,t} + \beta_8 YearDummies_{i,t} + \varepsilon_{i,t} \end{aligned} \quad (5)$$

5.3 Short-term price reaction to share repurchases

In order to assess the short-term price reaction to share repurchases, and give an answer to Hypothesis 2, an event study approach, as proposed by MacKinlay (1997), using cumulative abnormal returns, is being conducted. Furthermore, the abnormal returns are estimated by making use of the market model. Brown and Warner (1985) prove that the market model is an appropriate methodology to use for daily data. Also, Campbell et al. (1997) show that the use of more precise models as opposed to the market model, do not give better abnormal return results.

5.3.1 Cumulative abnormal returns

A time frame of 21 days, starting on trading day -10 and ending on trading day +10, surrounding the event is taken to illustrate the price changes regarding the repurchase day. Next, the estimation window, which is needed to measure abnormal returns, is determined. As suggested by MacKinlay (1997), 120 trading days before the event window are taken. Consequently, the estimation window used is from trading day -121 to trading day -11. The estimation window is assumed to be a period free of significant factors manipulating the event.

In order to perform the market model, daily stock returns, and daily market returns are calculated as follows:

$$Return_{i,t} = \frac{Stock\ price_t - Stock\ price_{t-1}}{Stock\ price_{t-1}} \quad (6)$$

$$Return_{m,t} = \frac{Hang\ Seng\ Index_t - Hang\ Seng\ Index_{t-1}}{Hang\ Seng\ Index_{t-1}} \quad (7)$$

Where $Stock\ price_t$ is the closing price of firm i on day t and $Stock\ price_{t-1}$ is the closing price on the day before. $Return_{i,t}$ denotes the rate of stock return. In line with prior literature, the value weighted Hang Seng Index is being used as the benchmark to calculate the market return $Return_{m,t}$, this index covers around 60% of the market capitalization.

The predicted market model returns are found by making use of ordinary least squares and the market model parameters, α_i, β_i and $\sigma^2_{\varepsilon_{i,t}}$:

$$Normal\ return_{i,t} = \alpha_i + \beta_i Return_{m,t} + \varepsilon_{i,t} \tag{8}$$
$$E(\varepsilon_{i,t}) = 0$$
$$var(\varepsilon_{i,t}) = \sigma^2_{\varepsilon_{i,t}}$$

Where $Normal\ return_{i,t}$ is the expected stock return of firm i on day t, and $\varepsilon_{i,t}$ is the random error. Next, the abnormal return is found by determining the difference between the actual and predicted market returns:

$$Abnormal\ return_{i,t} = Return_{i,t} - Normal\ return_{i,t} \tag{9}$$

Finally, the abnormal returns are summed up to find the estimated average cumulative abnormal returns for the event window.

$$CAR_i(\tau_1, \tau_2) = \sum_{\tau=\tau 1}^{\tau 2} AR_{i\tau} \tag{10}$$

Where event window is trading day τ_1 until trading day τ_2. The null hypothesis states that CAR in time window τ_1 to τ_2 is zero.

5.3.2 Significance testing of cumulative abnormal returns

In Hong Kong, repurchasing firms need to disclose the details of the buyback before the beginning of the trading day following the repurchase day. Zhang (2005), elaborates that Hong Kong investors' short-term reaction to share repurchases can be best measured by making use of the sub-window (0, +2). This thesis tests the statistical significance of several event windows' CAR in order to determine whether the proposed sub-window by Zhang (2005) is the most suitable window to use for its dataset. The statistical significance is tested by making use of a number of tests.

The first test used to test the significance of the CARs, is the cross-sectional *t*-test:

$$t_{CAR_{\tau_1,\tau_2}} = \frac{CAR_{\tau_1,\tau_2}}{SD_{CAR_{\tau_1,\tau_2}}} \tag{11}$$

Where CAR_{τ_1,τ_2} is the cumulative abnormal return from trading day τ_1 to trading day τ_2, and $SD_{CAR_{\tau_1,\tau_2}}$ is its standard error. This traditional test statistic is broadly used, however, its results can be such that there is a downward bias in the standard deviation and the null hypothesis gets over-rejected if there are even small cross-sectional correlation or volatility changes caused by events in the event study (Dutta, 2014). Numerous attempts have been made to solve these statistical issues. Additional to the traditional cross-sectional *t*-test, I make use of the tests proposed by these attempts.

The first attempt proposed by Patell (1976) standardizes the CARs in the event window in order to reduce the volatility caused by events with high standard deviations of returns. Also, Boehmer et al. (1991) found a test statistics that is robust against volatility changes. These two tests rely on the assumption that the clustering of events is the cause of event-induced volatility changes. Therefore, it is crucial to test share repurchases with these tests. Besides, Kolari and Pynnönen (2010) state that both Patell (1976) and Boehmer et al. (1991) over-reject the null hypothesis because returns can be cross-correlated, and the authors propose a new test statistic which corrects for cross-correlation. Finally, the sign test, as proposed by Cowan (1992), is used in order to deal with nonnormality. This test relates the ratio of positive abnormal returns around the event date with abnormal returns in normal times. This thesis tests the significance in all tests at the 1, 5 and 10 percent levels.

5.3.3 Cross-sectional analysis

In order to test hypotheses 2.1 to 2.4 regarding the short-term price impact of a share repurchase as displayed in Chapter 3 Table 4, a multivariate OLS regression is conducted, by, next to the control variables, making use of different explanatory variables in each model. The control variables are $RepurchaseSize_{i,t}$, which denotes the amount of shares repurchased over the amount of shares outstanding, and $YearDummies_{i,t}$, which controls for the year of the repurchase. The exact time window of dependent variable $CAR_i(\tau_1, \tau_2)$ is being determined by analyzing the result of the significance tests of the short-term CARs. The most significant time window will be used. The used sample is the repurchase specific sample as elaborated in Table 5. The regression in Formula (12) tests hypothesis 2.1:

$$\begin{aligned} CAR_i(\tau_1, \tau_2) = \beta_0 &+ \beta_1 CAR(-10,-2)_{i,t} + \beta_2 FirmSize_{i,t} \\ &+ \beta_3 MarketToBook_{i,t} + \beta_4 RepurchaseSize_{i,t} \\ &+ \beta_5 YearDummies_{i,t} + \varepsilon_{i,t} \end{aligned} \tag{12}$$

Where $CAR(-10,-2)_{i,t}$ is the pre-event change in CAR, $FirmSize_{i,t}$, denotes firm size by taking the log of the firm's market capitalization, and $MarketToBook_{i,t}$ is a firm's market to book ratio capturing its undervaluation. All three variables capture the signaling hypothesis.

$$CAR_i(\tau_1,\tau_2) = \beta_0 + \beta_1 Dividends_{i,t} + \beta_2 RepurchaseSize_{i,t} + \beta_3 YearDummies_{i,t} + \varepsilon_{i,t} \quad (13)$$

Where $Dividends_{i,t}$, is the ratio of cash dividends paid to net income and captures the dividend substitution hypothesis.

$$CAR_i(\tau_1,\tau_2) = \beta_0 + \beta_1 Cash_{i,t} + \beta_2 RepurchaseSize_{i,t} + \beta_3 YearDummies_{i,t} + \varepsilon_{i,t} \quad (14)$$

Where $Cash_{i,t}$ represents the cash to assets ratio and captures the free cash flow hypothesis.

$$CAR_i(\tau_1,\tau_2) = \beta_0 + \beta_1 Leverage_{i,t} + \beta_2 RepurchaseSize_{i,t} + \beta_3 YearDummies_{i,t} + \varepsilon_{i,t} \quad (15)$$

Where $Leverage_{i,t}$ is a firm's net debt to total assets ratio, capturing the capital structure hypothesis.

Finally, a cross-sectional OLS regression including all variables is conducted:

$$\begin{aligned} CAR_i(\tau_1,\tau_2) = {} & \beta_0 + \beta_1 CAR(-10,-2)_{i,t} + \beta_2 FirmSize_{i,t} \\ & + \beta_3 MarketToBook_{i,t} + \beta_4 Dividends_{i,t} + \beta_5 Cash_{i,t} \\ & + \beta_6 Leverage_{i,t} + \beta_7 RepurchaseSize_{i,t} \\ & + \beta_8 YearDummies_{i,t} + \varepsilon_{i,t} \end{aligned} \quad (16)$$

The main advantage of the regression denoted in Formula (16) is that when focusing on one of the explanatory variables, the other variables take the role of control variables. In prior literature, when, for example, analyzing the free cash flow hypothesis, the variable of interest used is $Cash_{i,t}$, while the control variables used are $FirmSize_{i,t}$, $MarketToBook_{i,t}$, $Dividends_{i,t}$ and $Leverage_{i,t}$. Thus, the regression denoted in Formula (16) can be best used to analyze each hypothesis, while using the other variables as control variables.

5.4 Attention impact on prices

Finally, to examine the effect of investor attention on the short-term price reaction after buybacks, dummy variable AIA, denoting abnormal attention, is added to the cross-sectional regression. By

plotting AIA over the event window (-10, +10) relative to the repurchase day, an analysis can be made regarding its development. Furthermore, Hong Kong companies are obligated to disclose their buyback to the Stock Exchange before 9:30 am of the trading day (t=1) following the repurchase day (t=0). Therefore, the details of the buyback become publicly available between the moment of buyback on day t=0 and the opening of the exchange on day t=1. Since there is no information available regarding the exact time of this information release between those two moments I need to detect on which calendar day investors' attentional reaction is strongest in order to determine which day's AIA to pick. Figure 2, below, displays the timeline around a repurchase day.

