THE SIGNALING EFFECT OF SHARE REPURCHASES

SHORT- AND LONG-RUN EVIDENCE FROM THE SWEDISH MARKET

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Bachelor Thesis

Stockholm School of Economics

2025

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Abstract:

This paper examines 458 open market share repurchase announcements by Swedish firms from 2010 to 2019. Using a cumulative abnormal return (CAR) methodology, we find significant short-run abnormal returns averaging 1.02%, with stronger effects for small firms and value stocks. In the long-run, we observe a one-year average CAR of 8.24%, consistent with the Underreaction Hypothesis (UH) developed by (Ikenberry, Lakonishok, & Vermaelen, 1995). However, results beyond the one-year horizon and across firm characteristics are inconclusive and model-dependent. Our findings contribute to the literature of repurchase signaling in a modern, Swedish context, suggesting persistent market underreaction.

Keywords:

Share repurchases, Abnormal returns, Market signaling, Undervaluation, Underreaction

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Bachelor Thesis
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1. Introduction

Firms with excess cash can keep it, invest in the business (including acquisitions), reduce debt, or return it to shareholders (Conerly, 2022). Holding cash lets the firm postpone the decision, which can be sensible if e.g. a recession is likely. However, money gradually loses its value, so holding vast amounts of cash is unlikely to be an attractive long-term strategy. However, investing in the company is reasonable when a good return on the investment can be reached. Similarly, reducing debt might be sensible, depending on the interest rate, potential fees, ability to re-borrow, and economic uncertainty (Conerly, 2022). However, if a firm feels confident with its current debt and does not see investments in its business as value-creating enough, it should return cash to its shareholders.

In addition to dividends, listed firms can repurchase their shares. Through this, the total number of shares outstanding decreases, increasing earnings per share. Consequently, share repurchases may be an attractive way to return profits to shareholders, increasing the share price over directly distributing cash. This, especially if the stock can be rebought relatively cheaply, which can be seen in the current surge in U.S. buybacks, following recent market volatility, as reported by (Steer, 2025). Still, share repurchases have a rich history of both very well-executed programs, and financial disasters. For example, during 2016 and 2017 General Electric spent $24 billion on share repurchases at much higher share price levels than the stock traded at when the program was ultimately halted in 2018 (Egan, 2018). At the same time, a more recent example is the ride-sharing app Lyft, whose share price increased by 7% after its share buyback plan was expanded on May 8 2025 (Subin, 2025).

Whether to conduct share buybacks is a critical decision for firms to manage their capital structure and return profits to shareholders. Ultimately, large misallocations of funds can be detrimental to any firm. Furthermore, compared to dividends, where investors themselves can decide how to distribute the proceeds, investors are dependent on management to identify when it is a good time to pursue buybacks. While share repurchases can be tax-efficient, through postponing capital gains taxes (Janssen, 2025), there is a significant risk that management becomes tempted to repurchase shares even when they should not, solely to increase earnings per shares (EPS), one of the foremost metrics management and companies are evaluated upon (Ezekoye, Koller, & Mittal, 2016), and thus prioritizing short-term gains over what is best for shareholders. While buybacks have been used for a long time in the U.S., and generally exceed dividend payments in most years, its practice is less common in Sweden, and its history is shorter and less documented since it was only legalized in 2000. While there are many examples of ill-timed repurchases, (Ikenberry, Vermaelen, & Zhou, 2024) finds no evidence of considerable harm to shareholders caused by buybacks. In fact, several studies find that share buybacks create abnormal returns for its shareholders.

While there are several explanations for undertaking or refraining from share repurchases, one of the most popular motivations is that share repurchases are a way for corporations to signal to the market that the stock is undervalued, as laid out in (Vermaelen, 1981). The intuitive argument for why this signal is credible is best illustrated by placing yourself

in management's position. If you think that the share price will decrease in a month (currently overvalued), why would you repurchase shares now, as it will become cheaper later? And consequently, if you think the share price will increase in a month (currently undervalued), you would buy now. Therefore, management choosing to buy back shares *now* (at any present time) signals confidence in their private information, compared to the less informed market, that the stock is currently undervalued. In an efficient market, share prices would instantly and correctly adjust to the new information signaled through the repurchase announcement, and no further outperformance should be expected. However, as literature in the field indicates, this is not necessarily the case. Hence, we are interested in examining if firms that repurchase their shares are indeed perceived as undervalued in the short-term, but also if the market is skeptical to the information signal, and the undervaluation persists over an extended time. This is described and referred to as the Underreaction Hypothesis (UH), developed by (Ikenberry, Lakonishok, & Vermaelen, 1995).

