

The Ability of Insider Managers to Detect and Exploit Market Mispricing

- An Empirical Study of the Swedish Stock Market 2000-2010

Abstract

This study examines the ability of insider managers to detect and exploit market mispricing of their firm's shares by investigating the share price performance around and following actual share repurchases using data from the Swedish stock market. The research is based on daily repurchase data from the Swedish stock exchange, NASDAQ OMX during 2000-2010. The average abnormal short term return following actual repurchases was positive and statistically significant, indicating a superior ability among insider managers to exploit market mispricing. In the long term, results for the average abnormal return were mixed. We find that it is difficult to draw general conclusions on the ability of insider managers to detect and exploit market mispricing in the long term.

Authors: Francesco Di Folco (20577)
 Henrik Jakobsson (20576)

Tutor: Professor Clas Bergström

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1. INTRODUCTION

During the last decades, share repurchases in financial markets have increased significantly in importance as a method for firms to distribute cash flows to their shareholders. Several countries have removed restrictions on share repurchases relatively recently.¹ Numerous studies have examined share repurchases and it is a well researched area in finance. However, the majority of studies on share repurchases are made on US data which is only disclosed quarterly². In addition, most studies are focused on the market reaction to announcements of open market share repurchase programs and not on actual share repurchases. See, for example, Comment and Jarell (1991), Dann (1981), Ikenberry, Lakonishok and Vermaelen (henceforth ILV) (1995) and Vermaelen (1981). ILV (1995) find that on average, the market reaction to announcements of a share repurchase program is 3.5% in the US.

An announcement of a share repurchase program is not a firm commitment and it is often not fully implemented. For example, during some repurchase programs, only a small percentage of the shares are actually repurchased.³ In a study using monthly data from the Canadian Stock Exchange, ILV (2000) find that repurchase activity increases following price drops. This suggests that insider managers repurchase shares when the value of the firm's share is perceived as greater than its current market price.

Share repurchases were restricted in Sweden until March 2000. Since then, many Swedish listed firms have initiated share repurchase programs. The Swedish stock exchange requires complete and timely disclosure of share repurchases. The rigid disclosure requirements enable us to perform this study using daily Swedish data.

In this thesis we examine the ability of insider managers to detect and take advantage of market mispricing of their firm's shares. We find that managers in general do have the ability to take advantage of market mispricing in the short term. However, the results are mixed regarding the long-term, which further highlights the need for caution when trying to detect abnormal long term returns.

¹ Selection of countries that have removed restrictions on share repurchases: Australia (1989), Hong Kong (1991), Korea (1994), Denmark and Japan (1995), Finland and Poland (1997), France, Germany and India (1998), South Africa, and Norway (1999).

² Prior to 2003 only through the changes in treasury shares and the number of outstanding shares provided in the quarterly financial report.

³ Stephens and Weisbach (1998) estimate that 10% of firms repurchase 5% or less of the announced target amount of shares within three years of the announcement.

We begin by providing a brief background to the origin of this thesis and an overview of share repurchases and their characteristics and benefits. Next we describe the methods used and discuss different methods for calculating long term abnormal returns. This is followed by a presentation and analysis of our results. Finally, we conclude and make suggestions for further research.

2. BACKGROUND

In this section we explain the theoretical background as well as provide a brief overview of the previous literature. Finally, we outline our research questions and hypotheses.

2.1 Motives for share repurchases

The reasons why firms choose to repurchase shares are manifold. See, for example, Dittmar (2000) and ILV (1996). According to the *excess capital hypothesis*, a firm with more capital than it can profitably invest may choose to either distribute the excess cash to its shareholders or retain it within the firm. Share repurchases, like paying dividends, is one method to do this. Lee and Rui (2007) compare the time-series behavior of share repurchases and dividends. They find that a change in the dividend of a firm says something about the future earnings of the firm, and that share repurchases do not contain such information. In addition, share repurchases turned out to be very much associated with high temporary cash flows whereas dividends were more associated with high recurring cash flows. Since the firm does not have to commit to repurchase shares and, unlike when paying dividends, there is no implicit expectation that the repurchase will recur regularly, repurchasing shares is a more flexible way to distribute capital. Hence, according to the excess capital hypothesis, firms with a higher portion of recurring and stable cash flows will to a greater extent choose to distribute cash by paying dividends to shareholders, while firms with more non-recurring and unstable cash flows are more inclined to make share repurchases as a means of distributing cash.

Generally, share repurchases represent a superior alternative to dividends from a tax perspective. In many countries, capital gains are taxed at a lower rate than dividends. In the case of Sweden, there is no such difference as both capital gains and dividends are taxed at the same rate. However, it may still be beneficial for an investor to receive the capital distribution in the form of a share repurchase, since unlike dividends, share repurchases do not cause any immediate tax payments. The shareholder only has to pay tax when the shares are sold, which is at his or her discretion. A dividend payment on the other hand, is taxed immediately.

The *undervaluation hypothesis* or *signaling hypothesis* assumes that insiders of a firm want to exploit their superior information about when the firm's shares are undervalued in order to make share repurchases that create value for shareholders. The possible information asymmetry between insiders and shareholders may cause the firm's shares to be undervalued. Share repurchases then function as a signal to the market of the undervaluation of the firm's shares. As a consequence, the

market interprets the action as an indication that the share is undervalued. This will increase the demand and hence the price of the firm's shares, creating value for the shareholders.

When a firm makes a share repurchase or pays a dividend, the leverage ratio changes due to the decrease in the firm's equity. The firm may therefore use share repurchases as a means to optimize the leverage ratio. A firm with a leverage ratio below the optimal ratio is therefore more inclined to repurchase shares. The decision to repurchase will hence be affected by the firm's capital structure. This is the *optimal leverage ratio hypothesis*.

