Essay 2

Share repurchases: Does frequency matter?*

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1. Introduction

Open market share repurchases have become popular in many countries around the world in recent years. However, the frequency of programs varies between repurchasing companies. Some companies initiate repurchase programs frequently, while other companies initiate repurchase programs occasionally or infrequently. This study adds to the extensive literature related to the valuation effects of open market share repurchases and examines the market performance of repurchase programs by firms with various repurchase frequencies.

We exploit a new and compiled data set of share repurchases which enables us to distinguish between firms with respect to the frequency of programs. Our data also enables us to examine the relationship between stock return and repurchase size. These issues are important, as prior studies have not been able to ascertain with precision whether frequency or repurchase size matters to market performance. For instance, some companies repurchase the announced number of shares, while others repurchase fewer shares or no shares at all after repurchase announcements. In summary, our knowledge of open market share repurchases has room for improvement, and the purpose of this study is to examine the valuation effects of open market share repurchase programs with respect to frequency and repurchase size.

There are several reasons why companies initiate open market share repurchase programs. Proposed motives for repurchases in the prior literature include, for example, undervaluation or signaling (Dann, 1981; Vermaelen, 1981; Comment and Jarrell, 1991; Ikenberry et al., 1995), dividend substitution (Jagannathan et al., 2000; Fama and French, 2001; Grullon and Michaely, 2002; Brav et al., 2005), capital structure adjustment (Hovakimian et al., 2001; Grullon and Michaely, 2004), takeover deterrence (Bagwell, 1991), excess cash distribution (Jensen, 1986) and option funding (Jolls, 1998; Dittmar, 2000).¹

Early studies by Dann (1981), Vermaelen (1981) and Comment and Jarrell (1991) find a positive AR around repurchase announcements. These results support the undervaluation/signaling hypothesis, such that managers announce repurchase programs when the stock is perceived as being undervalued. However, it is improbable that frequent repurchasers perceive their stock as being undervalued on a regular basis. More likely, frequent repurchasers substitute repurchases for dividend increases as suggested by Jagannathan et al. (2000) and Grullon and Michaely (2002). Fama and French (2001) also document that US corporations in the 1990s started to disburse cash to their shareholders

¹ For a comprehensive review of repurchase motives, see Vermaelen (2005).

through share repurchases rather than through cash dividends and, consequently, the proportion of dividend-paying firms dropped significantly. With the increased use of share repurchases as a way to distribute profits to shareholders, the expression “dividend policy” has also changed to “payout policy”, as in the latest edition of the classic textbook in corporate finance (Brealey et al., 2011). If infrequent repurchasers repurchase their own shares because the managers perceive their stock as being undervalued, and if frequent repurchasers repurchase their own shares as a substitute for dividend increases, we would expect that the announcement of repurchase programs by infrequent repurchasers are generally greeted more favorably than repurchase programs by frequent repurchasers.

Most of our insights into repurchase programs can be attributed to studies with US data. However, US firms do not have to disclose information about their repurchase transactions in detail. To overcome this data constraint, several earlier US studies have used changes in treasury stock and the number of outstanding shares as reported in the quarterly financial reports to calculate the number of repurchased shares. Banyi et al. (2008) examine this methodology and conclude that many previous US studies of open market share repurchases have used less accurate data.²

In this study, we examine open market share repurchase programs in Sweden. Share repurchases in Europe differ from share repurchases in the US in many respects. For instance, EU Member States require the approval of share repurchases by shareholders at a general meeting, whereas in the US the Board of Directors approves repurchase programs. Open market share repurchase programs in EU countries also have restrictions on the repurchase size, the program length and the price paid for the repurchased shares. In addition, share repurchase transactions must be disclosed on a regular basis in several EU countries.³

There are several reasons why repurchase programs in Sweden are an interesting subject of study. First, there are relatively few prior studies of share repurchases in a European setting. Second, open market share repurchase programs in Sweden have a maximum length of approximately 1 year, which enables us to study multiple programs with high precision. Third, repurchase transactions are disclosed on a daily basis, which makes it possible to relate stock return to repurchase size.

In a related study by Jagannathan and Stephens (2003), the authors find that firms that repurchase their shares frequently are larger, have less variation in operating income, have

² Chang et al. (2010) report that the mean of actual share repurchases varies between 1.5% and 4.1% of outstanding shares using Center for Research in Security Prices (CRSP) and Compustat data, respectively.

³ For a description of the regulatory framework for share repurchases in the ten largest stock markets and in Europe, see Kim et al. (2004) and Lee et al. (2010), respectively.

lower market-to-book ratios, and have higher dividend yields than firms that repurchase their shares only occasionally or infrequently. They also find that infrequent repurchase programs are greeted by the market with a much stronger positive reaction than occasional or frequent programs. Jagannathan and Stephens (2003) suggest that infrequent repurchasers repurchase their own shares when the stock is perceived as being undervalued and frequent repurchasers repurchase shares as a substitute for increasing dividends.

Farrugia et al. (2011) extend Jagannathan and Stephens' (2003) study by investigating the impact of business conditions on the frequency of share repurchases using Australian data. The authors find a significant relation between economic conditions and the decision to repurchase shares for firms that repurchase their own shares infrequently. However, in contrast to Jagannathan and Stephens (2003), they find that frequent repurchasers experience greater short-run returns around repurchase announcements than infrequent or occasional repurchasers.⁴ The authors attribute the higher announcement returns for frequent repurchasers to potentially higher degrees of information asymmetry in such firms.