While (Dann, 1981) finds evidence of firm value increasing considerably directly following share repurchase announcement, (Ikenberry et al., 1995) show that share buybacks lead to abnormal returns (AR) both over a short period of time, but also over longer time-periods, meaning that while positive, the initial reaction to the buyback announcements is too small, strengthening the UH. Outside the U.S., similar results have been found by (Manconi, Peyer, & Vermaelen, 2019). Simultaneously, (Råsbrant, 2013), a study conducted in Sweden, finds evidence of abnormal positive returns up to one year after the initiation announcement. Notably, this study is conducted for the time period 2000-2010, when share repurchases were recently legalized in Sweden.

With the majority of related studies within this string of market signaling research supporting the UH to various degrees, we strive to drive research forward in three ways. Firstly, our study examines the Swedish market to see if the market interprets the announcement as an undervaluation signal and if the UH holds true in a market where share repurchases are less prevalent, and in a more modern setting than previous studies. Secondly, recent research indicates markets have become more efficient (Guzman, Rezaee, & Clare, 2024), whereby we see value in exploring whether modern financial markets still have a blind spot for the signaling of open market repurchases. Thirdly, we are interested in whether abnormal returns depend on how much attention a stock gets by the financial markets. To measure this we assume smaller stocks on average receive less attention by market participants than larger stocks. Subsequently, we aim to drive research forward by answering the following research question inspired by previous works within the field, including (Ikenberry et al., 1995) and (Peyer & Vermaelen, 2009):

Did listed companies experience abnormal returns following open market share repurchase announcements in the short- and long-term in Sweden in the 2010s, and does information asymmetry affect this result?

To answer this question, we pose the following formal research questions and hypotheses:

1. Is the short-term average cumulative abnormal return (CAR) positive and significantly different from 0?

$$H_1: \overline{CAR} > 0$$

$$H_0: \overline{CAR} \leq 0$$

Based on intuitive market psychology, we would expect the short term CAR to be positive around the announcement date. This is because management (with private information) buying back shares at market price indicates the current price is cheap.

2. Is long-term average CAR positive and significantly different from 0?

$$H_1: \overline{CAR} > 0$$

$$H_0: \overline{CAR} \leq 0$$

As shown by (Ikenberry et al., 1995), long-term abnormal returns are positive and significant over the 0 to 48 month window following announcement for their data set, supporting the UH. We pose the same hypothesis to see if this is the case for our data set, with very different characteristics (geography and time period) compared to most previous research in the field.

3. Is average CAR more positive for smaller stocks?

$$H_1: \overline{CAR}_{small} > \overline{CAR}_{large}$$

$$H_0: \overline{CAR}_{small} \leq \overline{CAR}_{large}$$

According to the Traditional Signaling Hypothesis (TSH), firms with higher information asymmetry should experience larger immediate reactions to new information, as these announcements contain more valuable information, as mentioned by (Ikenberry et al., 1995). Consequently, we aim to investigate whether smaller firms, which we assume receive less attention by the market, experience larger short-run abnormal returns, but also higher long-run CARs because the initial reaction is still not precisely correct. Of importance when testing this is that the size premium, as discussed by (Fama & French, 1993), is controlled for when calculating the abnormal returns under the Fama-French three-factor (FF3) market model. This ensures that the potential difference in abnormal returns observed for small and large firms is not because of systematic risk exposure, but rather the market's ability to internalize the new information.