Another motive for making share repurchases is the *management incentive hypothesis*. If a manager has stock options as part of the compensation, he or she has an incentive to uphold the per-share value of the stock. Consequently, stock options may cause managers to prefer share repurchases over dividends since repurchases do not dilute the per-share value of the firm.

Lastly, there is the *takeover deterrence hypothesis*. A firm that is a potential target for a takeover, may be able to increase the price of a takeover by making share repurchases, which may deter a possible acquirer. If the shareholders that are selling their shares in a repurchase have the lowest reservation values, the repurchase increases the lowest price for which the share may be acquired, thus increasing the takeover price.

2.2 Methods for share repurchases

According to Vermaelen (2005), a firm may repurchase shares in four different ways: fixed-price tender offer; a Dutch auction tender offer; an open market repurchase; and a privately negotiated repurchase from a large investor.

In an *open market share repurchase* the firm instructs the broker to buy shares in the open market. If the firm is not in a hurry to repurchase a lot of shares, wants to maintain flexibility and does not want to pay a premium above the market price, it is often beneficial to repurchase shares in the open market. Open market share repurchases is the most common repurchase method. Although open market repurchases seem to be the cheapest way to repurchase shares, they are often subject to volume and price restrictions.

In a *fixed-price tender offer* the firm offers to repurchase a specific number of shares at a given price (the tender price) before a given date (the expiration date). The investors have until the expiration date to decide whether or not to tender their shares. The tender price has to be sufficiently above the market price in order for investors to tender their shares. If the tender price is below or equal to

the market value after the repurchase announcement, the offer will be unsuccessful. On the other hand, if the tender price is significantly higher than market value, the offer will be heavily oversubscribed, and the firm may feel it has paid too much.

In the case of a *Dutch auction tender offer*, the firm specifies a range of prices within which each tendering shareholder chooses their minimum acceptable selling price. Each shareholder then informs the firm of the number of shares he or she is willing to sell and the minimum acceptable selling price. The firm subsequently pays the lowest price to shareholders that will secure the desired number of shares. Dutch auctions may be more beneficial to a firm than a fixed-price tender offer. It is often a cheaper way to buy back a specific number of shares than through a fixed-price offer. The firm is essentially repurchasing from the most pessimistic investors, who would be the first to tender their shares in a hostile bid. Moreover, the repurchase price is not fixed in advance, instead it moves with the general level of the stock market, meaning that the firm is better hedged against a falling stock market.

Firms may also repurchase shares through a *private share repurchase*, in which the firm repurchases shares from large investors outside the stock market. These repurchases could take place at a premium above the market price, at the market price or at a discount. Greenmail, is a kind of special premium transaction, where the firm buys back shares from a potential raider. Many private repurchases take place at a discount from the market price. The reason for this may be a desire to provide liquidity for large investors who want to exit rapidly and are in a poor negotiating position.

The most common way to repurchase shares is through the open market. Around 90% of the value of all announced repurchases between 1980 and 2000 in the US was conducted through open market share repurchase programs (Grullon and Michaely, 2000). In the rest of the world, open market share repurchases are also the most common form of share repurchases, followed by private repurchases and fixed price tender offers (Vermaelen, 2005). In Sweden, share repurchases represented 42% of the total capital distributed to shareholders between 2000 and 2005 for Swedish firms (De Ridder and Råsbrant 2009).

It is often quite difficult to conduct studies on share repurchases since many countries, including the US, do not require firms to disclose details regarding repurchase transactions. Although, there are a few countries such as Australia, Hong Kong, Malaysia, Mexico, Singapore, Sweden and the UK, that require firms to disclose full details of their repurchases on a daily basis (Vermaelen, 2005). Hence, these countries are of particular interest when studying the effects of share repurchases.

2.3 Previous literature

Share repurchases is a well-researched area in finance. Previous research is to a large extent centered on the volume of repurchase activity, the information content of repurchase announcements, and the short term performance of repurchasing firms. See for example ILV (1995), Ikenberry and Vermaelen (1996), Stephens and Weisbach (1998) and Jagannathan, Stephens and Weisbach (2000). Due to the lack of data on actual share repurchases, the majority of studies on share repurchases are conducted on share repurchase announcements. However, there are a number of studies that have been using actual share repurchase data. Here, we will try to give a brief overview of the field.

Cook et al. (1999) studied the repurchase timing and execution using 64 US firm's separately disclosed repurchase trading data. The results were mixed for firms listed on the New York Stock Exchange and NASDAQ. Even if no clear evidence of market timing ability was found, there was considerable variation across the firms.

Zhang (2005) studies the share price performance around and following actual share repurchases using daily share repurchase data from the Hong Kong Stock Exchange. The 3-day return following actual repurchases was found to be 0.43% on average. Zhang also studies the effects on long term performance by using the BHAR method (buy-and-hold-method for calculating abnormal returns). He finds that firms on average do not seem to have any abnormal performance over long horizons. However, there was some evidence that firms with high BTM values showed superior performance following share repurchases. Brockman and Chung (2001) also used Hong Kong data and studied the timing ability of share repurchases. They found that managers do have a considerable ability to time the repurchases, which suggests that managers do make use of private information when conducting share repurchases, giving support to the undervaluation hypothesis.

ILV (2000) studied the share price performance following actual repurchases using data from the Canadian Stock Exchange. Their findings were similar to the findings of Zhang (2005) in that they found that repurchases appear to follow price declines. In addition, their results indicate that high BTM firms earn abnormal returns following repurchase announcements. However, the available Canadian data is on a monthly basis given the less rigorous disclosure requirements in Canada.