Instead of examining the announcement effect of repurchase programs with various frequencies, Yook (2010) examines long-term performance for frequent and infrequent repurchasers. He finds that only infrequent repurchasers who actually repurchase shares experience significant long-run abnormal returns (ARs). As with Jagannathan and Stephens (2003), he argues that the motives of firms that repurchase infrequently may include an undervaluation of the stock.

We examine 331 open market share repurchase programs initiated by 125 Swedish firms listed on the Stockholm Stock Exchange (SSE). The programs were approved by the shareholders at general meetings over the period 2000 to 2009. Firms with 1 or 2 repurchase programs are classified as infrequent repurchasers, firms with 2 or 3 repurchase programs are classified as occasional repurchasers, and firms with 5 or more repurchase programs are classified as frequent repurchasers.

We find that infrequent repurchasers tend to repurchase fewer shares and over fewer days than frequent repurchasers in their repurchase programs. Frequent repurchasers are larger, have higher book-to-market ratios and dividend yields compared to infrequent repurchasers. As with Jagannathan and Stephens (2003), we find that repurchase announcements by infrequent repurchasers generally exhibit higher ARs than repurchase announcements by frequent repurchasers. Using Ibbotson's (1975) Returns Across Time and Securities (RATS)

⁴ Farrugia et al. (2011) examine raw returns around repurchase announcements.

methodology and the calendar-time portfolio approach, we also examine stock performance within the approved length of the repurchase programs. Subsequent to the approval month and from the first repurchase month until the month of the next annual general meeting, only occasional and frequent repurchasers exhibit a positive AR. We find a positive association between monthly ARs and the repurchase size for all types of repurchasers.

The rest of the paper proceeds as follows. Section 2 outlines the regulatory framework for share repurchases in Sweden and describes the data and sample. Section 3 describes the methodology used. Section 4 reports and discusses the empirical findings. Section 5 concludes.

2. Regulatory framework for share repurchases in Sweden and the data

2.1. The regulatory framework for share repurchases in Sweden

Share repurchases in Sweden are influenced by three bodies. The first body is the EU, which in the second Company Law Directive regulates share repurchases. The Directive sets a threshold which national legislation must meet and EU Member States can deviate from the regulatory framework by even stricter rules. Following amendments to the Directive in 2006, the previous rule of maximizing share repurchases to a maximum of 10% of the total number of shares was removed and, today, there is no restriction on how much a firm can repurchase. However, share repurchases may not reduce net assets to a level below the sum of share capital and non-distributable reserves. According to the Directive, a company can keep the repurchased shares as treasury stock or cancel the shares.

The second body which regulates share repurchases in Sweden is the national legislature. Changes in the Swedish Companies Act, effective 10 March 2000, enabled Swedish firms to repurchase their own stock to a maximum of 10% of the total number of shares.⁵ In Sweden, share repurchases must be approved by the shareholders at a general meeting (by at least two-thirds of the votes casted). Share repurchases cannot be authorized by the shareholders for longer than until the next annual general meeting. In most cases the shareholders authorize the Board of Directors to purchase the company's own shares. Share repurchases can take two forms in Sweden: a) a fixed price tender offer, and b) an open market repurchase (or a combination of both methods). In a fixed price tender offer, the firm offers its shareholders

⁵ Following approval of the Bill 1999/2000:34 by Parliament on 23 February 2000 and changes in the Company Act (SFS 2000:66).

the option to tender a specific number of shares directly to the firm at a fixed price over a specified time period. In an open market repurchase, the firm repurchases its shares directly from the market.⁶

The third body which regulates share repurchases in Sweden is the SEE, where repurchases take place. The Exchange regulates share repurchases through its listing agreement with its companies. The company's resolution at a general shareholder meeting to purchase its own shares and decisions by the Board of Directors to utilize authorizations to purchase the company's own shares must be disclosed as soon as possible. The SSE requires details of: a) the period during which the decision to repurchase the company's own shares is to be effected or the period in which the authorization to the Board of Directors may be utilized; b) existing holdings of the company's own shares and the maximum number of shares intended to be repurchased; c) the highest and lowest price paid per share; d) the purpose of the repurchase; and d) other conditions for the repurchase. Following a repurchase, the company must report to the SSE the number of shares bought, the price paid and the company's current holdings of its own shares as soon as possible, but not later than 30 minutes before trading starts the following trading day. With the exception of block trades, the daily repurchase size must be less than 25% of the daily average trading volume for the four weeks prior to the repurchase date.

The increased popularity of stock repurchases in the US can be partially attributed to a lower tax-rate on capital gains than on dividends. In Sweden, individual investors are liable for income tax on investment income, such as interest, dividends and capital gains from the sale of financial assets. Income from capital is taxed at a flat rate of 30%. From a tax perspective, individual investors should prefer capital gains over dividends, since the capital gains tax can be deferred until the time of realization. Individual investors resident outside of Sweden are liable for withholding tax on dividends. The withholding tax is 30% but it is normally reduced under double taxation treaties between Sweden and other countries. No withholding tax is imposed on dividends distributed to a foreign legal entity resident within the EU if the shareholding is 10% or more. Generally, individual investors who are resident outside of Sweden and foreign legal entities are not liable for Swedish tax on capital gains.⁷ From a tax perspective, foreign investors should, therefore, generally prefer capital gains over dividends.

⁶ For a comparison with guidelines for open market repurchases in the US, see Cook et al. (2004) and Banyl et al. (2008).