This paper examines open market share repurchase announcements during 2010-2019 by firms listed on the Swedish stock exchange (OM). We choose to focus on open market repurchases since this is the most common option chosen by management, as highlighted by (Zeng & Luk, 2024). The methodology follows conventional research design within the field of repurchase signaling and is inspired by papers including (Ikenberry et al., 1995), (Vermaelen, 1981), and (Råsbrant, 2013). For both the short- and long-term analyses we will use the CAR methodology to measure abnormal returns. For the short-term horizon, we investigate average CARs over various trading day intervals (-20 to -3,

-2 to 2, and 3 to 10) around the announcement (day 0) similar to (Ikenberry et al., 1995), and check for significance by calculating t-statistics. In the long-term analysis, we use a market model CAR approach, comparing the actual return following announcements against the expected returns derived through the FF3 and CAPM models. We use the same methodology as in the short-term analysis, by summing the ARs following each repurchase announcement over one-, two-, and three-year horizons (250, 500 and 750 trading days). This is followed by averaging the results to present average CARs, with t-statistics indicating the significance of our findings.

Our sample consists of 458 share repurchase announcements, made by 116 individual firms. Compared to previous U.S. studies, including (Ikenberry et al., 1995), we find a lower, yet significant, short-run abnormal return of 1.02% directly following the announcement, in line with European studies, as discussed by (Råsbrant, 2013). Additionally, and consistent with the TSH, we find that in the short-run, small firms experience higher abnormal returns than large firms. Similarly, value stocks exhibit higher abnormal returns than glamour stocks.

Furthermore, we find significant and positive abnormal returns in the long-run following repurchase announcements, with an average one-year CAR of 8.24%, strengthening the UH. However, our results do not allow us to confidently conclude on differences between value versus glamour stocks and large versus small firms. This, in contrast to the findings of (Ikenberry et al., 1995) and (Peyer & Vermaelen, 2009) who show that value stocks experience significantly higher long-run abnormal returns than glamour stocks, and the same being true for small firms relative to large firms.

In Section 2 of this paper we will provide a more thorough review of the existing literature in the field. Section 3 explains our dataset, Section 4 delves into the empirical methodology used, Section 5 examines and discusses our results, and lastly conclusions are provided in Section 6.

2. Literature Review

Previous literature is highly concentrated toward the U.S. market. In one of the earliest studies in the field, (Dann, 1981) investigates a 121-day window around the repurchase announcement for 143 common stock repurchases in the U.S. While they find a significant increase in share price within the first day following the announcement, it is effectively internalized by the market, and consequently no abnormal returns are found over the long-run. From these results, they conclude that the results appear to be a consequence of an information signal by the firm. Furthermore, in another study from this period, (Vermaelen, 1981) finds additional support for repurchases serving as a signaling mechanism to the market, although merely a period up to 60 days following the announcement is investigated.

However, in one of the most influential studies in this field, (Ikenberry et al., 1995) examines stock performance in the U.S. preceded by open market share repurchase announcements during the 1980s. In the paper, they hypothesise that the market reacts to repurchase announcements "with skepticism", and that the price adjustment takes place slowly over time (i.e. the UH). Furthermore, in addition to a short-run abnormal return of around 3.5%, they show that a buy-and-hold strategy over four years generates an abnormal return of 12.1%, and for "value stocks", this number is 45.3%. In contrast to the prediction by the efficient market hypothesis, this result indicates that the market underreacts to the initial repurchase announcement.

Furthermore, more recent studies, including (Peyer & Vermaelen, 2009), show that the U.S. market still experiences buyback anomalies. Additionally, (Manconi et al., 2019) reaches the same conclusion, and further shows that this is a global phenomenon, by investigating 9,000 repurchase announcements from 31 countries outside the U.S.

With several studies supporting the signaling hypothesis and UH, (Råsbrant, 2013) investigates share repurchases in Sweden during the time period March 2000 to March 2010, and finds a significant abnormal return of 1.94% in the two-day period after the firm reports to Nasdaq that it will complete its first repurchases within the coming days (hence investigating the initiation announcement, not the repurchase announcement). In addition to strengthening the signaling hypothesis, they argue that this may be influenced by liquidity effects, as there is a positive correlation between the amount repurchased and abnormal return. This, because Swedish firms conduct repurchases quickly following announcement, and on average make up 31.8% of trading activity during repurchase days. However, they regardless find positive and significant one-year abnormal returns in the first year following the announcement. Still, this contrasts the findings of e.g. (Ikenberry et al., 1995) and (Peyer & Vermaelen, 2009), who find long-run abnormal returns over the entire four-year investigated period following the repurchase announcement.