Similar to Zhang (2005), Brockman and Chung (2001) also use Hong Kong data when they study share repurchases and they conclude that managers have substantial timing ability when making share repurchases. Managers were found to minimize costs when implementing repurchase plans and hence made use of private information to buy back shares at the lowest cost possible. Brockman and

Chung also found other objectives such as changing the firm's capital structure and defending against hostile takeovers. This made it somewhat difficult to empirically establish evidence of timing ability. The alternative objectives favored the null hypothesis of no timing ability.

Using Swedish data, De Ridder and Råsbrant (2010) studied the effect of the size and frequency of the repurchases on the one year stock return. They find that the market on average regards share repurchases as positive news, causing the stock price to rise. In addition, they find that there is a positive effect of repurchase size on abnormal return. Their results are in line with the signaling hypothesis and the idea that firms can take advantage of undervaluation by conducting share repurchases.

Analyzing the changes in daily return volatility due to actual share repurchases, Kim (2007) finds that firms that are actively repurchasing shares in times when the share price has fallen, reduce the daily return volatility. This result is important since it suggests that it is not the announcement that has a negative effect on the return volatility (risk), but rather, it is the actual buyback activity. The measure of systematic risk, the CAPM beta, will decrease only when the firm makes actual share repurchases. This further highlights the importance of understanding the mechanisms and implications of actual share repurchases and not just the announcements.

2.4 Research questions and hypotheses

According to Ikenberry and Vermaelen (1996) a repurchase program can be viewed as an exchange option. Since a repurchase program is not a firm commitment, it gives firms the flexibility of deciding whether or not to repurchase shares at some later point in time. The repurchase program allows managers to use company resources to buy back shares when they regard it as undervalued, or abstain from buying back shares. In other words, it gives firms the possibility to exchange the market value for the "true value" whenever management regards this as beneficial for shareholders.

An announcement of a share repurchase program can be expected to increase the firm's share price at the time of the announcement, regardless of whether or not the firm's share is fairly priced at that time. The option to repurchase shares opens the possibility for management to take advantage of mispricing in the future, even if there currently is no such mispricing. It is only valuable however, if management has the ability to detect and take advantage of valuation errors between market prices and "true value" (Ikenberry and Vermaelen, 1996). If insider managers on average have no such ability, then on average there should not be any significant market reaction to announced repurchase programs since even if there will be future discrepancies between market value and "fair

value”, managers will not be able to exploit them. The exchange option should have no value if insider managers have no such ability.

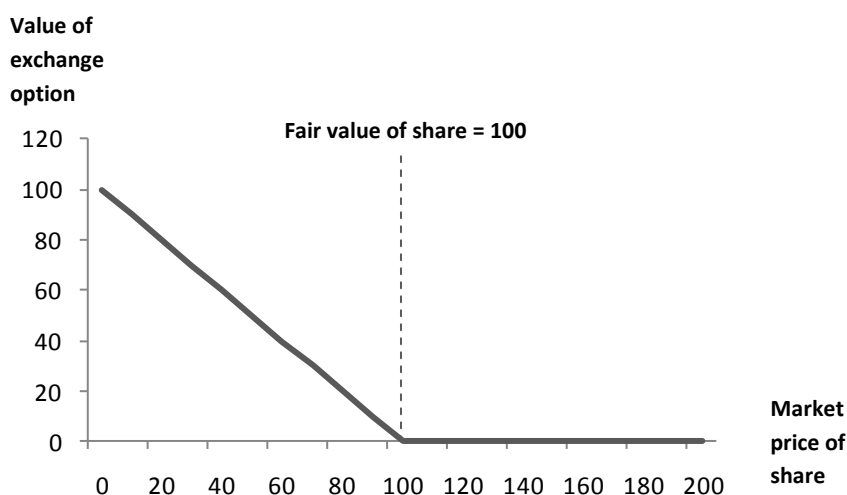
Exchange Option – Numerical Example:

Fair value of stock = 100

Market price of stock = 80

Value of share repurchase: Fair value – Market price = $100 - 80 = 20$

Figure 1: The value of the exchange option as a function of the market price



It may be reasonable to assume that insider managers have more firm-specific information than outside investors. This would be an argument in favor of the view that managers have a superior ability to detect and take advantage of mispricing of the firm’s share. But it may also be argued that outside professional investors have access to more market-wide information and more resources to process this information. See for example Zhang (2005).

If insider managers do not have a superior ability to detect and take advantage of mispricing then share repurchases may just constitute a way to distribute free cash flow to shareholders with no significant value creation for the firm. However, if insider managers can take advantage of mispricing and repurchase shares when the market price is lower than the “fair value” of the share, this might

imply that investors that are selling in a repurchase are affected negatively due to asymmetric information. This is an interesting question since this could imply that investors should not sell shares if they know it takes place through a share repurchase as the fact that the firm wants to repurchase shares would be a signal of undervaluation and hence the investor is better off by keeping the shares.

The daily data on share repurchases provided by the Swedish stock exchange is favorable for studying whether firms actually buy back shares when they are undervalued. By using daily data from the Swedish stock exchange, this thesis aims to analyze whether insider managers have a superior ability to detect and take advantage of mispricing of a firm's shares, by studying the stock market reaction to actual share repurchases, both on a short term and long term horizon. Most previous studies have been focusing on the short term. However, it may be interesting to investigate whether there are long term abnormal returns following share repurchases.