⁷ Unless the capital-gains are derived from a permanent establishment in Sweden.

2.2. Data and sample

The sample includes all of the initiated open market share repurchase programs that were authorized between March 2000 and December 2009 by shareholders in Swedish firms listed on the SSE. Authorization and initiation announcements were collected from the AffärsData database and from the companies' websites. Repurchase transaction data was obtained from NASDAQ OMX Stockholm.⁸ The transaction data includes the name of the repurchasing firm, the repurchase date, the total number of shares repurchased during the day distributed by class of share, and the average repurchase price. The first repurchase transaction in the sample is on March 30, 2000, and the last transaction is on April 9, 2010. The Thomson Reuters Datastream database was used to obtain price and total return data on individual shares as well as the book value of equity, the return on assets and the dividend yield. The companies' total numbers of shares and firm ownership data were obtained from Euroclear Sweden.

We classify the firms according to three categories based upon the number of repurchase programs they initiated over the sample period. Firms that initiated 1 or 2 programs are classified as infrequent repurchasers (79 firms). Firms that initiated 3 or 4 programs are classified as occasional repurchasers (27 firms), and firms that initiated 5 or more programs are classified as frequent repurchasers (19 firms).

Table 1 provides the number of initiated open market share repurchase programs approved each year. Over the sample period, 125 firms initiated 331 repurchase programs. Of these, 33.5% are programs by infrequent repurchasers, 28.4% are programs by occasional repurchasers, and 38.1% are programs by frequent repurchasers. The distribution of repurchase programs by frequent repurchasers is relatively stable over the sample period until 2009, when there is a significant drop in the number of programs. A possible cause of this drop is the financial crisis in 2008-2009. The number of repurchase programs initiated each year by infrequent and occasional repurchasers is more volatile. The number of programs by these firms is relatively high from 2000 until 2002, but drops between 2003 and 2006. In 2007 and 2008, the number of repurchase programs by infrequent repurchasers peaks.

⁸ Repurchase transactions before December 18, 2000, were obtained from the Swedish Financial Supervisory Authority (Finansinspektionen).

Table 1**The number of initiated open market share repurchase programs approved each year**

This table provides the number of initiated open market share repurchase programs approved each year. The sample comprises repurchase programs by 125 Swedish firms listed on the SSE. The repurchase programs are classified into three groups: programs by infrequent repurchasers are repurchase programs by firms with 1 or 2 initiated repurchase programs over the sample period; programs by occasional repurchasers are repurchase programs by firms with 3 or 4 initiated repurchase programs over the sample period; and programs by frequent repurchasers are repurchase programs by firms with 5 or more initiated repurchase programs over the sample period.

Year	All Repurchase Programs	Programs by Infrequent Repurchasers	Programs by Occasional Repurchasers	Programs by Frequent Repurchasers
2000	42	16	12	14
2001	34	6	13	15
2002	40	10	14	16
2003	28	4	11	13
2004	24	5	7	12
2005	15	2	3	10
2006	27	4	8	15
2007	52	24	12	16
2008	48	32	6	10
2009	21	8	8	5
Total	331	111	94	126
Percentage	100	33.5	28.4	38.1

3. Methodology

In the study, we estimate both short-term ARs surrounding the initiation announcements of repurchase programs and long-term ARs within the programs. To examine ARs surrounding the initiation announcements, we apply standard event methodology with the market model as a benchmark.⁹ The parameters of the market model are calculated by using 250 days of return data, from 270 to 21 days prior to the announcement. Since initiation announcements of share repurchase programs must be publicly disclosed, the exact date of the event is easily identified. To accommodate for announcements after the Stock Exchange's trading hours, we use a 2 day event window (0 to +1).

Long-term ARs within the programs are estimated using Ibbotson's (1975) RATS methodology and the calendar-time portfolio approach. The AR is estimated based on the Fama-French (1993) three-factor model augmented with Carhart's (1997) momentum factor.¹⁰

⁹ For a comprehensive review of event study methodologies, see MacKinlay (1997).

¹⁰ For a comprehensive discussion of measuring long-term abnormal returns, see Barber and Lyon (1997), Fama (1998), and Mitchell and Stafford (2000).

To avoid the overlapping of programs, we only estimate long-run ARs until the month preceding the next annual general meeting.¹¹

4. Empirical results

4.1. Descriptive statistics of repurchase programs and characteristics of repurchasing firms

Table 2 reports characteristics of the initiated open market share repurchase programs. Generally, shareholders authorize the Board of Directors to repurchase up to 10% of the total number of shares, the maximum allowed repurchase size according to Swedish law. On average, shareholders of firms that repurchase frequently authorize the Board of Directors to acquire 9.5% of the total number of shares, while shareholders of firms that repurchase infrequently authorize the Board of Directors to acquire 8.8% of the total number of shares.

Usually, firms repurchase fewer shares than the authorized amount. On average, infrequent, occasional and frequent repurchasers repurchase 2.4%, 2.5% and 3.1% of the total number of shares, respectively. The average repurchase fraction is significantly higher in programs by frequent repurchasers than in programs by infrequent repurchasers. Repurchase programs by frequent repurchasers comprise approximately 50% more repurchase days and calendar months with repurchase transactions than programs by infrequent repurchasers. On average, frequent repurchasers repurchase shares during 36.9 days in 4.5 calendar months, while infrequent repurchasers repurchase shares during 23.7 days in 3.0 calendar months. The differences are statistically significant. The average number of months from shareholders' authorization until the first repurchase month is significantly higher in repurchase programs by infrequent repurchasers than in programs by frequent repurchasers. This suggests that infrequent repurchasers time their repurchases to a larger extent than frequent repurchasers, and repurchase their shares when the stock is perceived as undervalued.