However, contrary to the dominant literature, which finds that share repurchases create long-run abnormal returns, (Wang, Yin, & Yu, 2021) show evidence that repurchases lead to underinvestment in projects like R&D, and therefore negatively impact long-run profits

from three years after legalization and forward. Despite this, (Ikenberry et al., 2024) find no evidence of buybacks hurting businesses by leading to underinvestments.

Our study builds upon (Ikenberry et al., 1995) by examining whether markets have, in a more modern setting, become more efficient in pricing value stocks relative to glamour stocks, which the results of (Peyer & Vermaelen, 2009) indicate, as they find a smaller outperformance by value stocks relative to glamour stocks. Additionally, we contribute to (Peyer & Vermaelen, 2009) by investigating the extent of the abnormal return anomaly in recent times, and whether small firms experience higher abnormal returns than large firms, to determine whether this finding of theirs is an established phenomenon, since it has thus far been less investigated in the literature. Furthermore, we contribute to (Råsbrant, 2013) by re-examining the Swedish repurchase market in a more modern investigated time period, and focus on the repurchase program announcement, rather than the initiation announcement. Lastly, we briefly discuss the implications of repeat announcements as a biasing factor in market signaling research, an area for potential future research.

3. Data

Our data sample consists of the companies with their primary listing in Sweden that announced open market share repurchases during the period 2010-01-01 to 2019-12-31. Because of limitations in accessing data to delisted firms, these are excluded from our data sample. The announcements were identified with the transaction screening tool of S&P CapitaIQ, where the following screening criteria were used:

1. Exchange: OM
2. Buyback transactions
3. Buyback feature: Open market repurchase
4. Announcement date: 2010-01-01 to 2019-12-31

In total, we identify 469 (pre data cleaning) open market share repurchase announcements during the investigated time period. Our sample of transactions are composed of 118 individual companies.

Once we have identified all companies of interest, we download their daily share price, market capitalization, and price-to-book (P/B) ratios using the S&P Capital IQ charting function, and match the data to each transaction. Notably, we use share prices adjusted for dividends, to control for e.g. negative share price effects of dividend payments. For announcements made on a non-trading day, the following trading day has been used as day 0 when calculating the abnormal return from the announcement over a period of days. Throughout the text, the number of days refers to trading days, not calendar days.

Furthermore, we download OMXS30 index levels over our period of interest from S&P Capital IQ and use this data to calculate daily returns for the OMXS30. This is later used as the benchmark in our short-term CAR analysis. For the long-term analysis, we use Fama-French factors $R_f, R_m - R_f, SMB, HML$ provided by the Swedish House of Finance Research Data Center (Sodini, Fu, & Aytug, 2020) to estimate betas used to calculate the expected returns for our sample.

Table 1 depicts our sample (post data cleaning described in Section 3.1.1.), providing details of the yearly number of repurchase announcements, and the percentage of shares to be repurchased. The majority of announcements are from the years 2010-2013, making up 66% of our observations. We suspect that the reason for this is related to it following the Financial Crisis, whereby many firms believed their share prices were undervalued following years of market turmoil. For example, in the U.S., firms comprising the S&P 500 index increased share repurchases by 221% in the second quarter of 2010, compared to the same quarter of 2009 (S&P Indices, 2010). Additionally, the Swedish stock market declined considerably again in 2011, as a result of the Eurozone crisis, potentially explaining the high activity in announcing share repurchases during and following this period with undervaluation as a motive.

3.1. Data cleaning

3.1.1. General data cleaning

To improve the quality of our data, several repurchase announcements have been excluded. First, announcements within a month of another announcement by the same company have been excluded, as these cases primarily are extensions of the original repurchase announcement, or the same announcement has been recorded twice in the database. Because our study focuses on the effects of repurchase announcements as a signal of undervaluation, we consider only the first of closely related announcements to be of interest, as it should contain the largest signaling effect. Second, firms that have been delisted and later re-listed have been excluded, due to limitations in accessing data around the announcement period. Third, repurchase announcements made prior to there being accessible trading information have also been excluded (see excluded transactions in Table A1). Following the data cleaning, our sample is reduced to 458 repurchase announcements by 116 individual firms, and can be found in Table 1.