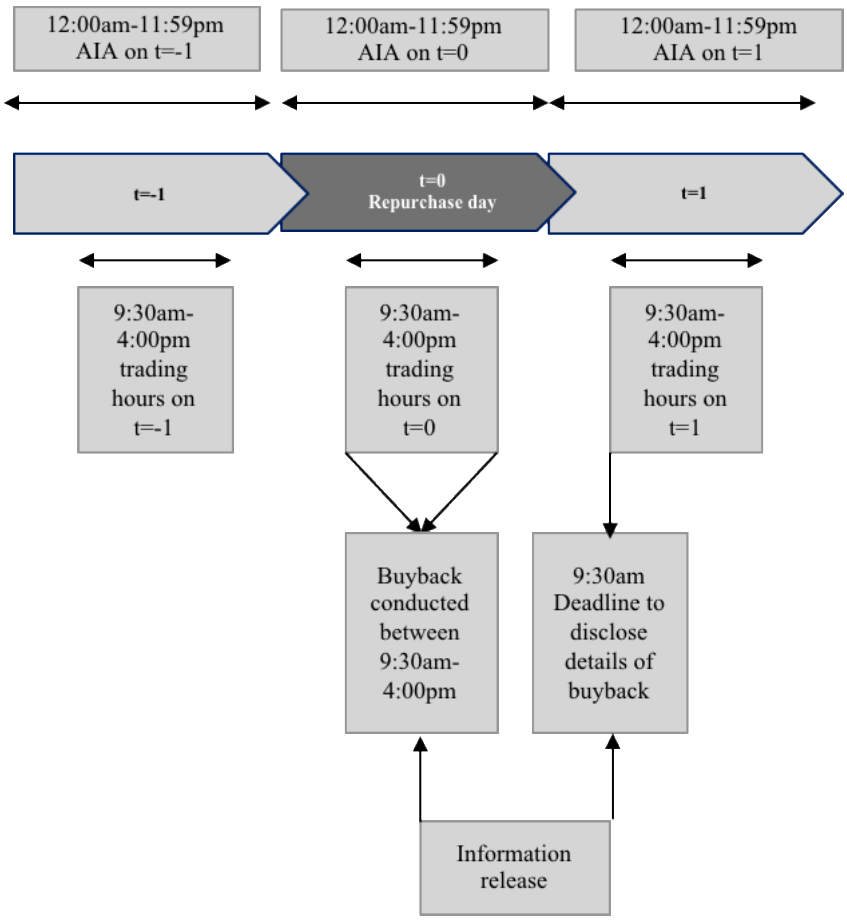

Figure 2: Timeline around a repurchase day
This figure displays the timeline around a repurchase day (t=0).

When analyzing the effect of AIA, the variables found to have a significant effect on the short-term price reaction, according to the regression in Formula (16), are used as control variables, in accordance with the original control variables $RepurchaseSize_i$ and $YearDummies_i$.

$$CAR_i(\tau_1, \tau_2) = \beta_0 + \beta_1 AIA_{i,t} + \beta_2 CAR(-10,-2)_{i,t} + \beta_3 FirmSize_{i,t} + \beta_4 MarketToBook_{i,t} + +\beta_5 Dividends_{i,t} + \beta_6 Cash_{i,t} + \beta_7 Leverage_{i,t} + \beta_8 RepurchaseSize_{i,t} + \beta_9 YearDummies_{i,t} + \varepsilon_{i,t} \quad (17)$$

In an additional regression, the interaction term between $AIA_{i,t}$ and $FirmSize_{i,t}$ will be added to examine whether the attention difference in short-term price reaction is based on the level of a firm's size. Moreover, the sample will be split into firm size quantiles to further analyze the differences.

6. Results

This chapter analyzes the results of the models explained in Chapter 5. First, in Section 6.1, the correlation matrix will be discussed. Then, in Section 6.2, the results of Hypotheses 1.1 to 1.4, regarding associations with AIA, will be presented. Thereafter, in Section 6.3, the results regarding the price reaction to buybacks anomaly's presence in my dataset will be examined. Subsequently, in Section 6.4, the results of Hypothesis 2.1 to 2.4, regarding the determinants of the price reaction to buybacks, will be presented. Finally, in Section 6.5, the results of the main question of this thesis, regarding the effect of attention on prices after buybacks, will be examined.

6.1 Correlation matrix

The Pearson correlation matrices are presented in Table A1 in the appendix. As elaborated in Chapter 4, Hypotheses 1 and 2 use different samples; the sample used for Hypothesis 2 only focusses on repurchase events. The matrices give the correlation coefficients and the significance between the dependent, independent and control variables used in this thesis. Keller and Warrack (2003) state that a multicollinearity problem occurs within a model when the absolute value of the correlation between the variable of interest and a control variable is higher than 0.7. The matrices show that the only variables having correlations amongst each other with values above 0.3 are AIA, Bloomberg's output and AIAC. Since these variables are derived from each other, this outcome was expected. No other correlations above 0.3 are observed, which implies that multicollinearity is not an issue in the dataset used for this thesis.

6.2 Abnormal Institutional Attention

This section presents the tests conducted to give an answer to hypotheses 1.1 to 1.4. In Chapter 3, it was hypothesized that the day of the week, firm size, trading volume and other repurchases made on the same day are associated with investor (in)attention. Following Ben-Rephael et al. (2017), dummy variable AIA is created by making use of the output given by the Bloomberg terminal and regressed on the abovementioned variables.

Table 8 displays the outcomes on the set of regressions conducted on AIA to test Hypotheses 1.1 to 1.4. Variables *Tuesday*, *Wednesday*, *Thursday* and *Friday* are dummy variables denoting whether the weekday of a stock is on that particular day. *Firm size* is the log of the firm's market capitalization and *Trading volume* is the number of shares traded divided by the number of shares outstanding. *Same day repurchases* is a variable with values ranging from (1) to 4 depending on the quartile. In Table 8, Column (1) captures hypothesis 1.1, Column (2) captures hypothesis 1.2, Column (3) captures hypothesis 1.3 and Column (4) captures hypothesis 1.4. Column (5) of Table 8 includes all independent variables.

Table 8: Regression results for Abnormal Institutional Attention

This table provides the results of an ordinary least squares regression for Abnormal Institutional Attention. The dependent variable is *AIA*, which is a dummy measure of abnormal institutional attention which is equal to 1 when the Bloomberg terminal's score is 2, 3 or 4 and equal to 0 when the Bloomberg terminal's score is 0 or 1. The Bloomberg terminal creates a measure of attention by counting the reading and searching volume of specific stocks' news articles by users of the terminal. Users can specifically search for news about a particular company by typing the company's stock code accompanied by the module "CN" (company news). Bloomberg gives scores based on whether users actively search for company news or only read company news articles. Ten is given as a score if investors actively search for news about a firm, and a score of one is given in case investors read an article. Subsequently, Bloomberg aggregates these scores to hourly levels. Then, the average hourly score is calculated in segments of eight hours. Thereafter, the average score of these eight hours is compared to the average hourly score of the prior 30 days. When the average score of eight hours is higher than 96% of the hourly scores of the prior 30 days, a new score of 4 is given. Likewise, when the average eight hour score is between 94%-96%, 90%-94%, 80%-90% or 0%-80% a new score is given of 3, 2, 1 or 0 respectively. In the end, by aggregating these new scores to daily levels, Bloomberg comes up with a final transformed daily score, which correspondingly ranges between 0 and 4. The independent variables in Column (1) are Tuesday-Friday, which are dummy variables equal to 1 when the stock's day of the week is on Tuesday-Friday, and equal to 0 otherwise. Column (1) captures the Weekday hypothesis (Hypothesis 1.1) displayed in Table 3. In Column (2), the independent variable of interest is *Firm size*, which is the log of a firm's market capitalization. Column (2) captures the size hypothesis (Hypothesis 1.2) displayed in Table 3. In Column (3), the independent variable of interest is *Trading Volume*, which is the number of shares traded divided by the current number of shares outstanding. This column captures the Trading Volume hypothesis (Hypothesis 1.3) documented in Table 3. Column (4) uses *Same day repurchase* as the independent variable of interest. *Same day repurchase* is obtained after dividing the repurchasing days into four quartiles based on the number of firms buying back shares on that particular day. Depending on the quartile, *Same day repurchase* is a variable which has a value from 1 to 4. Column (4) captures the Distraction hypothesis (Hypothesis 1.4) displayed in Table 3. Finally, the regression in Column (5) includes all abovementioned variables. *Year Dummies* are included to control for year effects.

	(1)	(2)	(3)	(4)	(5)
	AIA	AIA	AIA	AIA	AIA
Tuesday	-0.006***				-0.007***
	(0.002)				(0.002)
Wednesday	-0.011***				-0.012***
	(0.002)				(0.002)
Thursday	-0.016***				-0.018***
	(0.002)				(0.002)
Friday	-0.029***				-0.031***
	(0.002)				(0.002)
Firm size		0.029***			0.033***
		(0.000)			(0.000)
Trading volume			0.009***		0.010***
			(0.000)		(0.000)
Same day repurchase				0.002	0.004
				(3.101)	(3.211)
Constant	0.087***	-0.391***	0.053***	0.070***	-0.467***
	(0.002)	(0.006)	(0.001)	(0.002)	(0.007)
Obs.	240175	240175	240175	240175	240175
Adj. R-squared	0.004	0.026	0.024	0.003	0.054
Year Dummies	YES	YES	YES	YES	YES

OLS robust standard errors are in parentheses

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

Testing for the impact of prior literature's determinants of attention on AIA, mixed results are obtained. Evidence is found that day of the week, firm size and trading volume have a significant effect on AIA. However, no evidence is found that the amount of same day repurchases has a significant influence on AIA.