¹¹ If a new repurchase program is authorized by the shareholders at an extraordinary general meeting before the next annual general meeting, we estimate the long-term abnormal return until the month preceding the extraordinary general meeting.

Table 2**Descriptive statistics of initiated open market share repurchase programs**

This table provides the means (medians in parentheses) of various characteristics of initiated open market share repurchase programs approved by 125 Swedish firms listed on the SSE over the period 2000 to 2009. The repurchase programs are classified into three groups: programs by infrequent repurchasers are repurchase programs by firms with 1 or 2 initiated repurchase programs over the sample period; programs by occasional repurchasers are repurchase programs by firms with 3 or 4 initiated repurchase programs over the sample period; and programs by frequent repurchasers are repurchase programs by firms with 5 or more initiated repurchase programs over the sample period. 'Fraction of shares approved for repurchase' is the percentage of total number of shares that is approved for repurchase by the shareholders at a general meeting. 'Fraction of shares actually repurchased' is the percentage of the total number of shares actually repurchased in the approved programs. 'Repurchase days' is the number of days with repurchase transactions over the program length. 'Repurchase months' is the number of calendar months with repurchase transactions over the program length. 'Months from approval until first repurchase' is the number of months from the month of shareholders' authorization of the repurchase program until the month of the first repurchase. The difference test is for differences in measures between programs by frequent and infrequent repurchasers. The *t*-statistics are for the difference in mean measures and the W-statistics in parentheses are from the non-parametric Wilcoxon rank sum test. *, ** and *** indicate two-tailed significance levels of 10%, 5% and 1%, respectively.

	Programs by Infrequent Repurchasers	Programs by Occasional Repurchasers	Programs by Frequent Repurchasers	Difference Test <i>t</i> -statistic (W-statistic)
Fraction of shares approved for repurchase	8.8 (10.0)	7.9 (10.0)	9.5 (10.0)	2.72*** (1.04)
Fraction of shares actually repurchased	2.4 (1.7)	2.5 (1.0)	3.1 (2.3)	2.17** (2.07)**
Repurchase days	23.7 (15.0)	32.3 (17.0)	36.9 (23.0)	2.95*** (1.88)*
Repurchase months	3.0 (2.0)	4.0 (3.0)	4.5 (3.0)	4.01*** (3.15)***
Months from approval until first repurchase	3.8 (3.0)	2.7 (2.0)	2.4 (1.0)	-3.71*** (-4.22)***

Table 3 reports firm characteristics around the approval of repurchase programs. The table is segmented by infrequent, occasional and frequent repurchasers. The average market capitalization is similar between the three groups. However, the market capitalization is severely skewed and, therefore, the median is a better measure. With a non-parametric Wilcoxon rank sum test, we find that the market capitalization of frequent repurchasers is significantly larger than the market capitalization of infrequent repurchasers. This result is consistent with the findings of Jagannathan and Stephens (2003). The mean book-to-market ratio is 0.73 for frequent repurchasers and 0.62 for infrequent repurchasers. The *t*-statistic and the W-statistic from the non-parametric Wilcoxon rank sum test show that the difference in the book-to-market ratio is significant at the 10% and 5% level, respectively. The non-parametric Wilcoxon rank sum test also show a significantly higher dividend yield for frequent repurchasers than for infrequent repurchasers. There is no significant difference in return on assets or foreign ownership between frequent and infrequent repurchasers.

Overall, we conclude that frequent repurchasers are larger and have higher book-to-market ratios and dividend yields compared to infrequent repurchasers.

Table 3

Firm characteristics around the approval of open market share repurchase programs

This table reports the means (medians in parentheses) of various firm characteristics around the approval of initiated repurchase programs by 125 Swedish firms listed on the SSE over the period 2000 to 2009. The repurchase firms are classified into three groups: infrequent repurchasers comprise 79 firms with 1 or 2 initiated repurchase programs over the sample period; occasional repurchasers comprise 27 firms with 3 or 4 initiated repurchase programs over the sample period; and frequent repurchasers comprise 19 firms with 5 or more initiated repurchase programs over the sample period. ‘Market capitalization’ is the market capitalization in million SEK at the end of the year prior to the approval of the repurchase program. ‘Book-to-Market ratio’ is the book-to-market ratio at the end of the year prior to the approval of the repurchase program. ‘Return on assets’ is the return on assets in the year prior to the approval of the repurchase program in percent. ‘Dividend yield’ is the dividend yield in percent on the year of the repurchase approval. ‘Foreign ownership’ is the percentage of the total number of shares deposited in foreign depots at the end of the year prior to the approval of the repurchase program. The difference test is for differences in measures between infrequent and frequent repurchasers. The *t*-statistics are for the difference in mean measures and the W-statistics in parentheses are from the non-parametric Wilcoxon rank sum test. *, ** and *** indicate two-tailed significance levels of 10%, 5% and 1%, respectively.