3.1.2. Long-run analysis data cleaning

For the long-run analysis we have made additional exclusions to those described in Section 3.1.1. Firstly, we have made exclusions based on data limitations in the Fama-French database. The database contains daily factor returns up until December 2019, whereby expected excess returns used to calculate abnormal returns can not be estimated beyond this point. Additionally, in 2019, the data contains large time gaps in factor returns, which makes us deem this year unreliable to calculate abnormal returns for. Consequently, announcements made in 2019 and 2018 are completely excluded from the long-run analysis, 2017 excluded from the two- and three-year (500d & 750d) horizons and 2016 excluded from the three-year (750d) horizon. Furthermore, to ensure robustness in the calculation of abnormal returns, all calculations of daily abnormal returns containing any missing input variables ($R_f, R_m - R_f, SMB, HML$ regression betas) are set to return N/A in the dataframe used for the analysis.

3.2. Survivorship bias

Because we only have access to data of currently publicly traded firms, our study partly suffers from survivorship bias, since it excludes e.g. bankrupt or acquired firms. Consequently, the effect of survivorship bias in the data has been carefully considered, and we deem its impact on our results to be quite small. First, as displayed in Table 1, our sample is dominated by buybacks announced early in our investigated time period. If survivorship bias were a significant factor, we would expect this to be the opposite, i.e. there being few old announcements, as these firms are more likely to have been delisted, all else equal. Second, we deem buybacks more likely to be announced by firms with excess cash, which are less likely to fail (but may get acquired), meaning our results might be an underestimation, rather than overestimation of abnormal returns. Consequently, we consider survivorship bias to potentially have an effect on the degree of abnormal returns from buybacks, rather than their existence.

Table 1: Summary statistics
Statistics for open market share repurchase announcements in Sweden between January 2010 and December 2019, based on data extracted from S&P Capital IQ (post data cleaning described in Section 3.1.1.). The table reports the number of repurchase announcements per year, the average percentage of outstanding shares to be repurchased according to the announcement, and the number of announcements per category of percentage of shares to be repurchased.

			Percent of shares announced for repurchase				
Year	n	Mean % share announced	0 to 2.5%	2.5% to 5%	5% to 10%	Above 10%	Not stated
2010	76	8.91	1	0	3	10	62
2011	76	8.42	2	0	4	16	54
2012	76	8.02	5	1	13	24	33
2013	74	7.37	6	2	13	18	35
2014	56	9.72	5	1	12	14	24
2015	19	7.51	2	0	5	6	6
2016	23	6.84	9	0	4	3	7
2017	23	4.89	5	1	2	3	12
2018	18	6.79	1	0	4	1	12
2019	17	6.84	1	2	3	2	9
All years	458	7.89	37	7	63	97	254

3.3. Classifications

To investigate if repurchase announcements have different impacts on small- versus large firms, and value- versus glamor stocks, the market capitalization and P/B ratios of all firms have been compared at the first trading day, and the median has been calculated. From this, every firm has been identified either as small (lower than or equal to the median market capitalization) or large (greater than the median market capitalization). The same is done for P/B, identifying our observations as value stocks (lower than or equal to the median P/B) or glamour stocks (greater than the median P/B). For firms repurchasing shares the same year as they were publicly listed, data from the end of the first day of trading has been used to determine size and valuation (see results in Table A2). While we acknowledge that price-to-book (P/B) is not a perfect indicator for classifying firms as value or glamour stocks, especially given (Faber, 2019) finds higher significance of the FF3 model with valuation proxies such as price-to-earnings or price-to-cash, we nonetheless consider P/B a reasonable proxy. This, because it is widely used in prior literature, consistent with the standard FF3 model, and, importantly, we lack sufficient data to apply alternative valuation measures.