Table 8 shows that there is a significant relation between the day of the week and AIA. Consistent with DellaVigna and Pollet (2009) and Ben-Rephael et al. (2017), significant within-week seasonality regarding attention has been found. The effect of the day on abnormal attention increases negatively from Monday to Friday. Table 8 shows that the coefficient on Friday is -0.029, whereas on Monday the coefficient is -0.006. DellaVigna and Pollet (2009) argue that on Fridays, the probability of investors being concerned with the approaching weekend and, consequently, do not pay the same level of attention to investing as on other weekdays. Moreover, Michaely et al. (2016) investigate this reduced market response to Friday share repurchases and find a reduced market reaction on Friday.

Next, consistent with Drake et al. (2016), firm size does have a positive and statistically significant effect on investor attention shocks. This indicates that when firms are larger, more information about these firms is available to attract the attention of investors. This is in line with Brown et al. (1987), who argue that larger firms are usually followed by more financial analysts, leading to more information becoming public. Additionally, the result is consistent with Collins et al. (1986) who also state that firm size has a positive impact on the amount of available information and the number of investors collecting and processing this information.

Furthermore, Table 8 indicates that trading volume has a positive and significant impact on investor attention shocks. This finding is in line with Loh (2010) and Hou et al. (2009), who state that when investors are actively buying and selling a particular stock, they need to pay attention to information concerning that stock.

Contrary to expectations, it is observed that the variable denoting the same day repurchases on a particular day does not have a negative sign. Hirshleifer et al. (2009) state that more activities on the same day lead to investors receiving lots of information and, consequently, result in them being distracted from the event. However, the event investigated by Hirshleifer et al. (2009) is earnings announcements. From Table 8, the conclusion can be drawn that the distraction hypothesis does not hold in my dataset when focusing on share repurchases. A possible reason for this could be that the highest number of same day repurchases in my dataset is 12, and the mean in my dataset is 3.9 daily repurchases. In the dataset of Hirshleifer et al. (2009) the highest number of same day earnings is 290, and their mean is 120.8 daily announcements. Therefore, the conclusion that can be drawn is that, since there are relatively few same day repurchases in my dataset, this phenomenon does not have a significant effect on shocks in institutional investor attention.

In Column (5), all explanatory variables are included. The results remain the same as the separate regressions. The regression gives evidence for a significant and positive impact that explanatory variables day of the week, firm size and trading volume have on attention shocks. Based on these results,

the conclusion can be drawn that proxies used by previous literature are commonly in line with the attention measure used in this thesis, when tested in Hong Kong. Also, the results of my dataset's AIA are consistent with the dataset of Ben-Rephael et al. (2017), implying that the use of AIA as an attention measure is appropriate. Observational errors in AIA can partly be the reason for the low r-squared. Nevertheless, in this thesis' later results, it will be shown that AIA does have a significant effect on stock prices.

In Table 8, AIA was used as the dependent variable. To check whether the results of Table 8 also hold when using a dependent variable which not only captures abnormal attention, additional regression analyses are conducted. This is done to exclude the possibility that the results are based on the tail of the attention shock distribution, since AIA captures shocks. The results of these regressions are presented in Table A2 in the appendix. The first additional regression, presented in Column (1) uses *Bloomberg output*, the direct attention score output generated from Bloomberg, which ranges from 0 to 4. The second additional regression, provided in Column (2) uses *AIAC* as the dependent variable. AIAC is a variable that is more continuous than the Bloomberg outputs. Its values are transformed from the 0 to 4 *Bloomberg output* by making use of conditional means of truncated normal distribution. *AIAC*'s equivalent scores are -0.350, 1.045, 1.409, 1.647 and 2.154. As displayed in Table A2 in the appendix, the results of these additional regressions are similar to the results in Table 8.

6.3 Short-term price reactions to share repurchases

This section presents the short-term price impact of actual share repurchase. First, the daily abnormal returns and CARs are being presented. Subsequently, the CAR development around share repurchases will be illustrated. Then, several sub-windows' CAR significance will be analyzed, and the most significant one will be picked to be used in the subsequent analysis.

By making use of the market model, abnormal returns are being determined. The Hang Seng Index is used as a benchmark. Furthermore, an estimation window of 120 days before the time window taken. The time frame consists of 21 days, starting on trading day -10 and ending on trading day +10, surrounding the event is taken to illustrate the price changes regarding the repurchase day. The time window's daily abnormal returns and daily CARs are presented in Table 9. In Figure 2, the CAR development is illustrated. Furthermore, in Table 10, several specific sub-windows and their significance are shown.

Table 9: Daily abnormal returns and cumulative abnormal returns

This table presents the daily abnormal returns, their t-values and the cumulative abnormal returns of the time window based on the market model event study. A time frame of 21 days, starting on trading day -10 and ending on trading day +10, surrounding the event is taken to illustrate the price changes regarding the repurchase day. The estimation window used is from trading day -121 to trading day -11. The Hang Seng index is used as a benchmark. The data set consists of 3917 open-market repurchases conducted on the Stock Exchange of Hong Kong between 2011 and 2018. ***, **, and * denote statistical significance at the 1%, 5% and 10% levels respectively.

Day	Number of firms	AR (%)	t-value	CAR (%)
-10	3917	-0.175***	-4.883	-0.175
-9	3917	-0.134***	-3.732	-0.309
-8	3917	-0.127***	-3.548	-0.436
-7	3917	-0.107***	-2.972	-0.543
-6	3917	-0.099***	-2.750	-0.641
-5	3917	-0.057	-1.600	-0.699
-4	3917	-0.097***	-2.696	-0.795
-3	3917	-0.119***	-3.330	-0.915
-2	3917	-0.156***	-4.345	-1.071
-1	3917	-0.152***	-4.250	-1.223
0	3917	-0.036	-0.999	-1.259
1	3917	0.236***	6.580	-1.023
2	3917	0.094***	2.619	-0.929
3	3917	0.050	1.381	-0.879
4	3917	0.009	0.242	-0.871
5	3917	-0.022	-0.614	-0.893
6	3917	-0.048	-1.332	-0.940
7	3917	-0.021	-0.574	-0.961
8	3917	-0.025	-0.701	-0.986
9	3917	-0.038	-1.069	-1.025
10	3917	-0.038	-1.377	-1.074

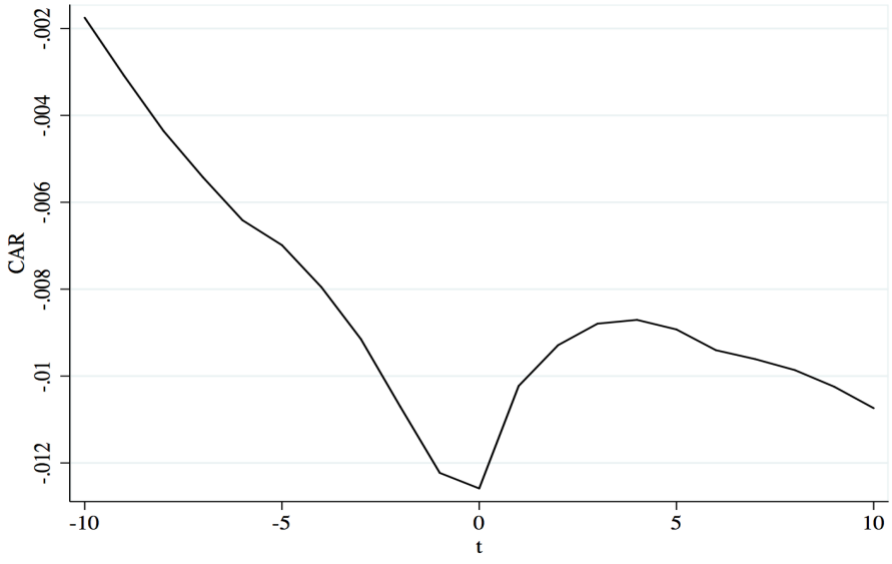

Figure 3: CAR development

This figure displays the development of the cumulative abnormal return in the 21 days surrounding a share repurchase. T=0 is the day of repurchase.

Table 10: Interval CARs and significance tests

This table shows the cumulative abnormal returns for several time windows calculated by using the market model. Interval (-10, -2) captures the pre-event CAR and interval (-10, +10) presents the 21-day CAR. Furthermore, four event windows (-1,+1; -1,+2; 0, +1; 0,+2) around the repurchase day capturing the short-term price reaction are taken in line with previous literature, as displayed in Table 3. The significance tests conducted are the traditional cross-sectional t-test, the Patell test as proposed by Patell (1976), the Adjusted Patell Test as proposed by Kolari and Pynnönen (2010), the Standardized cross-sectional test as proposed by Boehmer et al. (1991) and the Gen. significance test as proposed by Cowan (1992). P-values are in parantheses. ***, **, and * denote statistical significance at the 1%, 5% and 10% levels respectively.