	Infrequent Repurchasers	Occasional Repurchasers	Frequent Repurchasers	Difference test <i>t</i> -statistic (W-statistic)
Market Capitalization	18,770 (2,290)	19,570 (6,298)	19,336 (3,729)	0.06 (3.03)***
Book-to-Market ratio	0.62 (0.49)	0.74 (0.66)	0.73 (0.66)	1.93* (2.55)**
Return on Assets	11.6 (10.9)	11.1 (9.9)	10.6 (9.0)	-0.89 (-1.56)
Dividend Yield	3.5 (3.2)	3.9 (3.5)	4.0 (3.8)	1.37 (2.35)**
Foreign Ownership	25.2 (18.7)	24.3 (22.5)	24.0 (14.6)	-0.45 (-1.18)

4.2. Abnormal return surrounding initiation announcements of share repurchase programs

Table 4 reports the CAR surrounding the initiation announcements of repurchase programs. According to the listing agreement between the SSE and the listed company, decisions by the Board of Directors to utilize authorizations to purchase the company’s own shares must be disclosed as soon as possible. Initiation announcements disclosed on the same day or the day after interim reports are removed from the sample. In addition, some initiation announcements were not found or reported, which leaves us with a sample of 126 initiation announcements. Of these, 59 are announcements by infrequent repurchasers, 31 are announcements by occasional repurchasers, and 36 are announcements by frequent repurchasers. The initiation announcements are on average preceded by a 20 day period of negative AR, which suggests

that the announcements are triggered by a period of share price underperformance. The average 2 day AR around initiation announcements for all repurchase programs is 1.94% and statistically significant at the 1% level. The 2 day AR is also significantly positive for each frequency group. However, as with Jagannathan and Stephens (2003) we find that the announcement effect is larger for infrequent repurchasers. The 2 day AR is on average 2.77% for infrequent repurchasers and 0.99% for frequent repurchasers. These results are consistent with the hypothesis that infrequent repurchasers repurchase their stock when managers perceive their stock as undervalued while frequent repurchasers are substituting repurchases for dividend increases.

Table 4

Abnormal returns surrounding initiation announcements of open market share repurchase programs

This table reports the CAR in percent surrounding the initiation announcements of open market share repurchase programs. The sample comprises 126 initiation announcements with no other price affecting information on the same day or the trading day prior to the announcement over the period March 2000 to March 2010. The ARs are measured with the market model as a benchmark. The parameters of the market model are calculated over days -270 to -21 relative to the initiation announcement. The repurchase programs are classified into three groups: Infrequent programs are repurchase programs by firms with 1 or 2 initiated repurchase programs over the sample period; Occasional programs are repurchase programs by firms with 3 or 4 initiated repurchase programs over the sample period; and Frequent programs are repurchase programs by firms with 5 or more initiated repurchase programs over the sample period. *, ** and *** indicate two-tailed significance levels of 10%, 5% and 1%, respectively.

	<i>n</i>	Trading days relative to the announcement day					
		-20 to -1		0 to +1		+2 to +20	
		CAR	<i>t</i> -statistic	CAR	<i>t</i> -statistic	CAR	<i>t</i> -statistic
All programs	126	-1.83**	-2.27	1.94***	7.61	-0.53	-0.67
Infrequent programs	59	-1.48	-1.16	2.77***	6.90	1.29	1.04
Occasional programs	31	-2.03	-1.24	1.49***	2.89	-1.63	-1.02
Frequent programs	36	-2.25*	-1.72	0.99**	2.39	-2.57**	-2.02

4.3. Abnormal returns within repurchase programs

In this subsection, we examine long-term ARs within the repurchase programs. Using Ibbotson's (1975) RATS methodology, we are able to study each event month following the approval month for infrequent, occasional and frequent repurchasers. In the RATS model, security excess returns are regressed each event month on the three Fama-French (1993) factors and the momentum factor advocated by Carhart (1997), as follows:

$$R_{i,t} - R_{f,t} = \alpha_j + \beta_j MKT_t + s_j SMB_t + h_j HML_t + m_j MOM_t + \varepsilon_{i,t} \quad (1)$$

where $R_{i,t}$ is the monthly return on stock i and $R_{f,t}$ is the 30 day T-bill rate in calendar month t corresponding to event month j . MKT_t is the monthly market return on the value-weighted OMXSPI stock index adjusted for the 30 day T-bill rate in calendar month t corresponding to event month j . SMB_t , HML_t and MOM_t are the Fama-French (1997) size and book-to-market factors, and the Carhart (1997) momentum factor in calendar month t corresponding to event month j . The estimated intercept, α_j , provides a measure of the average AR in event month j .

Table 5

Abnormal return following approvals of share repurchase programs using Ibbotson's (1975) RATS methodology

This table reports the monthly AR and CAR in percent following approvals of initiated open market share repurchase programs over the period March 2000 to June 2010. ARs are calculated each event month following the approval month until the next AGM using Ibbotson's (1975) RATS methodology with the Fama-French (1993) factors and the Carhart (1997) momentum factor in the following regression model:

$$R_{i,t} - R_{f,t} = \alpha_j + \beta_j MKT_t + s_j SMB_t + h_j HML_t + m_j MOM_t + \varepsilon_{i,t},$$

where $R_{i,t}$ is the monthly return on stock i and $R_{f,t}$ is the return on 30 day T-bills in calendar month t corresponding to event month j . MKT_t is the monthly market return on the value-weighted OMXSPI stock index adjusted for the rate on 30 day T-bills in calendar month t corresponding to event month j . SMB_t and HML_t are the Fama-French (1993) size and book-to-market factors, and MOM_t is the Carhart (1997) momentum factor in calendar month t corresponding to event month j . The intercept α_j , measures the average monthly AR in event month j . Event month 0 is the month of shareholders' approval of the repurchase program. Programs by infrequent repurchasers are repurchase programs by firms with 1 or 2 initiated repurchase programs over the sample period. Programs by occasional repurchasers are repurchase programs by firms with 3 or 4 initiated repurchase programs over the sample period. Programs by frequent repurchasers are repurchase programs by firms with 5 or more initiated repurchase programs over the sample period. The standard errors of the coefficients have been adjusted for heteroscedasticity using White's (1980) procedure. *, ** and *** indicate two-tailed significance levels of 10%, 5% and 1%, respectively.