Like Zhang (2005), we have chosen to include size and book-to-market (BTM) in our analysis since these are variables commonly used to explain stock returns. The amount of available market information may be expected to differ regarding small and large firms which would mean there is greater asymmetric information surrounding small firms. BTM on the other hand, may be expected to have an impact on the effect of repurchases given that high BTM may be a sign of undervaluation or simply that the share price has declined recently.

For the purpose of this thesis, we have assumed that insider managers act in the interest of shareholders, and hence we have not taken e.g. management incentive programs into account.

Hypothesis 1: The short term stock market reaction following actual share repurchases is zero.

Hypothesis 2: The long term stock market reaction following actual share repurchases is zero.

3. METHODOLOGY

3.1 Data collection

The data on actual share repurchases was retrieved from the Surveillance Department of NASDAQ OMX. According to the Swedish stock exchange regulations, all listed firms must report about all transactions regarding the firm's own shares no later than the following trading day. The reported information for each repurchase day includes the quantity, volume weighted average price and the total amount. The information was collected from March 2000, (when repurchases were legalized in Sweden), up until October 2010. Other data, such as historical share prices, the Stockholm All-Share index return, historical market capitalizations and BTM ratios, were retrieved from Datastream.

All firms classified as overseas firms (dual-listed) were excluded in the data sample as these do not have to comply with the disclosure requirements according to Swedish law. Repurchases classified as part of an option program, bonus issue and transaction payment were excluded from the database.

Data points of the two samples were matched by first extracting all repurchase days from the NASDAQ OMX sample and thereafter merging the data set with the Datastream sample containing stock prices, BTM and market values. The data sets were matched by firm name.

3.2 Event days

Our aim is to investigate the average share price returns around and following the event days. However, firms have varying frequencies of share repurchases. By considering every repurchase day as an event day, firms which made frequent repurchases will be over-represented in the data. Conversely, by taking only one repurchase day in a repurchase program for a given firm as an event day, much valuable information will be lost. In order to mitigate this problem, we have chosen to take the first repurchase day of each month for any given firm as the only repurchase day in that month. Thus, there can only be one repurchase day in a given month for each firm, in line with the method applied by Zhang (2005). This simplification of the input data produces a more manageable sample data set. Furthermore, since only one repurchase transaction each month is counted as an event date, the volume of repurchased shares is not taken into consideration. The total volume of all repurchases is excluded as well as the volume of the selected event days. Consequently, the repurchase transactions are equally weighted.

3.3 Missing values

As described above, certain transactions depending on firm characteristics and transaction type were excluded. A number of event days were also excluded due to insufficient data. Event days with missing BTM ratio or market value were excluded. Furthermore, we set up a prerequisite for each event day to have observable data points one month before and 36 months after the date.

3.4 Measures of long term returns

In order to calculate long term abnormal returns, we have chosen to apply the Buy-and-Hold-Abnormal-Return (BHAR) approach. However, the use of this measure both has its advantages and disadvantages, and there is an ongoing discourse among researchers about which measure is the most suitable for detecting abnormal long term returns. We will try to give a brief overview of the arguments for and against this measure as well as discuss the alternative measure, which is the long term cumulative abnormal return (CAR) measure.

In event studies of long term abnormal returns, a number of biases come into play, namely the *new listing bias*, the *rebalancing bias* and the *skewness bias*. In addition, there may be cross-sectional dependence among event firms and the asset pricing model that is used may be incorrect. The factors that distort the results depend on the method used to calculate abnormal returns.

Firstly, the new listing bias arises because the index or reference portfolio used to calculate long term abnormal returns includes new firms that were listed *after* the event month, making the comparison of the returns skewed. Secondly, rebalancing bias arises because the returns of a reference portfolio, e.g. an equally weighted market index, are typically calculated assuming periodic (for example monthly) rebalancing. However, the returns of the sample firms are compounded without rebalancing. Lastly, the skewness bias arises because long term returns are positively skewed.

Barber and Lyon (1997) advocate the use of the BHAR measure, by which abnormal returns are calculated as the buy-and-hold return on a sample firm less the buy-and-hold return on a reference portfolio or a control firm. They argue that CAR may lead to incorrect conclusions and that when long term abnormal returns are calculated using a reference portfolio such as a market index, there are significant biases in test statistics. CARs are very much affected by the new listing bias. As a result, they argue, long term CARs are generally positively biased. On the contrary, long term BHARs are more affected by the rebalancing and skewness biases. Hence, long term BHARs are generally negatively biased. The results of Barber and Lyon (1997) as well as those of Kothari and Warner

(1996) highlight these problems when it comes to calculating long term abnormal returns using either a reference portfolio or an asset pricing model.

However, Barber and Lyon (1997) recommend a method of matching sample firms to control firms of similar size and BTM ratio, in order to handle the various biases. Both sample and control firms are then listed at the event date, minimizing the new listing bias. The rebalancing bias is reduced since the returns of the sample and control firms are calculated in the same way. Further, the abnormal returns calculated in this approach turned out to be fairly symmetric.

Barber and Lyon (1997) and Lyon et al. (1999) argue that the average monthly return (CAR) does not accurately measure the return to an investor who holds a security for a long period after the event date. Long term investor experience is better captured by compounding short term returns to obtain BHAR.

3.4.1 Critique against BHAR

Mitchell and Stafford (2000) argue that major corporate actions are not random events, and hence that event samples rarely consist of independent observations, leading to cross-correlation of abnormal returns. Since the BHAR methodology assumes independence of observations, this would be a significant drawback of BHAR. Another argument against the use of the BHAR method discussed by Mitchell and Stafford (2000) is that BHAR is only one type of investor experience. There are other types of investor experiences from other trading strategies, such as e.g. periodic portfolio rebalancing. Also, the BHAR measure is increasing in holding period because of compounding, given that there has been abnormal performance during any portion of the return series.