However, dividing our sample at the median may weaken our ability to detect return differences between groups, since it groups firms with varying characteristics together instead of separating them into more granular groups (e.g., into deciles). Still, this may primarily affect the exact magnitude of our findings, rather than their absolute existence. For example, (Ikenberry et al., 1995) find four-year abnormal returns of 45.3% for the most conservatively valued stocks, and -4.3% for the most opposite group, a difference which we argue would have been identified under a median split too. Additionally, this follows the reasoning of (DeCoster, Gallucci, & Iselin, 2011), who argue that dividing groups at the median is reasonable when investigating if there is an effect from a variable, rather than examining precisely how large the effect is. Due to a lack of accessibility to size and valuation deciles for the firms listed on Nasdaq Stockholm each year, this approach has been chosen.

3.4. Repeat announcements

Because much of the previous literature is focused on the U.S., it is worth noting that regulation concerning share repurchases differs between the U.S. and Sweden. To repurchase shares in Sweden, the company needs permission by the general meeting, and it is only valid for a year, according to Chapter 19, Section 20 of the Swedish Companies Act ((*Aktiebolagslag (2005:551)*, 2005). In the U.S. however, no yearly approval by shareholders is necessary and programs can therefore continue for longer (Mayer Brown, 2020). Consequently, because repurchase announcements in the U.S. are not as easy to anticipate as in Sweden, they should contain a larger signaling effect, which may explain why U.S. studies find higher abnormal returns from repurchase announcements than European studies do (Råsbrant, 2013). However, and importantly, announcing a new share buyback program each year following approval by the general meeting is not mandatory in Sweden, as can be seen by the varying number of announcements per year in Table 1.

Because repurchase programs can maximally run for a year, we suspect our sample may contain “repeat announcements", by which we mean an announcement by a firm that has already made another buyback announcement previously during our investigated time period. Therefore, we further investigate how large a proportion of our data sample is repeat announcements. As can be seen in Table 2, value and glamour stocks experience the same proportion of repeat announcements. However, large firms not only make considerably more repurchase announcements than small firms, but also contain a larger proportion of repeat announcements.

Table 2: Repeat announcements by classification
Share repurchase announcements in Sweden during January 2010 to December 2019 displayed per group and how many repurchases during the investigated period are by unique firms, and again by the same firms, denoted as "repeat announcements". Small firms have market capitalizations below the sample median in that year, and large firms have market capitalizations above the sample median in that year. Value stocks have price-to-book ratios below the sample median in that year, while glamour stocks have price-to-book ratios above the sample median in that year.

Classification	Announcements	Unique firms	Repeat announcements	% Repeat announcements
Large	266	61	205	77.1%
Small	192	66	126	65.6%
Value	229	68	161	70.3%
Glamour	229	68	161	70.3%

4. Empirical Methodology

In this paper, we use the cumulative abnormal return (CAR) methodology, as used by papers including (Råsbrant, 2013), (Vermaelen, 1981), and (Ikenberry et al., 1995), to measure abnormal returns in the short- and long-run. While the CAR approach, as argued by (Ikenberry et al., 1995), is not a realistic trading strategy, which could more accurately be reflected through for example a buy-and-hold portfolio composition partly used by (Ikenberry et al., 1995), its results nonetheless provide meaningful insights of whether long-run abnormal returns exist. Therefore, the calculated abnormal return may not offer the precise results experienced by an investor, but may yet serve as a reliable indicator for the presence of abnormal returns, consistent with our hypotheses.

4.1. Short-run methodology

In the short-run analysis, we follow the methodology of (Ikenberry et al., 1995), through investigating the abnormal return $(AR_{i,t})$ of announcements during three different time intervals, 20 to 3 days before the announcement, 2 days before to 2 days after the announcement, and 3 to 10 days after the announcement. Daily abnormal return is calculated as the difference in return between the stock associated with the buyback announcement i $(R_{i,t})$, and the market benchmark $(R_{b,t})$. Because different Swedish indices normally have a high correlation, we determine the importance of selecting a specific benchmark for each security as relatively low for these short time intervals. Consequently, we have chosen to use the well-known and much cited OMXS30 index, comprising the 30 most traded stocks on Nasdaq Stockholm.

$$AR_{i,t} = R_{i,t} - R_{b,t}$$

Using the CAR approach, $AR_{i,t}$ is summed up for each transaction over the three different time intervals as follows to estimate CAR for each announcement:

$$CAR_{i,t_1:t_2} = \sum_{t=t_1}^{t_2} AR_{i,t}$$

After this, the average cumulative abnormal return ($\overline{CAR}$) across the announcements are calculated for the various intervals.