Event month	Programs by Infrequent Repurchasers		Programs by Occasional Repurchasers		Programs by Frequent Repurchasers	
	AR	<i>t</i> -statistic	AR	<i>t</i> -statistic	AR	<i>t</i> -statistic
0	2.51**	2.12	2.05*	1.95	2.30***	2.70
1	2.06**	2.14	1.64*	1.68	0.29	0.45
2	-1.20	-1.07	-1.08	-1.41	-1.52***	-2.94
3	-0.71	-0.89	-0.15	-0.19	0.23	0.23
4	-2.07**	-2.02	1.27	1.49	0.91	1.03
5	-1.31	-1.36	-0.75	-0.72	-0.09	-0.12
6	-1.10	-1.00	0.10	0.11	1.11	1.55
7	-0.12	-0.11	-0.44	-0.40	2.07***	2.89
8	0.06	0.05	4.28***	3.47	-0.62	-0.48
9	3.05**	2.01	1.76	1.44	1.89**	2.01
10	1.47	1.54	0.37	0.36	2.92***	3.56
11	1.60	1.39	2.01**	2.14	1.68**	2.15
Event months	CAR	<i>t</i> -statistic	CAR	<i>t</i> -statistic	CAR	<i>t</i> -statistic
1-6	-4.34*	-1.77	1.03	0.46	0.94	0.50
7-11	6.06**	2.28	7.97***	3.22	7.94***	3.82
1-11	1.72	0.48	9.00***	2.70	8.87***	3.16

Table 5 reports the average monthly ARs following approvals of initiated open market share repurchase programs. We follow the approved programs until the month prior of the next AGM, which typically occurs 12 months after the approval month. In event month 0 - the month of the repurchase approval - we find a positive and significant AR of approximately 2% for all types of repurchasers, irrespective of repurchase frequency. However, in the 6 month period following the approval month, the average cumulative AR is -4.34% and statistically significant at the 10% level for infrequent repurchasers, while it is statistically insignificant for occasional and frequent repurchasers. The negative AR for infrequent repurchasers at the beginning of the approved program and the fact that infrequent repurchasers wait longer from the approval month until they initiate their approved programs are consistent with the hypothesis that infrequent repurchasers repurchase their stock when the stock is perceived as being undervalued. Interestingly, all types of repurchasers exhibit a positive and statistically significant CAR in the second half of the program (event months 7-11). However, only occasional and frequent repurchasers have a significantly positive CAR in the 11 month period following the approval month (event months 1-11). Over the period, occasional and frequent repurchasers both have an average CAR of 9% (significant at the 1% level).

Fama (1998) and Mitchell and Stafford (2000) advocate the calendar-time portfolio approach to estimate long-term ARs. To confirm the long-run ARs estimated using Ibbotson's (1975) RATS methodology, we also use this approach. In the calendar-time portfolio approach, portfolios of event firms are formed each calendar month. Firms are included in the portfolio the calendar month after the approval month, and excluded from the portfolio the month of the next AGM. At the beginning of each calendar month, the portfolio is rebalanced so that the portfolio is equally weighted. Excess returns are regressed on the Fama-French (1993) factors and the Carhart (1997) momentum factor, as follows:

$$R_{p,t} - R_{f,t} = \alpha_p + \beta_p MKT + s_p SMB_t + h_p HML_t + m_p MOM_t + \varepsilon_{p,t} \quad (2)$$

where $R_{p,t}$ is the monthly return on the equally weighted portfolio of event firms in calendar month t . The other variables are defined as above. By forming the portfolios of event firms, any cross-sectional dependence of the individual event firm ARs are accounted for in the portfolio variance at each point in calendar time.

Table 6**Abnormal return following approvals of share repurchase programs using the calendar-time portfolio approach**

This table reports the average monthly ARs of equal-weighted calendar-time portfolios over the sample period May 2000 to June 2010. The average monthly ARs are calculated using the calendar-time portfolio approach and applying the Fama-French (1993) factors together with the Carhart (1997) momentum factor in the following regression model:

$$R_{p,t} - R_{f,t} = \alpha_p + \beta_p MKT_t + s_p SMB_t + h_p HML_t + m_p MOM_t + \varepsilon_{p,t},$$

where $R_{p,t}$ is the monthly total return on the equal-weighted portfolio of firms with initiated repurchase programs in calendar month t and $R_{f,t}$ is the return on 30 day T-bills in calendar month t . MKT_t is the monthly return on the value-weighted OMXSPI stock index adjusted for the return on 30 day T-bills in calendar month t . SMB_t and HML_t are the Fama-French (1997) size and book-to-market factors, and MOM_t is the Carhart (1997) momentum factor in calendar month t . The intercept, α_p , measures the average monthly AR on the equal-weighted portfolios of firms with activated repurchase programs. The portfolios are formed each calendar month from the month following the approval of the program until the month of the next annual general meeting. Programs by infrequent repurchasers are repurchase programs by firms with 1 or 2 initiated repurchase programs over the sample period. Programs by occasional repurchasers are repurchase programs by firms with 3 or 4 initiated repurchase programs over the sample period. Programs by frequent repurchasers are repurchase programs by firms with 5 or more initiated repurchase programs over the sample period. Only calendar months with a minimum of 4 stocks in the portfolio are included in the regression. The standard errors of the coefficients have been adjusted for heteroscedasticity using White's (1980) procedure. *, ** and *** indicate two-tailed significance levels of 10%, 5% and 1%, respectively.