Interval	CAR (%)	T-test *t*-value	Patell test *z*-value	Adjusted Patell test *z*-value	Standardized cross-sectional test *z*-value	Gen. sign test *z*-value
(-10, -2)	-1.071	-9.743*** (0.000)	-16.254*** (0.000)	-5.655*** (0.000)	-7.873*** (0.000)	-1.766* (0.077)
(-1, +1)	0.048	0.757 (0.450)	0.503 (0.615)	-0.231 (0.818)	-0.321 (0.749)	5.870*** (0.000)
(-1, +2)	0.142	1.947* (0.055)	0.892 (0.372)	0.392 (0.696)	0.546 (0.586)	6.020*** (0.000)
(0, +1)	0.200	3.890*** (0.000)	4.157*** (0.000)	2.062** (0.041)	2.871*** (0.005)	7.499*** (0.000)
(0, +2)	0.294	4.667*** (0.000)	5.768*** (0.000)	2.692*** (0.008)	3.748*** (0.000)	8.103*** (0.000)
(-10, +10)	-1.074	-6.054*** (0.000)	-15.432 (0.000)	-4.979*** (0.000)	-6.932*** (0.000)	-1.826* (0.068)

As can be seen from Figure 2, CAR is declining before the repurchase day. Also, Table 10 shows that CAR(-10, -2) has a value of -1.071%. A possible explanation for this observation is that managers buy back shares after share price declines. This result is in line with Ikenberry and Vermaelen (1996), who outline that managers attempt to repurchase when prices are in decline. A probable reason could be that managers intend to signal that their company's present market price is too low and, consequently, their firm is an appealing investment (Wansley et al., 1989). Next, from Figure 2, we observe that the short-term CAR reaction after the repurchase is upwards. Previous literature has used different time windows to capture this reaction. As examined in Chapter 2, these event windows are (-1, +1), (-1, +2), (0, +1) and (0, +2). Accordingly, in Table 10, these windows are examined to present the short-term CAR reaction around share repurchases. It is observed that the CAR is positive for all four event windows, ranging from 0.048% to 0.294%, implying that on average, the CAR response to share buybacks is positive. This implies that Hypothesis 2 regarding the short-term positive price reactions to buybacks holds.

Furthermore, Table 10 shows several significance tests for each event window. It is observed that CAR in both event window (0, +1) and event window (0, +2) is statistically significant at the 1% level according to the *t*-test. Event window (-1, +2) is significant at the 10% level, whereas event window (-1, +1) is not significant according to the *t*-test. Additional significance tests have been conducted

because, as explained in Chapter 5, there is a possibility that the dataset experiences event-induced volatility. The Patell test and the Standardized cross-sectional test adjust for volatility, while the Adjusted Patell test adjusts for cross-correlation. Lastly, the Gen. significance test deals with possible nonnormality. Subsequently, Table 10 indicates that CAR(-1, +2) is not significant according to the four additional tests. However, the CAR of sub-window (0, +1) remains significant at the 1% level according to three out of the four supplementary tests and CAR(0, +2) remains significant at the 1% level in all tests. Moreover, the abovementioned CAR(-10, -2) is statistically significant at the 1% level according to the *t*-test and three out of the four additional tests.

All in all, the results show that the short-term price reaction to share repurchases is significantly positive. This observation is in line with the results of prior literature that investigated actual share repurchases such as Zhang (2005), Obernberger (2014), Skjeltorp (2004) and Akyol and Foo (2013).

6.4 Determinants of short-term price reaction

This section tests Hypotheses 2.1 to 2.4 regarding the possible explanations of the observed positive short-term price reactions to share repurchases. To capture the short-term price reaction to share repurchases, as dependent variable CAR(0, +2) is picked above CAR(-1, +1), (-1, +2) and (0, +1) because it is more significant in each significance test conducted and presented in Table 10. Furthermore, CAR(-10, -2) is used to capture the pre-event price changes. Table 11 presents the regression in which CAR(0, +2) is regressed on firm characteristics which can be related to the hypotheses described in Chapter 3, namely, the signaling hypothesis (Column (1)), dividend substitution hypothesis (Column (2)), free cash flow hypothesis (Column (3)) and capital structure hypothesis (Column (4)). Column (5) in Table 11 includes all hypotheses simultaneously. The results are presented in Table 8.

Table 11: Regression results for short-term price reaction

This table provides the results of an ordinary least squares regression for the short-term price reaction after a share buyback. The dependent variable is CAR(0, 2), which is the cumulative abnormal return in the window t=0 to t=2, where t=0 is the repurchase date, and captures the short-term price reaction after a buyback. The time window is determined testing for the significance of several windows (see Table 12). The signaling hypothesis (hypothesis 2.1), as displayed in Table 5, is captured by *CAR(-10, -2)*, *Firm Size* and *Market to book*. *CAR(-10, -2)* is the cumulative abnormal return in the event window t=-10 to t=-2, where t=0 is the repurchase date. It captures the pre-event price changes. *Firm size* is the log of a firm's market capitalization. *Market to book* is the market to book ratio. The dividend substitution hypothesis (hypothesis 2.2) is captured by *Dividends*, which is the ratio of cash dividends to net income. The free cash flow hypothesis (hypothesis 2.3) is captured by *Cash*, which is the cash to assets ratio. Finally, the capital structure hypothesis (hypothesis 2.4) is captured by *Leverage*, which is the net debt to total assets ratio. *Repurchase size* is the number of shares repurchased divided by the number of shares outstanding. *Year Dummies* are included to control for year effects.

	(1) CAR(0, +2)	(2) CAR(0, +2)	(3) CAR(0, +2)	(4) CAR(0, +2)	(5) CAR(0, +2)
CAR(-10, -2)	-0.026***				-0.025***
	(0.009)				(0.009)
Firm size	0.001				0.001
	(0.001)				(0.001)
Market to book	-0.001**				-0.001***
	(0.000)				(0.000)
Dividends		-0.001**			-0.001**
		(0.000)			(0.000)
Cash			0.002		0.005
			(0.006)		(0.010)
Leverage				-0.002	-0.003
				(0.004)	(0.006)
Repurchase size	0.001	0.001	0.001	0.001	0.001
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Constant	-0.014	-0.002	-0.003	-0.002	-0.013
	(0.009)	(0.002)	(0.002)	(0.002)	(0.010)
Obs.	3917	3917	3917	3917	3917
Adj. R-squared	0.010	0.008	0.007	0.007	0.012
Year Dummies	YES	YES	YES	YES	YES

OLS robust standard errors are in parentheses
*** *p<0.01*, ** *p<0.05*, * *p<0.1*

Testing for the impact of firm characteristics on short-term price reaction after buybacks, mixed results are obtained. In Table 11, Column (1) captures the signaling hypothesis, whereas Columns (2), (3) and (4) capture the dividend substitution hypothesis, free cash flow hypothesis and capital structure hypothesis, respectively. Column (5) presents the full model. No significant differences are observed between the full model and the separate models. Evidence is found that pre-event price drift, undervaluation of the repurchasing firm, and tax differences between dividends and capital gains have a significant impact on the short-term price reaction. However, no evidence is found that firm size, free cash flow and leverage ratio have a significant effect on short-term price reaction to share repurchases.

Table 11 shows that CAR(-10, -2), which captures the pre-event price changes, has a negative and significant effect on the short-term price changes after a buyback at the 1% level. According to this result, a low price performance before the repurchase leads to a high short-term price reaction after the repurchase. This result can be explained by the signaling hypothesis, which relies on the assumption that there is asymmetric information between managers and the market. According to this hypothesis,

managers repurchase when prices are in decline, or when managers think their share is valued lower than the intrinsic value, in order to signal the market that their company's current market price is too low and, consequently, their stock is an attractive investment (Ikenberry and Vermaelen, 1996; Wansley et al., 1989). Furthermore, contrary to the results of Vermaelen (1981), Table 11 does not find a negative and significant relationship between firm size and share repurchases. Vermaelen (1981) claims that smaller firms are more exposed to asymmetric information and, consequently, use share repurchases more often as a way to signal their stock's undervaluation to the market. Next, as expected, Table 11 shows that market to book ratio, which captures the undervaluation of a firm, has a negative and significant effect on short-term price changes after a buyback at the 1% level. This result is also in line with the signaling hypothesis, which argues that managers buy back stock when they believe their company is undervalued (Comment and Jarell, 1991; Ikenberry et al., 1995). To sum up, there is evidence supporting the signaling hypothesis. This is consistent with prior literature which states that signaling is the most prevalent explanation (Vermaelen, 1981; Ikenberry and Vermaelen, 1996).

Next, as expected, Table 11 shows that the *Dividends*, capturing the ratio of cash dividends paid to net income, has a negative and significant impact on the short-term price changes after a repurchase at the 5% level. This result indicates that price reactions are larger when share buybacks have larger tax advantages than dividends. The observation can be explained by the dividend substitution hypothesis and is consistent with Blouin et al. (2007), who also find that firms substitute dividends for buybacks, and argue the reduction in tax rates of dividends is higher than the reduction in tax rates of capital gains.

Furthermore, contrary to expectations, Table 11 shows that variable *Cash*, denoting the cash to assets ratio, which captures the free cash flow hypothesis, has no significant effect on short-term price reactions after share repurchases. This indicates that the cash to assets ratio does not explain CAR(0, +2). However, the sign of the coefficient is as expected. The result is not in line with the findings of Stephens and Weisbach (1998) and Vafeas and Joy (1995) who find that companies with more free cash flows have greater short-term returns following buybacks.

Lastly, inconsistent with expectations, the table does not give evidence for the capital structure hypothesis, which is captured by the variable *Leverage*. This variable represents the net debt to total assets. According to the table, this variable has no significant effect on price reactions after buybacks. This result is in contrast to Dittmar (2000), who documents that firms can use share buybacks in order to alter their capital structure and reach their optimal leverage ratio level. Also, contrary to the result presented in Table 11, Hovakimian et al. (2001) confirm that CAR is affected by the leverage ratio.

All in all, evidence has been found that the signaling hypothesis holds. Two out of the three variables capturing the signaling hypothesis have a statistically significant effect on short-term share prices after buybacks. Also, the results give evidence for the dividend substitution hypothesis since the dividend payout ratio has found to have a significant effect. However, contrary to expectations, no evidence is found in favor of the free cash flow and capital structure hypothesis.