$$\overline{CAR}_{t_1:t_2} = \frac{1}{n}\sum_{i=1}^{n} CAR_{i,t_1:t_2}$$

for $[CAR_{i,-20:-3}\ , CAR_{i,-2:2}\ , CAR_{i,3:10}]$ where $[i\ =\ 1, 2, 3, \dots, n]$

Furthermore, $\overline{CAR}_{t_1:t_2}$ is calculated on the aggregate level, by announcement year, stated percentage of shares to be repurchased, size, and valuation (size and valuation segmentation discussed in Section 3.3.). Significance of short-term results are tested by calculating t-statistics to investigate if $\overline{CAR}_{t_1:t_2}$ is significantly different from 0 (null hypothesis). T-statistics are calculated as follows:

$$t = \frac{\overline{CAR}_{t_1:t_2} - \mu_0}{\delta_{\overline{CAR}_{t_1:t_2}}/\sqrt{n}}, (\text{where } \mu_0 = 0)$$

4.2. Long-run methodology

To calculate long-run results, more care is taken to control for firm specific factors affecting expected returns. Therefore, rather than using a general stock index as reference, we take into account the firm specific risk factors introduced by (Fama & French, 1993), shown to affect the expected returns of stocks. More specifically, the Fama-French three-factor (FF3) market model is used, similarly to in (Peyer & Vermaelen, 2009). In addition, results are replicated using the CAPM market model to investigate the implications of model choice on our results.

Consequently, we first calculate the daily expected excess return for each announcement. This is done as a time-series OLS (ordinary least squares) regression for each transaction (and related firm). We do this two times. The first time with the FF3 market model where the dependent variable is $\left(R_{i,t} - R_{f,t}\right)$ (daily excess return for the stock related to transaction i), and the independent variables are $\left(R_{m,t} - R_{f,t}\right)$ (daily market excess return), SMB_t (small minus big factor) and HML_t (high minus low factor). The second time using the CAPM market model, where the dependent variable is $\left(R_{i,t} - R_{f,t}\right)$ (daily excess return for the stock related to transaction i) and the independent variable is $\left(R_{m,t} - R_{f,t}\right)$ (daily market excess return). The regression runs on daily data 500 trading days (2 years) before and up until the announcement day for each transaction. Noteworthy, equal-weighted SMB_t and HML_t factors are used for consistency. This, since we are interested in the average effect of repurchase announcements (CAR is calculated on firm level and is later averaged, treating each observation equally), and thus our research design implies equal weighted results.

FF3 market model:

$$R_{i,t} - R_{f,t} = \alpha_i + \beta_{i,MKT}\left(R_{m,t} - R_{f,t}\right) + \beta_{i,SMB}SMB_t + \beta_{i,HML}HML_t + \epsilon_{i,t}$$

CAPM market model:

$$R_{i,t} - R_{f,t} = \alpha_i + \beta_{i,MKT}\left(R_{m,t} - R_{f,t}\right) + \epsilon_{i,t}$$

From this, we get three- and one beta for the FF3- and CAPM model respectively that we use together with subsequent daily FF3 factor data to calculate the expected daily excess return of our stocks $E\left[R_{i,t} - R_{f,t}\right]$ for the following 750 trading days.

FF3 market model:

$$E\left[R_{i,t} - R_{f,t}\right] = \beta_{i,MKT}\left(R_{m,t} - R_{f,t}\right) + \beta_{i,SMB}SMB_t + \beta_{i,HML}HML_t$$

CAPM market model:

$$E\left[R_{i,t} - R_{f,t}\right] = \beta_{i,MKT}\left(R_{m,t} - R_{f,t}\right)$$

Afterward, this is used to determine the daily abnormal returns, $AR_{i,t}$, for each transaction as follows for the two market models:

$$AR_{i,t} = \left(R_{i,t} - R_{f,t}\right) - E\left[R_{i,t} - R_{f,t}\right]$$

After calculating $AR_{i,t}$ for (t = 1,2,3...750, and i=1,2,3... n), we proceed by calculating $CAR_{i,x}$ for each transaction over the three time horizons (one-, two-, and three years). This is calculated as:

$$CAR_{i,x} = \sum_{t=1}^{x} AR_{i,t}$$

for $[CAR_{i,250}\ ,\ CAR_{i,500}\ ,\ CAR_{i,750}]$ where $[i\ =\ 1, 2, 3, \dots, n]$