	Programs by Infrequent Repurchasers		Programs by Occasional Repurchasers		Programs by Frequent Repurchasers	
	Model 1	Model 2	Model 1	Model 2	Model 1	Model 2
Intercept, α_p	0.0082*	0.0028	0.0114***	0.0074*	0.0142***	0.0076***
MKT	0.7363***	0.9879***	0.6978***	0.9092***	0.7105***	0.9125***
SMB		0.4468***		0.2383		0.3496***
HML		0.3300**		0.3350***		0.4020***
MOM		0.1077		0.0799		0.0594
R^2	0.56	0.65	0.52	0.61	0.61	0.72
Observations	90	90	103	103	115	115

Table 6 presents the estimated coefficients from two models of the calendar-time portfolio regression. Applying the Fama-French (1993) factors and the Carhart (1997) momentum factor model, the average monthly AR (the intercept) of the portfolios of event firms is positive and significant for occasional and frequent repurchasers. The average monthly ARs are 0.74% and 0.76%, respectively, which correspond to annual returns of 8.88% and 9.12%, respectively. Thus, the estimated ARs over the approved program lengths using the calendar-time portfolio approach are similar to the estimated cumulative ARs over the program lengths using Ibbotson's (1975) RATS methodology.

Using Ibbotson's (1975) RATS methodology, we also examine ARs surrounding the first repurchase month in the repurchase programs. Table 7 reports ARs from one month before the first repurchase month until six months after the first repurchase month.¹²

Table 7

Abnormal return surrounding the first repurchase month using Ibbotson's (1975) RATS methodology

This table reports monthly the AR and CAR in percent surrounding the first repurchase month in open market share repurchase programs over the period March 2000 to June 2010. ARs are calculated each event month from the month prior to the first repurchase month until 6 months subsequent to the first repurchase month using Ibbotson's (1975) RATS methodology with the Fama-French (1993) factors and the Carhart (1997) momentum factor in the following regression model:

$$R_{i,t} - R_{f,t} = \alpha_j + \beta_j MKT_t + s_j SMB_t + h_j HML_t + m_j MOM_t + \varepsilon_{i,t},$$

where $R_{i,t}$ is the monthly return on stock i and $R_{f,t}$ is the return on 30 day T-bills in calendar month t corresponding to event month j . MKT_t is the monthly market return on the value-weighted OMXSPI stock index adjusted for the rate on 30 day T-bills in calendar month t corresponding to event month j . SMB_t and HML_t are the Fama-French (1993) size and book-to-market factors, and MOM_t is the Carhart (1997) momentum factor in calendar month t corresponding to event month j . The intercept α_j measures the average monthly AR in event month j . Event month 0 is the month of the first repurchase in a repurchase program. All reported event months are within the approved repurchase period of each program. Programs by infrequent repurchasers are repurchase programs by firms with 1 or 2 initiated repurchase programs over the sample period. Programs by occasional repurchasers are repurchase programs by firms with 3 or 4 initiated repurchase programs over the sample period. Programs by frequent repurchasers are repurchase programs by firms with 5 or more initiated repurchase programs over the sample period. The standard errors of the coefficients have been adjusted for heteroscedasticity using White's (1980) procedure. *, ** and *** indicate two-tailed significance levels of 10%, 5% and 1%, respectively.

Event month	Programs by Infrequent Repurchasers		Programs by Occasional Repurchasers		Programs by Frequent Repurchasers	
	AR	<i>t</i> -statistic	AR	<i>t</i> -statistic	AR	<i>t</i> -statistic
-1	-2.00**	-2.50	-0.48	-0.48	0.47	0.58
0	2.57***	2.85	2.05*	1.93	0.46	0.67
1	0.56	0.57	-1.04	-1.27	1.10*	1.76
2	-0.19	-0.19	0.22	0.31	0.76	1.48
3	1.21	1.08	1.92	1.37	0.53	0.95
4	-0.21	-0.16	0.18	0.17	1.11	1.73
5	0.34	0.27	1.02	0.97	-0.11	-0.14
6	1.09	0.88	2.41*	1.92	-0.30	-0.39
Event months	CAR	<i>t</i> -statistic	CAR	<i>t</i> -statistic	CAR	<i>t</i> -statistic
1-6	2.79	1.05	4.71*	1.71	3.10*	1.93

Consistent with the hypothesis that infrequent repurchasers repurchase their own shares when the stock is perceived as being undervalued, we find that the AR is significantly negative (-2.00%) and significant at the 5% level in the month prior to the first repurchase month for infrequent repurchasers. In addition, the average AR is positive (2.57%) and

¹² Event months that do not fall within the approved length of the programs are deleted to avoid overlapping.