6.5 Price effect of attention

Now I have proved in Section 6.2 that AIA is, also in my dataset, a plausible proxy for investor attention, in Section 6.3 that short-term price reaction to share repurchases is significantly positive, and in Section 6.4 that this price reaction is significantly affected by the variables capturing the signaling hypothesis and dividend substitution hypothesis, the main question of this thesis can be tested. Therefore, this section gives an answer to the question whether abnormal institutional investor attention affects the short-term price reaction after repurchases.

Figure 3, below, shows the development of AIA from 10 days before until 10 days after a repurchase.

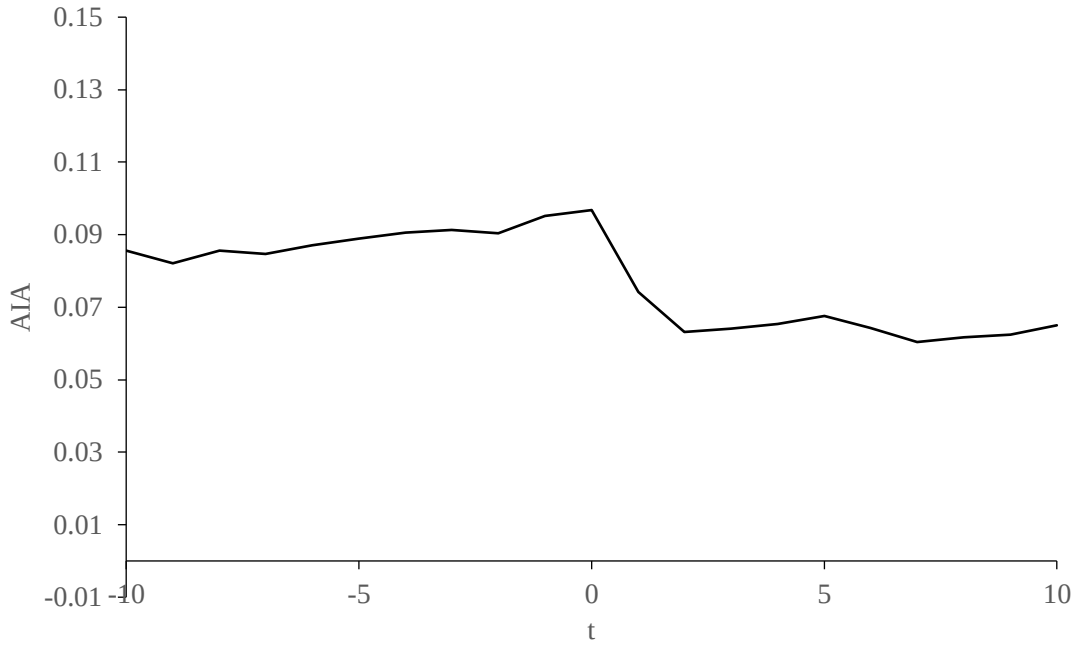

Figure 4: AIA development
This figure displays the development of the abnormal institutional attention in the 21 days surrounding a share repurchase. T=0 is the day of repurchase. Days (t) are full calendar days from midnight to midnight

I observe that out of the 21 days, the calendar day with the highest AIA is the day of a repurchase; implying that the attention of investors is attracted the most on that day. Also, it is observed that the days immediately following a repurchase AIA declines, whereas in Figure 2, we saw that CARs in this same period increase. Furthermore, firms in Hong Kong are obligated to disclose their buyback to the Stock Exchange before 9:30 am of the trading day (t=1) following the repurchase day (t=0). Therefore, the details of the buyback become publicly available between the moment of buyback on day t=0 and the opening of the exchange on day t=1. Since there is no information available regarding the exact time of this information release between those two moments, and Figure 3 shows that the highest AIA value is on day t=0, this day's AIA is used in the remainder of this analysis. Moreover, in Table 9, I observed that the abnormal return is not yet positive on day t=0. Consequently, I can exclude the possibility of

reverse causation; AIA on t=0 is not affected by the increasing prices after repurchases. Also, from Table A1 of the appendix it is observed AIA and repurchases are not negatively correlated.

In Table 10, the price reaction for the full sample was already given. Next, in order to make a clear distinction between firms that received abnormal attention during the repurchase and firms that did not receive abnormal attention, the CARs for both groups are determined separately. Figure 4 illustrates the CAR development 10 days prior to the buyback until 10 days after the buyback for the group of firms that did not receive abnormal attention, whereas Figure 5 displays the CAR development of firms with abnormal attention. Furthermore, Table 12 presents the CAR results of sub time windows (0, +1) and (0, +2) capturing short-term price reactions to a buyback. Additionally, summary statistics of both groups are provided in Table A3 in the appendix.

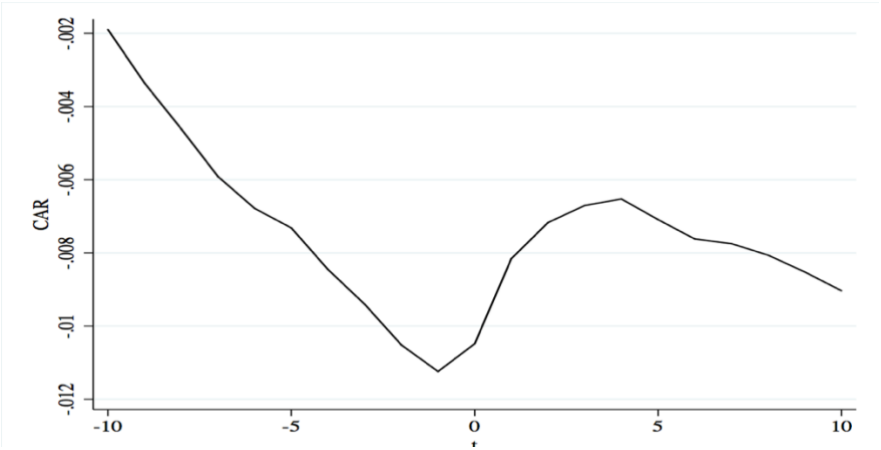

Figure 5: *CAR development over event window (-10, +10) of firms without AIA*

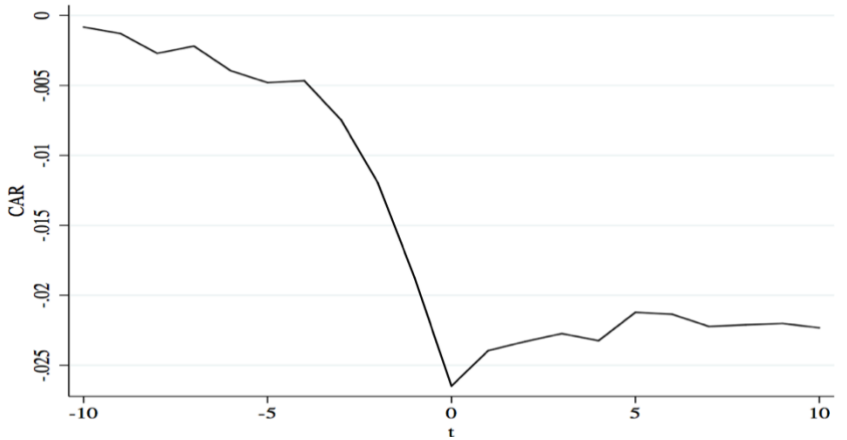

Figure 6: *CAR development over event window (-10, +10) of firms with AIA*

Table 12: CARs per attention group

This table shows the cumulative abnormal returns for several time windows calculated by using the market model. Interval (-10, -2) captures the pre-event CAR and interval (-10, +10) presents the 21 day CAR. Furthermore, the intervals with the highest significance in Table 12 are taken. The sample is divided in repurchases with abnormal institutional attention and repurchases without abnormal institutional attention. T-values are in parentheses. ***, **, and * denote statistical significance at the 1%, 5% and 10% levels respectively.

	CAR (%)	
Interval	No abnormal institutional attention (*N*=3385)	Abnormal institutional attention (*N*=532)
(0, +1)	0.308***	-0.519**
	(5.538)	(-3.880)
(0, +2)	0.407***	-0.455**
	(5.972)	(-2.773)
(-10, +10)	-0.903***	-2.232***
	(0.000)	(0.000)
(-10, -2)	-1.052***	-1.197***
	(0.000)	(0.000)

Table 12 indicates that in interval (0, +1), as well as in interval (0, +2), firms that received abnormal institutional attention have a significantly lower CAR than firms that did not receive abnormal attention on the day of the repurchase. A surprising result is that the short-term price reaction of abnormal attention stocks is not positive. However, Figures 4 and 5 and Table 12 do indicate that a share repurchase tempers the pre-event price decline in both groups. From Figures 4 and 5, it is observed that the CAR level increases for both groups after a buyback, while it was in decline during the 10 days before the buyback. Moreover, Table 12 shows that the CAR in the pre-event window (-10, -2) are -1.052% and -1.197% for the groups respectively and that this increases to 0.308% and -0.519%. Besides, all CAR results are significant at at least the 5% level.

Next, Table 13 presents the regression in which the short-term price reaction is regressed on abnormal institutional attention, whilst controlling for the signaling hypothesis and dividend substitution hypothesis, based on Section 6.4. Also, Table 13 presents a second regression, in Column (2), in which the interaction variable between AIA and Firm Size is added.