Fama (1998) discusses the problems associated with using BHAR for calculating long term abnormal returns. The central arguments laid out by Fama (1998) in favor of using shorter intervals for calculating abnormal returns, such as CAR, may be summarized as follows:

- (i) Most asset pricing models assume normally distributed returns. Given that normality is a better approximation for short horizons, shorter time horizons are superior for measuring long term returns. In addition, most empirical tests of asset pricing models typically use monthly returns.
- (ii) BHARs can give false conclusions since they can grow with the return horizon even when there is no abnormal return after the first period. CARs produce fewer statistical problems than long term BHARs since they avoid the problems that arise from compounding monthly returns to get long term BHAR.

- (iii) Controlling for size and BTM through matching sample firms with a reference portfolio or a control firm is not enough in order to capture all cross-correlation among event firms.

3.4.2 Choice of method

Lyon et al. (1999) highlights the problems with measuring long term abnormal returns by relying on an asset pricing model. A test of the null hypothesis that long term abnormal returns are zero is a joint test of long term abnormal returns are zero and that the asset pricing model used to estimate abnormal returns is correct.

An advantage of the CAR method is that it controls well for cross-sectional dependence among sample firms. The disadvantage of this approach is that it does not precisely measure investor experience. We believe that the BHAR method best measures the return experienced by an investor, since it is the return an investor actually would receive from investing for the whole period. The largest disadvantage of this approach is that it is more sensitive to the problem of cross-sectional dependence among the sample firms. The ongoing discourse among researchers on this topic may be summarized by concluding that measuring long term abnormal returns is difficult and should be done with caution.

3.5 Method description

3.4.1 Portfolio sorting

All observed repurchase event dates were sorted into quartiles according to size and BTM. Each repurchase was sorted into a quartile based on the size or BTM value at the specific event date. A given repurchasing firm's size or BTM value was compared to all other quoted firms at the specific date.

3.4.2 Short term abnormal returns

Short term abnormal returns were calculated by using the cumulative abnormal returns method (CAR). Three windows of trading days were used in the calculations; CAR(-20, -1), CAR(0, 2) and CAR(0, 20). The three-day event window between the event day and the following two days shows the immediate short term abnormal returns following the actual repurchase. The slightly longer short term abnormal returns are given by the 21-day interval following the event day. To further supplement our research we investigate the returns during a 20-day period before the actual

repurchase. It is interesting to investigate market returns before repurchases as these present some evidence on what might motivate actual repurchases.

We chose the NASDAQ OMX All-share index as the market return benchmark. It is commonly accepted that the short term abnormal returns are not sensitive to the choice of benchmark.⁴ The resulting CARs were further sorted on year as well as quartiles of BTM and market value. In order to test the statistical significance of the results, p-values were calculated.

The CAR is calculated by summing up the abnormal return of each trading day over the specified time interval:

$$CAR_{i,t} = \sum AR_{i,t}$$

i = Stock i

t = Event date

AR = Abnormal return

$$AR_{it} = R_{i,t} - R_{m,t}$$

R_{i,t} = Return of stock i at time t

R_{m,t} = Return of the benchmark at time t

$$R_{i,t} = (P_{i,t-1}/P_{i,t})/P_{i,t-1}$$

P_{i,t} = Price of stock i at time t

$$R_{m,t} = (P_{m,t-1}/P_{m,t})/P_{m,t-1}$$

P_{m,t} = Price of benchmark at time t

⁴ Brown and Warner (1985) and Campbell et al. (1997)

For further analysis and robustness check, a cross-sectional regression was conducted. The two event windows following the event date, $CAR(0, 2)$ and $CAR(0, 20)$, were regressed on the natural logarithm of the market value, BTM-ratio and the CAR of the 20-day event window before the repurchase day ($CAR(-20, -1)$). $CAR(-20, -1)$ was included in order to control for possible mean reversion that possibly could arise from average negative returns prior to the repurchases.

The regression calculation is performed as described below:

$$CAR(0,2)_{i,t} = \alpha_0 + \beta_0 CAR(-20,-1)_{i,t} + \beta_1 \text{Log(Size)}_{i,t} + \beta_2 BTM_{i,t} + \epsilon_{i,t}$$

$$CAR(0,20)_{i,t} = \alpha_0 + \beta_0 CAR(-20,-1)_{i,t} + \beta_1 \text{Log(Size)}_{i,t} + \beta_2 BTM_{i,t} + \epsilon_{i,t}$$

α_0 = Intercept of dependent variable

β = Regression coefficient

Log(Size) = Natural logarithm of firm size

BTM = Book-to-market-ratio of firm

ϵ = Error term

3.4.3 Long term abnormal returns

Long term abnormal returns were calculated using the buy-and-hold abnormal return method (BHAR). The BHARs were calculated over one, two and three years. In order to effectively run the calculations, the data set was collapsed into months. The share price for each month of a given firm was set to the last trading day's price, market capitalization and BTM value. These monthly windows were then used in the BHAR calculations. In the case of long term abnormal returns, the results are sensitive to the choice of benchmark, (Zhang (2005)). Each repurchase day was assigned with a control firm as a benchmark. The control firm was chosen by first generating a sample of all listed firms with a market capitalization of 70-130% in relation to the repurchasing firm for the specific event month. Then the firm in the sample with the BTM value closest to the repurchasing firm in the given event month was chosen as the control firm.

The buy-and-hold returns over the given time interval were calculated for the repurchasing firm which were subsequently subtracted by the buy-and-hold returns for the control firm.