significant at the 1% level in the month of the first repurchase. In the 6 month period following the first repurchase month, the CAR for infrequent, occasional and frequent repurchasers is 2.79%, 4.71% and 3.10%, respectively. However, the CAR is only statistically significant for occasional and frequent repurchasers. Interestingly, our results do not support the findings by Yook (2010), who finds that infrequent repurchasers who actually repurchase their shares following the repurchase announcement experience significantly better stock price performance than frequent repurchasers.¹³

4.4. Abnormal return and repurchase size

In order to examine the ARs within the programs further, we analyze whether there is a relationship between monthly ARs and monthly repurchase sizes. An increased demand of the stock could increase the price of the stock. To examine the relationship between monthly ARs and repurchase sizes, we use the following firm fixed effects regression:

$$AR_{i,j} = \alpha_i + \beta_1 AR_{i,j-1} + \beta_2 REPFRAC_{i,j} + \varepsilon_{i,j} \quad (3)$$

where $AR_{i,j}$ is the AR for firm i in repurchase month j . The AR is calculated using the market adjusted model with the value-weighted OMXSPI stock index as a benchmark. $REPFRAC_{i,j}$ is the fraction of the total number of shares that firm i repurchases in repurchase month j .

Table 8 shows that the repurchase size coefficient is positive and significant for all types of programs. There is thus a positive relationship between monthly ARs and monthly repurchase sizes in repurchase programs by all types of repurchasers (infrequent, occasional and frequent). However, the repurchase size coefficient is larger and more significant in programs by infrequent repurchasers.

¹³ Yook (2010) examines the period following the initiation announcement and not the first repurchase month. However, since the median number of days from the Board of Directors' initiation announcement until the first repurchase is only 2 days in our sample, the initiation announcement and the first repurchase generally occur in the same month.

Table 8**Firm fixed effects regression on monthly abnormal returns**

This table reports parameter estimates from the following firm fixed effects regression:

$$AR_{i,j} = \alpha_i + \beta_1 AR_{i,j-1} + \beta_2 REPFRAC_{i,j} + \varepsilon_{i,j}$$

where $AR_{i,j}$ is the AR for firm i in repurchase month j . The AR is calculated using the market adjusted model with the value-weighted OMXSPI stock index as benchmark. $REPFRAC_{i,j}$ is the fraction of total number of shares that firm i repurchases on repurchase month j . The sample includes repurchase months in 321 repurchase programs over the period March 2000 to June 2010. Estimation is done with firm fixed effects and standard errors adjusted for group-wise heteroscedasticity. Programs by infrequent repurchasers are repurchase programs by firms with 1 or 2 initiated repurchase programs over the sample period. Programs by occasional repurchasers are repurchase programs by firms with 3 or 4 initiated repurchase programs over the sample period. Programs by frequent repurchasers are repurchase programs by firms with 5 or more initiated repurchase programs over the sample period. *, ** and *** indicate two-tailed significance levels of 10%, 5% and 1% respectively.

	Programs by Infrequent Repurchasers		Programs by Occasional Repurchasers		Programs by Frequent Repurchasers	
	Coefficient	<i>t</i> -statistic	Coefficient	<i>t</i> -statistic	Coefficient	<i>t</i> -statistic
Intercept	0.0096**	2.39	0.0145***	4.53	0.0144***	6.25
AR_{j-1}	-0.2089***	-3.06	-0.0467	-1.09	-0.0402	-0.93
REPFRAC	1.0645**	2.16	0.7980*	1.77	0.5792*	1.74
Number of firms	79		27		19	
Repurchase months	333		373		562	

5. Conclusion

In this paper we examine differences in the market performance of Swedish firms that initiate repurchase programs infrequently, occasionally and frequently. By using detailed data on repurchase activities, we are able to examine share repurchases with high precision and relate the performance to repurchase size. Since the duration of a repurchase program is pre-determined in Sweden, we are able to classify the programs by frequency and study market performance within the programs. We find that repurchase programs by infrequent repurchasers tend to be smaller and last for fewer days than repurchase programs by frequent repurchasers. When we examine the firm characteristics of the various types of repurchasers, we find that frequent repurchasers are larger and have higher book-to-market ratios and dividend yields compared to infrequent repurchasers. As with Jagannathan and Stephens (2003), we find that repurchase announcements by infrequent repurchasers are greeted more favorably than repurchase announcements by frequent repurchasers. The 2 day AR around initiation announcements of repurchase programs is on average 2.77% for infrequent repurchasers and 0.99% for frequent repurchasers. These results are consistent with the

hypothesis that infrequent repurchasers repurchase their stock when managers perceive their stock as being undervalued and frequent repurchasers are substituting repurchases for dividend increases. In addition, the first repurchase month in infrequent repurchase programs is generally preceded by a month with negative AR, which further strengthens the undervaluation hypothesis for infrequent repurchasers. Using Ibbotsons's (1975) RATS methodology and the calendar-time portfolio approach, we also examine the stock performance within the repurchase programs. Subsequent to the approval month and from the first repurchase month until the month of the next annual general meeting, only occasional and frequent repurchasers exhibit a positive AR. Our findings are not consistent with the findings of Yook (2010), who finds that infrequent repurchasers who actually repurchase their shares following the repurchase announcement experience significantly better stock price performance following announcements of repurchase programs than frequent repurchasers. We are not able to explain the differences in long-term ARs between frequent and infrequent repurchasers by repurchase size. Further research to ascertain the differences in long-term ARs between infrequent and frequent repurchasers is therefore warranted.

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