Table 13: Regression results for short-term price reaction, including AIA

This table provides the results of an ordinary least squares regression for the short-term price reaction after a share buyback. The dependent variable is CAR(0, 2), which is the cumulative abnormal return in the window t=0 to t=2, where t=0 is the repurchase date, and captures the short-term price reaction after a buyback. The independent variable of interest is AIA. AIA is a dummy measure of abnormal institutional attention which is equal to 1 when the Bloomberg terminal's output is 2, 3 or 4, and equal to 0 when the Bloomberg terminal's output is 0 or 1. The Bloomberg terminal creates a measure of attention by counting the reading and searching volume of specific stocks' news articles by users of the terminal. Bloomberg gives scores based on whether users actively search for company news or only read company news articles. Ten is given as a score if investors actively search for news about a firm, and a score of one is given in case investors read an article. Subsequently, Bloomberg aggregates these scores to hourly levels. Then, the average hourly score is calculated in segments of eight hours. Thereafter, the average score of these eight hours is compared to the average hourly score of the prior 30 days. When the average score of eight hours is higher than 96% of the hourly scores of the prior 30 days, a new score of 4 is given. Likewise, when the average eight hour score is between 94%-96%, 90%-94%, 80%-90% or 0%-80% a new score is given of 3, 2, 1 or 0 respectively. In the end, by aggregating these new scores to daily levels, Bloomberg comes up with a final transformed daily score, which correspondingly ranges between 0 and 4. The effect of AIA on CAR(0, 2) is tested whilst controlling for other possible determinants of CAR(0, 2) according to prior literature. These variables are *CAR(-10, -2)*, *Firm Size*, *Market to book*, *Dividends*, *Cash* and *Leverage*. *CAR(-10, -2)* is the cumulative abnormal return in the event window t=-10 to t=-2, where t=0 is the repurchase date. It captures the pre-event price changes. *Firm size* is the log of a firm's market capitalization. *Market to book* is the market to book ratio. The dividend substitution hypothesis is captured by *Dividends*, which is the ratio of cash dividends to net income. The free cash flow hypothesis is captured by *Cash*, which is the cash to assets ratio. Finally, the capital structure hypothesis is captured by *Leverage*, which is the net debt to total assets ratio. *Repurchase size* is the number of shares repurchased divided by the number of shares outstanding. *AIA_FirmSize* is the interaction between AIA and firm size. *Year Dummies* are included to control for year effects.

	(1) CAR(0, +2)	(2) CAR(0, +2)
AIA	-0.010***	-0.095***
	(0.002)	(0.025)
CAR(-10, -2)	-0.027***	-0.027***
	(0.009)	(0.009)
Firm size	0.001*	0.000
	(0.001)	(0.001)
Market to book	-0.001**	-0.001**
	(0.000)	(0.000)
Dividends	-0.001*	-0.001**
	(0.000)	(0.000)
Repurchase size	0.001**	0.001**
	(0.000)	(0.000)

AIA_FirmSize		0.005***
		(0.001)
Constant	-0.017*	-0.005
	(0.010)	(0.010)
Obs.	3917	3917
R-squared	0.018	0.021
Adj. R-squared	0.014	0.017
Year Dummies	YES	YES

OLS robust standard errors are in parentheses
**** p<0.01, ** p<0.05, * p<0.1*

The first regression presented in Column (1) of Table 13 gives evidence that abnormal institutional investor attention has a significant and negative influence on short-term price development after share buybacks at the 1% level. This indicates that firms that attract abnormal attention during the repurchase on average have lower short-term price reactions compared to companies without abnormal institutional attention. Furthermore, by adding an interaction term between AIA and Firm Size in Column (2), it is examined whether the AIA difference in short-term price reaction is based on the firm size level. The table shows that CAR(0, +2) is lower for AIA firms, however, this difference in CAR between repurchases with and without AIA is not the same for every firm size level. The interaction effect is statistically significant at the 1% level. The increase in CAR(0, 2) for being a bigger sized firm differs for AIA=1 and AIA=0, and firm size has a positive effect. So the difference in CAR(0, 2) between AIA=0 and AIA=1 gets tempered as the size of a firm increases.

Table 14: Regression results: by size quantiles

In this table the sample is split into small and large firms based on Firm Size. Firms with a firm size larger than the median firm size are labelled as "large" and firms with a firm size smaller than the median firm size are labelled as "small".

	CAR(0, +2)	
	(1)=small	(2)=large
AIA	-0.019***	-0.005*
	(0.004)	(0.002)
CAR(-10, -2)	-0.024**	-0.041***
	(0.012)	(0.013)
Firm size	0.002	0.001
	(0.002)	(0.001)
Market to book	-0.003***	-0.000
	(0.001)	(0.000)
Dividends	-0.002**	0.000
	(0.001)	(0.003)
Cash	-0.004	0.006
	(0.017)	(0.012)
Leverage	-0.016*	0.023***
	(0.010)	(0.008)
Constant	-0.026	-0.022
	(0.025)	(0.019)
Obs.	1968	1949
Adj. R-squared	0.027	0.023
Year Dummies	YES	YES

OLS robust standard errors are in parentheses
**** p<0.01, ** p<0.05, * p<0.1*

Additionally, Table 14 above displays the short-term price performance regressions by firm size quantiles. Also, this table shows that AIA has a larger effect on the short-term price reaction after the buybacks of firms in the small firm quantile. Nevertheless, still significant results for both size groups are obtained with respect to the effect of AIA on CAR(0, +2).

With regards to the signaling hypothesis, the results presented in the tables imply that a firm that receives abnormal institutional attention suffers less from information asymmetries between managers and the market, and therefore shows on average a lower short-term abnormal return than firms not receiving abnormal reaction. Consequently, it can be stated that the positive price developments immediately after share repurchases are driven by repurchases that did not receive appropriate attention from institutional investors. Thus, explaining why companies receiving abnormal institutional attention do not benefit in the short-term from repurchasing stock.

These regression results, combined with the results of Figures 4 and 5 and Tables 12 and 13, are not entirely consistent with expectations. Prior literature documented that low investor attention could lead to investors ignoring the share repurchase, thus ignoring the undervaluation signal of managers. Therefore, it was expected that low attention firms have weaker short-term price reactions. However, my finding is consistent with Cheng et al. (2015), who exploit previous stock turnover as an indirect measure for investor attention, and find that firms with a lower prior turnover generate higher short-term price reactions after buyback announcements. Moreover, the finding can be explained by Ikenberry et al. (1995) who document that the average short-term market reaction for glamour stocks, which can be considered to be high-attention stocks, is lower than the reaction for value stocks, which can be considered low-attention stocks. They determine the level of a stock being labeled as glamour by looking at its M/B ratio and argue that these stocks have lower undervaluation and, subsequently, lower short-term price reactions after a buyback. Table A3 in the appendix displays that, also, in my sample, abnormal attention firms have a higher M/B ratio than firms not receiving abnormal attention. Thus, implying that firms with AIA suffer less from undervaluation than firms without AIA, which leads to them reacting less to share repurchases. Also, AIA implies that more financial analysts are following the stock, leading to more firm information becoming public and hence reducing the information asymmetry. This could lower the need for managers to signal, and therefore the result shows that the price development for these stocks is less favorable.

In Table 13, AIA was used as the independent variable of interest. To test whether the outcomes of Table 13 also hold when using a variable which not only captures abnormal attention, supplementary regression analyses are conducted. This is done to exclude the possibility that the results are based on the tail of the attention shock distribution, since AIA captures shocks. Table A4 in the appendix, presents the results of these regressions. The first additional regression uses *Bloomberg output*, the direct attention score output generated from Bloomberg, which ranges from 0 to 4 instead of AIA. The second additional regression uses *AIAC* as the independent variable of interest. *AIAC* is a variable that is more continuous than *Bloomberg output*. Its values are transformed from the 0 to 4 *Bloomberg output* by

making use of conditional means of truncated normal distribution. *AIAC*'s equivalent scores are -0.350, 1.045, 1.409, 1.647 and 2.154. As shown in Table A4 in the appendix, the results of these additional regressions are similar to the results in Table 13.

Overall, evidence is found that the positive price developments after share are driven by repurchases that did not receive enough attention from institutional investors. Firm size tempers the difference in price effect between firms with and without AIA. However, AIA has a significant and negative impact on CAR(0, +2).

7. CONCLUSION

This concluding chapter gives a summary of this thesis. First, in Section 7.1, the main findings of this paper are provided. Thereafter, in Section 7.2, this thesis' limitations and possible additional research concepts are provided.

7.1 Summary

In recent decades, the global popularity of share buybacks has explosively increased. A broad range of earlier research has documented possible drivers of the share price increase after buybacks. Also, there has been a development in the research on investor attention. Until recently, the most common research measures for investor attention were indirect proxies. These proxies have been used to find out the effect of investor attention on corporate events, such as mergers and earnings announcements. However, very little research has been done on buybacks. This thesis attempted to fill the gap in the literature between investor attention and share repurchases by using the direct institutional investor attention measure of the Bloomberg terminal.

By making use of unique data on daily open-market share buybacks done on the Stock Exchange of Hong Kong between 2011 and 2018, the determinants of share buybacks and institutional investor attention are examined. Also, this thesis used the novel direct investor attention proxy introduced by Ben-Rephael et al. (2017). Their proxy, AIA, is derived from the Bloomberg terminal's news searching and reading activity score for stocks. It is found that this proxy is associated with within-week seasonality, a firm's size and trading volume, in my Hong Kong sample. This implies that the amount of attention decreases along the week and that on Fridays, investors have less attention because they are concerned with the approaching weekend. The result also indicates that larger firms are usually followed by more financial analysts, leading to more information becoming public, thus attracting more attention. Moreover, it indicates that when investors are actively buying and selling a specific stock, they need to pay attention to information concerning that stock. However, no evidence has been found that the number of buybacks done on a particular day has a distracting effect on investors.