BHAR is calculated according to the following:

$$BHAR_{i,t} = \prod(R_{i,t}) - \prod(R_{control\ firm,t})$$

i = Stock i

t = Event date

$R_{i,t}$ = Return of stock i at time t

$R_{control\ firm,t}$ = Return of the control firm at time t

For further analysis, a cross-sectional regression was carried out similar to the one performed on short term CARs. The three-year BHARs were regressed on the natural logarithm of market value, BTM and the CAR of the 20-day event window before the repurchase day (CAR(-20, -1)).

The regression calculation is described below:

$$BHAR(3\text{-year})_{i,t} = \alpha_0 + \beta_0 CAR(-20,-1)_{i,t} + \beta_1 \text{Log(Size)}_{i,t} + \beta_2 BTM_{i,t} + \varepsilon_{i,t}$$

α_0 = Intercept of dependent variable

β = Regression coefficient

Log(Size) = Natural logarithm of firm size

BTM = Book-to-market-ratio of firm

$\varepsilon_{i,t}$ = Error term

4. DATA

4.1 Regulatory environment

In Sweden, share repurchases were not allowed until March 10, 2000, when changes in the Companies Act made it possible for firms that are listed on the Swedish stock exchange to repurchase shares on the stock market. The regulation surrounding repurchase trading consists of the Swedish Company Law, the regulatory code by the Swedish Financial Supervisory Authority, and applicable rules in the stock exchange's Listing Agreement (De Ridder and Råsbrant 2009).

According to the Swedish company law, a repurchase program must be approved by the shareholders at the annual general meeting with two thirds of the votes. The decision to approve a repurchase program is only valid until the next general meeting and repurchases can only be made from distributable profits. A firm can only repurchase a maximum of 10% of the outstanding shares during each repurchase program. The repurchased shares can then be kept as treasury shares, cancelled, used in option programs or sold again at a later point in time. The repurchase can either be an open market share repurchase or a public offer (tender) or some combination of the two. In addition, a firm can also repurchase shares through a block trade from specific shareholders.

During a single day the repurchase size may not exceed 25% of the average daily trading volume during the four calendar weeks immediately preceding the week of the repurchase. The exception is block transactions. Limited orders have to be placed within the current bid-ask spread, even for off-exchange transactions. It is prohibited for a firm to repurchase shares within the last 30 minutes of trading as well as during the 30 days prior the release of an annual or interim report. A repurchasing firm may only use one stock broker and must inform the broker that the trade is a share repurchase.

4.2 Disclosure requirements

Unlike the regulation in the US and in many other countries, the regulation in Sweden requires full disclosure of details of the repurchase program and the repurchase transactions. A firm conducting open market share repurchases must report the repurchase transactions to the stock exchange no later than the opening of the stock exchange on the following trading day. This includes providing details of the number of shares that were repurchased, the type of share class, the average price paid per share class, the number of shares held in treasury, and the current total number of outstanding shares. The stock exchange publicly discloses all open market share repurchases on its website, normally on the same day or the following morning before the start of trading. Hence, information regarding actual share repurchases in Sweden is quickly available to the public.

4.3 Data composition

The collected data on share repurchases since March 2000 are presented in Table 1 and shows some distinct characteristics. There are no observed repurchases in the years 2008 to 2010. This is a result of the method used to filter out observations with sufficiently long data points following the repurchase. Share repurchases of course occurred during 2008 to 2010. Furthermore, for clarification purposes this descriptive section should be read with the knowledge of that the data presented are simplified since only the first repurchase for each firm in a given month is accounted for.

The first year of legalized share repurchases showed a small number of repurchases compared to the following years. Part of the reason for this is the fact that it was not until March share repurchases were allowed and thus decreased the time available for repurchases during the year. Moreover, it seems repurchases were not that popular at the starting point of legalization. However, the following year, 2001, showed the highest number of repurchases in the sample, 153 observations. This could be explained by the present market turmoil caused by the IT-stocks around the turn of the century. The second highest number of repurchases, 70, was observed in 2007. This could possibly be explained by the recent financial crisis with the unfolding of the sub-prime lending complications.

The years 2001 and 2007 showed the highest number of repurchases in the lower quartiles for both size and BTM. In the full sample, only 4 observations were made in the lowest size quartile. Larger firms seem to be more inclined to repurchase shares on the open market. There was also a significantly lower number of repurchases in the lowest BTM quartile. However, the total observed number of repurchases for the three other quartiles was on roughly the same level. Not surprisingly, it appears that firms valued high on the market compared to the book value are less inclined to repurchase shares.

Table 1: Descriptive statistics of repurchase data

Year	Repurchase events	Size quartile				Book-to-market quartile			
		1	2	3	4	1	2	3	4
2000	10	0	0	4	6	2	2	2	4
2001	153	0	15	45	93	26	39	28	60
2002	65	0	5	20	40	9	18	24	14
2003	32	0	0	14	18	8	12	8	4
2004	45	0	0	17	28	8	10	26	1
2005	13	0	0	5	8	3	4	3	3
2006	46	0	6	20	20	7	4	21	14
2007	70	4	17	18	31	17	23	13	17
2008	0	0	0	0	0	0	0	0	0
2009	0	0	0	0	0	0	0	0	0
2010	0	0	0	0	0	0	0	0	0
All years	434	4	43	143	244	80	112	125	117

5. RESULTS

5.1 Short-term

Table 2 reports the outcome of calculating cumulative abnormal returns of the observed repurchase transactions. The mean $CAR(-20,-1)$, before the repurchase events, was 1.70% with a p-value significantly different from zero of 0.014. This is a surprising result since it would be expected for firms to repurchase shares following a price decline. The average $CAR(0,2)$ for the three day return of the repurchases was 0.84% with a highly significant p-value of 0.007. Although the average return was not of a high magnitude, there was evidence for positive market reactions in the three days following a share repurchase. The average $CAR(0,20)$ was 2.05% with a p-value of 0.016. This gives some significant evidence that share repurchases in the short-term of 21 days seem to be received positively by the market.

The average short-term CARs sorted in groups according to size showed few clear patterns, except for those explained above regarding the inter-group distinctions. The two largest quartiles showed positive stock returns before the repurchase as well as positive returns during both the three-day and 21-day periods after the events. For these groups, the average $CAR(0,20)$ was higher than the $CAR(0,2)$. The second quartile showed negative returns in the three-day period following repurchase events. Due to the lack of observations in the first quartile, no meaningful observations could be made.

The results for CARs grouped after BTM showed that firms with the lowest BTM-ratio had high average returns before the repurchase events. The average three-day returns show the two highest average returns in the two lowest quartiles of BTM, indicating that growth stocks yield the highest abnormal returns following repurchases. Regarding the 21-day period for average $CAR(0,20)$, like the three-day returns, firms with lower ratios of BTM receive a higher positive response on the market following actual repurchases.

As noted above, the short term analysis of $CAR(0,20)$ showed that actual repurchases seemed to be positively viewed by the market. These results are in line with previous research by Zhang (2005) which found that the $CAR(0,20)$ following actual repurchases in Japan was 0.69%. However, previous research has indicated that reactions to announced open market repurchase programs have been of a higher magnitude. ILV (1995) reported that the average initial market reaction to announcements of open market share repurchase programs was about 3.54% in the US and Zhang (2002) showed that the average abnormal return for open market share repurchase announcements in Japan was about 5.99%. Possibly, part of the market reaction in our sample was attributable to the announcement of the open market repurchase programs.

Table 2: Cumulative abnormal returns surrounding the repurchase events

(%)		n	CAR(-20, -1)	CAR(0, 2)	CAR(0, 20)
<i>Full sample (n = 434)</i>					
CAR		434	1.70	0.84	2.05
p-value			(0.014)	(0.007)	(0.016)
<i>By size quartile</i>					
CAR	1	4	-1.00	-0.61	3.72
p-value			(0.007)	(0.004)	(0.027)
CAR	2	43	1.44	-0.23	1.56
p-value			(0.011)	(0.002)	(0.012)
CAR	3	143	1.28	1.26	2.20
p-value			(0.010)	(0.010)	(0.017)
CAR	4	244	2.05	0.80	2.02
p-value			(0.016)	(0.006)	(0.016)
<i>By BTM quartile</i>					
CAR	1	80	3.14	1.43	2.67
p-value			(0.025)	(0.011)	(0.021)
CAR	2	112	0.65	1.19	3.40
p-value			(0.005)	(0.009)	(0.027)
CAR	3	125	1.42	0.16	0.47
p-value			(0.011)	(0.001)	(0.004)
CAR	4	117	2.04	0.82	2.02
p-value			(0.016)	(0.007)	(0.016)

The cross-sectional regression analysis of the short-term returns is presented in Table 3. The results for the regression on CAR(0,2) present weak statistical significance. The regression on CAR(0,20) shows a correlation between the returns prior to the repurchase and the 20-day period after the repurchase with a regression coefficient of 0.107 and a p-value of 0.015. The CAR(0,20) seems to be weakly negatively correlated to both size and BTM-ratio, although at less than strong significance levels. Both regressions report low adjusted R-square. This indicates that there are other factors affecting the returns that are not accounted for by our model.

Table 3: Cross-sectional regression of short term cumulative abnormal returns

	Dependent variable	
	CAR(0, 2)	CAR(0, 20)
<i>Independent variables</i>		
Intercept	0.017	0.058
<i>p-value</i>	(0.133)	(0.009)
CAR (-20, -1)	-0.027	0.107
<i>p-value</i>	(0.229)	(0.015)
Log(Size)	-0.001	-0.004
<i>p-value</i>	(0.548)	(0.096)
BTM	-0.003	-0.012
<i>p-value</i>	(0.503)	(0.200)
Adj. R ²	-0.002	0.014
F-value	0.71	3.02
n	434	434

5.2 Long-term

The average long term returns calculated through BHAR are reported in Table 4. The one-year BHAR were 1.07% with a highly significant p-value of 0.009. The two-year BHAR were more striking with the positive returns of 5.54% and a p-value of 0.044. For the three-year period returns were at a more moderate level of 1.51% with a p-value of 0.012. This can be compared to ILV (2000), which investigate announced repurchase programs in Canada and shows an abnormal return of 21.4% over a three-year period. However, Zhang (2005), which investigate three-year abnormal returns following actual share repurchases in Hong Kong, finds that the return is negative. The one-year return of Zhang (2005), of 1.13%, is in line with our findings.

The BHAR over the years 2000 to 2005 showed positive returns for the one- and two-year periods. However, the three-year period returns were negative with a BHAR of -2.99% and p-value of 0.024. For the period 2006-2010, returns were strongly negative in the one-year period of -8.33%. Conversely, the average BHAR for the three-year period was 13.84%, although at a weak significance level.

These results are an indication that the market information may be asymmetric and that insider managers in some cases seem to have a superior ability to detect and take advantage of market mispricing in the long-term.