Next, it is found that that the cumulative abnormal return, covering the short-term price reaction after a buyback, in my sample is 0.294%. This proves that the widely documented price anomaly after repurchases is still prevalent for recent Hong Kong buybacks. By using a multivariate OLS regression, it is found that this abnormal return can be explained by the signaling hypothesis. This suggests that managers buyback when their stock price is in decline to signal the market that their firm is undervalued. Also, evidence has been found in favor of the dividend substitution hypothesis, which states that managers substitute dividends for buybacks because of tax advantages. However, no evidence has been found for the free cash flow hypothesis and the capital structure hypothesis. Table 15, below, provides an overview of the outcomes of the hypotheses.

Table 15: Summary of Hypotheses outcomes

This table presents an overview of the outcome of the tested hypotheses. In Tables 3 and 4 in Chapter 3, an overview of the hypotheses and the used variables was provided.

#	Hypothesis	Accepted	Rejected
1.1	Weekday hypothesis	✓	
1.2	Size hypothesis	✓	
1.3	Trading volume hypothesis	✓	
1.4	Distraction hypothesis		✓
2	Price anomaly hypothesis	✓	
2.1	Signaling hypothesis	✓	
2.2	Dividend substitution hypothesis	✓	
2.3	Free cash flow hypothesis		✓
2.4	Capital structure hypothesis		✓

Furthermore, after testing the effect of investor attention on share buybacks, evidence has been found that investor attention and short-term price reactions have a negative relationship. Thus, it can be concluded that the positive price developments after share repurchases are driven by repurchases that did not receive enough attention from institutional investors. A possible explanation for this finding is that low attention stocks suffer more from undervaluation, and therefore in line with the signaling hypothesis, conduct share repurchases.

7.2 Limitations and further research

Although, the investor attention measure used in my thesis, namely the Bloomberg terminal's news searching and reading activity score for individual stocks is novel and it has not extensively been used yet, it has some limitations. Only 4721 out of the 19449 repurchases had attention data available in the Bloomberg terminal. Unfortunately, Bloomberg does not provide a reason for the unavailability of news searching and reading activity data of stocks. This data availability limitation leaves out the effect of attention on a great amount of repurchases; it would have been better to include them all, however, the sample is still large enough to provide valid results.

Furthermore, this thesis takes the repurchase day (t=0) as the calendar day to measure attention. This day is picked because the AIA development results around repurchases imply that this day is the day on which the attention of investors is strongest. However, if this was not the case and the attention was stronger on day t=1, and this day was picked, reverse causality issues could have been present and, for example, Granger causality tests should have been conducted. I tried to perform this test as an additional test, however, this was not possible because my dataset is unbalanced; the repurchases are not distributed evenly over the days in my sample.

Further research could test the effect of AIA, as introduced by Ben-Rephael et al. (2017), on share repurchases in different countries or on repurchase announcements instead of actual repurchases.

Additionally, the long-term impact of attention after repurchases could be examined. Moreover, next to share repurchases, AIA can be tested on other corporate events such as earnings announcements or IPOs. Moreover, this thesis did not take into account the industry fixed effects. Further research may make an analysis of the industries in the Hang Seng Index, and use an industry fixed effect regression.

Also, in further research, when examining the effect on buybacks, AIA can be compared to Google's search volume index in order to compare the effects of institutional and retail investors. Unfortunately, when I tried to find the Google search volume index for the companies in my dataset, I could not obtain enough data. This is mainly because the Hong Kong company codes to be searched via Google are not as simple as the US ticker symbols. For example; the ticker symbol for US company Microsoft is "MSFT", whereas the company code for the Hong Kong company Cathay Pacific Airways is "293" or "293:HK". To solve this issue, Chinese symbols could be used in further research.

All in all, this thesis is one of the first to examine the effect of institutional investor attention, proxied by the Bloomberg terminal's news searching and reading activity, on share repurchases. By including the abovementioned remarks and recommendations, further research can more extensively answer this thesis' main question regarding the effect of attention on share buybacks.

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APPENDIX

Table A1: Matrix of correlations

This table shows the Pearson's correlation matrix presenting the correlation between the variables used in the analyses. Panel A gives the correlations for the sample used to analyze Hypotheses 1.1 to 1.4, taking observations for all trading days between 2011 and 2018 for companies with investor attention data available. Panel B gives the correlations for the sample used for Hypotheses 2 onwards, using data focusing on the event dates on which repurchases were conducted. *CAR(0, +2)* is the cumulative abnormal return in the window t=0 to t=2, where t=0 is the repurchase date. *Bloomberg Output* is the measure provided by the Bloomberg terminal. The Bloomberg terminal creates a measure of attention by counting the reading and searching volume of specific stocks' news articles by users of the terminal. Users can specifically search for news about a particular company by typing the company's stock code accompanied by the module "CN" (company news). Bloomberg gives scores based on whether users actively search for company news or only read company news articles. Ten is given as a score if investors actively search for news about a firm, and a score of one is given in case investors read an article. Subsequently, Bloomberg aggregates these scores to hourly levels. Then, the average hourly score is calculated in segments of eight hours. Thereafter, the average score of these eight hours is compared to the average hourly score of the prior 30 days. When the average score of eight hours is higher than 96% of the hourly scores of the prior 30 days, a new score of 4 is given. Likewise, when the average eight hour score is between 94%-96%, 90%-94%, 80%-90% or 0%-80% a new score is given of 3, 2, 1 or 0 respectively. In the end, by aggregating these new scores to daily levels, Bloomberg comes up with a final transformed daily score, which correspondingly ranges between 0 and 4. *AIA* is a dummy measure of abnormal institutional attention which is equal to 1 when the Bloomberg output is 2, 3 or 4, and equal to 0 when the Bloomberg output is 0 or 1. *AIAC* is a variable that is more continuous than the Bloomberg outputs. Its values are transformed from the 0 to 4 Bloomberg output by making use of conditional means of truncated normal distribution. AIAC's equivalent scores are -0.350, 1.045, 1.409 1.647 and 2.154. *Tuesday - Friday* are dummy variables which take the value 1 when the weekday is on Tuesday-Friday, and take the value 0 otherwise. *Trading Volume* is the number of shares traded divided by the current number of shares outstanding. *Same day repurchase* is obtained after dividing the repurchasing days into four quartiles based on the number of firms buying back shares on that particular day. Depending on the quartile, *Same day repurchase* is a variable which has a value from 1 to 4. *CAR(-10, -2)* is the cumulative abnormal return in the event window t=-10 to t=-2, where t=0 is the repurchase date. It captures the pre-event price changes. *Market to book* is the market to book ratio, *Dividends* is the ratio of cash dividends to net income, *Cash* is the cash to assets ratio and *Leverage* is the net debt to total assets ratio. *Repurchase size* is the number of shares repurchased divided by the number of shares outstanding.

Panel A: All daily observations for companies with attention data available *(Hypotheses 1.1-1.4)*

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
(1) AIA	1.000											
(2) AIAC	0.797	1.000										
(3) Bloomberg output	0.913	0.965	1.000									
(4) Repurchase day	0.002	0.002	0.002	1.000								
(5) Tuesday	0.011	0.013	0.012	-0.000	1.000							
(6) Wednesday	0.003	0.000	0.002	0.000	-0.251	1.000						
(7) Thursday	-0.007	-0.011	-0.010	0.001	-0.253	-0.258	1.000					
(8) Friday	-0.027	-0.028	-0.030	0.001	-0.250	-0.254	-0.257	1.000				
(9) Firm size	0.148	0.242	0.212	-0.009	0.001	-0.002	-0.003	-0.002	1.000			
(10) Trading volume	0.148	0.158	0.163	0.015	-0.003	0.005	0.008	0.007	-0.100	1.000		
(11) Same day repurchase	0.006	0.015	0.012	0.101	-0.005	0.005	0.009	0.024	-0.090	-0.026	1.000	
(12) Market to book	0.037	0.058	0.051	-0.007	0.000	0.001	-0.001	-0.001	0.201	0.090	-0.029	1.000

Panel B: Repurchase data *(Hypothesis 2 onwards)*

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	

(1) CAR(0, 2)	1.000										
(2) AIA	-0.070	1.000									
(3) AIAC	-0.054	0.884	1.000								
(4) Bloomberg output	-0.064	0.935	0.966	1.000							
(5) CAR(-10,-2)	-0.031	-0.008	-0.020	-0.015	1.000						
(6) Firm size	0.027	0.151	0.199	0.174	0.131	1.000					
(7) Market to book	-0.027	0.062	0.071	0.068	-0.057	0.304	1.000				
(8) Dividends	-0.021	-0.029	-0.028	-0.027	-0.026	-0.129	-0.023	1.000			
(9) Cash	0.005	-0.037	-0.045	-0.041	-0.072	-0.060	0.367	0.080	1.000		
(10) Leverage	0.007	0.041	0.042	0.044	0.128	0.212	-0.172	-0.138	-0.631	1.000	
(11) Repurchase size	0.027	0.129	0.133	0.130	0.046	-0.056	-0.046	0.030	0.016	0.049	1.000