Table 4: Buy-and-hold abnormal returns up to three years

(%)	n	BHAR - 1 year	BHAR - 2 years	BHAR - 3 years
<i>Full sample</i>				
BHAR	434	1.07	5.54	1.51
<i>p-value</i>		(0.009)	(0.044)	(0.012)
<i>Year 2000-2005</i>				
BHAR	318	4.49	6.05	-2.99
<i>p-value</i>		(0.036)	(0.048)	(0.024)
<i>Year 2006-2010</i>				
BHAR	116	-8.33	4.13	13.84
<i>p-value</i>		(0.066)	(0.033)	(0.110)

The BHAR for the actual repurchase events show striking differences when grouped into quartiles according to size, reported in Table 5. The smallest quartile shows high returns of around 30%, although it is based on a sample of only four observations and thus is most unreliable. The second quartile shows high positive returns for the two- and three-year periods, however at low significance levels. The two largest size quartiles show negative and statistically significant three-year BHARs. Moreover, a pattern for the two-year period BHARs is discernable with diminishing returns with increasing size of the firms. Smaller firms could yield higher returns after share repurchases due to a higher information asymmetry on the market concerning these firms, compared to large firms.

Table 5: Buy-and-hold abnormal returns grouped according to size

(%)	Size quartile	n	BHAR - 1 year	BHAR - 2 years	BHAR - 3 years
BHAR	1	4	27.69	33.26	49.12
<i>p-value</i>			(0.200)	(0.239)	(0.343)
BHAR	2	43	-1.49	18.87	35.88
<i>p-value</i>			(0.012)	(0.149)	(0.278)
BHAR	3	143	-6.62	5.56	-5.67
<i>p-value</i>			(0.053)	(0.044)	(0.045)
BHAR	4	244	5.58	2.73	-1.12
<i>p-value</i>			(0.044)	(0.022)	(0.009)

The grouping of the BHARs on BTM-ratio also presented some interesting results, presented in Table 6. Firms in the first quartile, with the lowest BTM-ratios, showed negative two- and three-year period returns. The second quartile showed positive returns for all three BHAR-periods, however not statistically significant. The third quartile presented positive and statistically significant BHAR for the two- and three-year periods at moderate levels of 2.07% and 3.23% respectively. The fourth quartile had highly significant two-year BHAR of 0.38% with a p-value of 0.003. The three-year BHAR were negative at -8.66% with a p-value of 0.069. Overall, the grouping of long-run abnormal returns by BTM shows mixed results which make it difficult to draw general conclusions.

Table 6: Buy-and-hold abnormal returns grouped according to BTM

(%)	BTM quartile	n	BHAR - 1 year	BHAR - 2 years	BHAR - 3 years
BHAR	1	80	1.35	-11.08	-35.48
<i>p-value</i>			(0.011)	(0.088)	(0.276)
BHAR	2	112	15.26	26.67	36.62
<i>p-value</i>			(0.121)	(0.210)	(0.285)
BHAR	3	125	-8.79	2.07	3.23
<i>p-value</i>			(0.070)	(0.017)	(0.026)
BHAR	4	117	-2.18	0.38	-8.66
<i>p-value</i>			(0.017)	(0.003)	(0.069)

The cross-sectional regression analysis of the long term BHARs is presented in Table 7. The results show a correlation between the three- year BHAR and CAR(-20,-1) with a regression coefficient of 1.286 and a p-value of 0.097. This result suggests that positive long term returns are correlated with positive returns in the 20-day period before the repurchases. The other coefficients show results of weak statistical significance level. Furthermore, the adjusted R-square of the regression is low, 0.002. As the regression of the short term returns above, these regression results indicate that there are other factors affecting the returns that are not accounted for by our model.

Table 7: Cross-sectional regression of long term buy-and-hold abnormal returns

	Dependentvariable
	BHAR - 3 years
<i>Independent variables</i>	
Intercept	-0.360
<i>p-value</i>	<i>(0.350)</i>
CAR (-20, -1)	1.286
<i>p-value</i>	<i>(0.097)</i>
Log(Size)	0.033
<i>p-value</i>	<i>(0.389)</i>
BTM	0.110
<i>p-value</i>	<i>(0.516)</i>
Adj. R ²	0.002
F-value	1.25
n	434

6. CONCLUSIONS

Based on the results presented above, it is possible to conclude that the average short term market response to actual share repurchases is positive. This implies that a repurchase gives a signal to the market that the firm is undervalued. Insider managers of a firm is not inclined to invest in their own share if it is priced too high. Our findings show that on average, the short term market response is positive and hence we reject hypothesis 1.

The long term returns based on BHAR are positive on average for periods of one to three years. This may be an indication that the market information is asymmetric and that insider managers may have a superior ability to detect and take advantage of market mispricing in the long term. However, the results for the long term abnormal returns are mixed and in general they are not statistically significant. The long term returns depend heavily upon the period. Hence, we cannot reject hypothesis 2.

Small firms show higher and statistically significant abnormal long term returns for all periods. This may be due to a higher information asymmetry on the market concerning smaller companies. However, in the short term, results were mixed and no clear pattern was observed. Firms with high BTM show statistically significant abnormal returns for the short term, although results were mixed for the long term.

6.1 Suggestions for further research

This thesis has focused on returns following actual repurchases in the short- and long term. We found some interesting evidence that repurchases on average actually were made following positive returns. It would be interesting to investigate this and see if the same results are obtained with a test on returns prior to repurchases over one year. Furthermore, it would be appropriate to redo our analysis on sample data over a longer period. Our data over ten years is limited as we require three years of data after each repurchase.

Further, our analysis assumed that company management act in the interest of shareholders. To further research market reactions to share repurchases, this assumption could be dropped. For example, one could add a variable for whether or not management has stock options with short time to expiry.

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