Table A2: Regression results for Bloomberg output and AIAC

This table provides the results of an ordinary least squares regression for the Bloomberg output and AIAC. In Column (1), the dependent variable is *Bloomberg output*. This variable is obtained from the Bloomberg terminal. The Bloomberg terminal creates a measure of attention by counting the reading and searching volume of specific stocks' news articles by users of the terminal. Users can specifically search for news about a particular company by typing the company's stock code accompanied by the module "CN" (company news). Bloomberg gives scores based on whether users actively search for company news or only read company news articles. Ten is given as a score if investors actively search for news about a firm, and a score of one is given in case investors read an article. Subsequently, Bloomberg aggregates these scores to hourly levels. Then, the average hourly score is calculated in segments of eight hours. Thereafter, the average score of these eight hours is compared to the average hourly score of the prior 30 days. When the average score of eight hours is higher than 96% of the hourly scores of the prior 30 days, a new score of 4 is given. Likewise, when the average eight hour score is between 94%-96%, 90%-94%, 80%-90% or 0%-80% a new score is given of 3, 2, 1 or 0 respectively. In the end, by aggregating these new scores to daily levels, Bloomberg comes up with a final transformed daily score, which correspondingly ranges between 0 and 4. In Column (2), the dependent variable is AIAC, which is a variable that is more continuous than the Bloomberg outputs. Its values are transformed from the 0 to 4 Bloomberg outputs by making use of conditional means of truncated normal distribution. AIAC's equivalent scores are -0.350, 1.045, 1.409, 1.647 and 2.154. *Tuesday - Friday* are dummy variables which take the value 1 when the weekday is on Tuesday-Friday, and take the value 0 otherwise. *Firm size* is the log of a firm's market capitalization. *Trading Volume* is the number of shares traded divided by the current number of shares outstanding. *Same day repurchase* is obtained after dividing the repurchasing days into four quartiles based on the number of firms buying back shares on that particular day. Depending on the quartile, *Same day repurchase* is a variable which has a value from 1 to 4. *Year Dummies* are included to control for year effects.

	(1) Bloomberg output	(2) AIAC
Tuesday	-0.034***	-0.023***
	(0.007)	(0.005)
Wednesday	-0.062***	-0.046***
	(0.007)	(0.005)
Thursday	-0.089***	-0.064***
	(0.007)	(0.005)
Friday	-0.137***	-0.093***
	(0.007)	(0.005)
Size	0.187***	0.149***
	(0.001)	(0.001)
Trading Volume	0.047***	0.032***
	(0.000)	(0.000)
Same Day Repurchases	1.928	1.872
	(2.600)	(2.411)
Constant	-2.620***	-2.430***
	(0.025)	(0.018)
Obs.	240175	240175
R-squared	0.092	0.109
Year Dummies	YES	YES

OLS robust standard errors are in parentheses
**** p<0.01, ** p<0.05, * p<0.1*

Table A3: Summary statistics of buybacks

This table gives the summary statistics of the variables used in the regression presented in Table 12. Panel A shows these summary statistics for the buybacks conducted by firms with abnormal institutional attention, whereas Panel B shows the statistics of the buybacks conducted by firms without abnormal institutional attention.

Panel A: Buybacks of firms with AIA								
	N	Mean	St.Dev	min	max	p25	Median	p75
CAR(0, +2)	532	-0.004	-0.004	-0.392	0.342	-0.026	0.000	0.023
CAR(-10, -2)	532	-0.012	-0.012	-0.310	0.220	-0.047	-0.011	0.028
Firm size	532	17.299	17.299	13.651	21.689	16.500	17.133	18.183
Market to book	532	2.234	2.234	0.210	14.470	0.760	1.365	2.810
Dividends	532	0.174	0.174	-2.504	2.880	0.090	0.159	0.209
Cash	532	0.151	0.151	0.000	0.658	0.084	0.126	0.209
Leverage	532	0.119	0.177	-0.658	0.485	0.033	0.166	0.227
Repurchase size	532	0.314	0.259	0.001	0.992	0.107	0.234	0.467
Panel B: Buybacks of firms without AIA								
	N	Mean	St.Dev	min	max	p25	Median	p75
CAR(0, +2)	3385	0.004	0.039	-0.299	0.330	-0.016	0.004	0.024
CAR(-10, -2)	3385	-0.010	0.080	-0.556	0.359	-0.045	-0.004	0.031
Firm size	3385	16.685	1.376	12.868	22.741	15.568	16.838	17.517
Market to book	3385	1.913	1.702	0.200	18.790	0.860	1.350	2.400
Dividends	3385	0.301	1.591	-3.610	19.999	0.083	0.148	0.251
Cash	3385	0.164	0.121	0.000	0.756	0.086	0.123	0.213
Leverage	3385	0.095	0.206	-0.756	0.703	0.005	0.135	0.225
Repurchase size	3385	0.307	0.243	0.000	1.000	0.114	0.235	0.446

Figure A1: Share repurchase distribution over weekdays

This figure illustrates the distribution of repurchases over the weekdays.

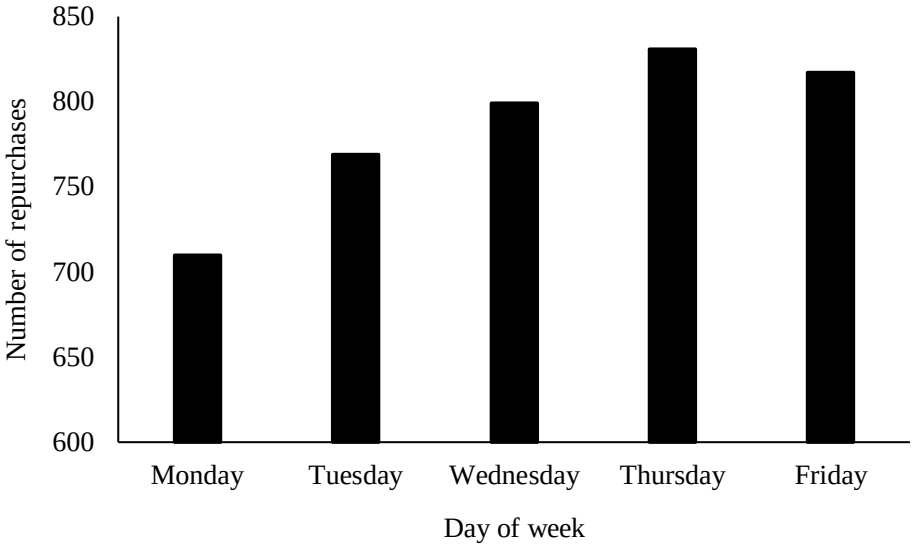

Table A4: Regressions using Bloomberg output and AIAC as independent variables of interest

This table provides the results of an ordinary least squares regression for the short-term price reaction after a share buyback. The dependent variable is CAR(0, 2), which is the cumulative abnormal return in the window t=0 to t=2, where t=0 is the repurchase date, and captures the short-term price reaction after a buyback. The independent variable of interest in Column (1) is *Bloomberg output*. This variable is obtained from the Bloomberg terminal. The Bloomberg terminal creates a measure of attention by counting the reading and searching volume of specific stocks' news articles by users of the terminal. Users can specifically search for news about a particular company by typing the company's stock code accompanied by the module "CN" (company news). Bloomberg gives scores based on whether users actively search for company news or only read company news articles. Ten is given as a score if investors actively search for news about a firm, and a score of one is given in case investors read an article. Subsequently, Bloomberg aggregates these scores to hourly levels. Then, the average hourly score is calculated in segments of eight hours. Thereafter, the average score of these eight hours is compared to the average hourly score of the prior 30 days. When the average score of eight hours is higher than 96% of the hourly scores of the prior 30 days, a new score of 4 is given. Likewise, when the average eight hour score is between 94%-96%, 90%-94%, 80%-90% or 0%-80% a new score is given of 3, 2, 1 or 0 respectively. In the end, by aggregating these new scores to daily levels, Bloomberg comes up with a final transformed daily score, which correspondingly ranges between 0 and 4. In Column (2), the independent variable of interest is AIAC, which is a variable that is more continuous than the Bloomberg outputs. Its values are transformed from the 0 to 4 Bloomberg outputs by making use of conditional means of truncated normal distribution. AIAC's equivalent scores are -0.350, 1.045, 1.409, 1.647 and 2.154. The effect of the two independent variables of interest on CAR(0, 2) is tested whilst controlling for other possible determinants of CAR(0, 2) according to prior literature. These variables are *CAR(-10, -2)*, *Firm Size*, *Market to book*, *Dividends*, *Cash* and *Leverage*. *CAR(-10, -2)* is the cumulative abnormal return in the event window t=-10 to t=-2, where t=0 is the repurchase date. It captures the pre-event price changes. *Firm size* is the log of a firm's market capitalization. *Market to book* is the market to book ratio. The dividend substitution hypothesis is captured by *Dividends*, which is the ratio of cash dividends to net income. The free cash flow hypothesis is captured by *Cash*, which is the cash to assets ratio. Finally, the capital structure hypothesis is captured by *Leverage*, which is the net debt to total assets ratio. *Repurchase size* is the number of shares repurchased divided by the number of shares outstanding. *Year Dummies* are included to control for year effects.

	(1) CAR(0, +2)	(2) CAR(0, +2)
Bloomberg output	-0.003***	
	(0.001)	
AIAC		-0.003***
		(0.001)
CAR(-10,-2)	-0.028***	-0.028***
	(0.009)	(0.009)
Firm size	0.001*	0.001*
	(0.001)	(0.001)
Market to book	-0.001**	-0.001**
	(0.000)	(0.000)
Dividends	-0.001*	-0.001*
	(0.000)	(0.000)
Repurchase size	0.001**	0.001**
	(0.000)	(0.000)
Constant	-0.017*	-0.019*
	(0.010)	(0.010)
Obs.	3917	3917
R-squared	0.017	0.016
Adj. R-squared	0.014	0.012
Year Dummies	YES	YES

OLS robust standard errors are in parentheses
*** *p<0.01, ** p<0.05, * p<0.1*