Following this, we use a winsorization approach excluding transactions in the 1st and 99th percentile of $\overline{CAR_x}$ values (for both the FF3 and CAPM analyses) for each of the three horizons. This is done to ensure a few extreme values do not skew our results in any particular direction. Once $CAR_{i,x}$ is calculated for each transaction, we calculate $\overline{CAR_x}$ to get the average cumulative abnormal return for a given time horizon (x) as follows:

$$\overline{CAR_x} = \frac{1}{n}\sum_{i=1}^{n} CAR_{i,x}$$

Significance is established by deriving t-statistics to investigate if $\overline{CAR_x}$ is significantly different from 0, using the following formula:

$$t = \frac{\overline{CAR_x} - \mu_0}{\delta_{\overline{CAR_x}}/\sqrt{n}}, (\text{where } \mu_0 = 0)$$

We calculate $\overline{CAR_x}$ over three different horizons (one-, two-, and three years) and display the results on the aggregate level, by announcement year, size, and valuation (discussed in Section 3.3.). This is done for both the FF3- and CAPM market model.

5. Results & Discussion

5.1. Short-term market reaction to share repurchase announcements

Table 3 displays our findings of short-run abnormal returns. While there are large differences between years, in general, there is a positive abnormal return leading up to the repurchase announcement of 0.56% (t-statistic 1.62), measured over days -20 to -3 relative to the announcement day. However, the largest impact, and only time interval for which results are statistically significant, is concentrated around the announcement, between days -2 to 2. During this period, there is a 1.02% (t-statistic 4.59) positive abnormal return. However, following the announcement, there is a small, non-significant, underperformance relative to the index of -0.14% (t-statistic -0.59) during days 3 to 10.

Intuitively, one would expect management to announce a repurchase program following weak share price performance, taking advantage of its stock being undervalued. Then, following the announcement, the market should internalize the undervaluation signal and the stock price should rise to its correct level. This relationship, of repurchases being announced after abnormally weak performance, is also what (Ikenberry et al., 1995) find. Interestingly, the only time period in our sample where announcements are preceded by negative CARs is the last period, 2017-2019. However, this is not statistically significant, partially explained by it being the period with the least observations. Rather, the only period with significant results over days -20 to -3 is 2014-2016, and these are positive CARs. Consequently, this may be a result of information leakage into the market prior to announcement, an occurrence that (Hao, 2016) finds evidence of in the U.S. market.

To further investigate our hypothesis, that the positive short-term market reaction to buybacks stems from an undervaluation signal, we examine an alternative hypothesis, namely whether liquidity affects the market reaction. If liquidity is severely affecting our results, we would continue experiencing positive CARs in the event window 3 to 10 days post announcement, as the company artificially increases demand for its shares. This time interval is chosen because (Råsbrant, 2013) reported that firms, at the median, make their first repurchases already two days after the program announcement. Assuming that this timing behavior has remained relatively stable in the Swedish market, the 3 to 10 day window should effectively capture the period during which repurchases are actively taking place. Still, despite investigating different program sizes (where larger programs should have more liquidity effect), no significant abnormal return during days 3 to 10 can be identified. In fact, our aggregate results indicate a negative abnormal return of -0.14%, although non-significant. Hence, liquidity does not seem to give a conclusive explanation for the short-term abnormal returns.

Furthermore, we investigate whether larger repurchase announcements are a more reliable undervaluation signal, and as per the TSH, lead to higher abnormal returns. Disregarding the seven announcements stating they will repurchase between 2.5% and 5.0%, the highest initial reaction is among buybacks of 10% or more of shares. Here, the initial abnormal return is 1.72% and significant. While a majority of announcements do not state the percentage of shares to be repurchased, the reaction to the largest

announcements are more than double that of those not disclosing (CAR 0.83%). This, since management at firms willing to repurchase a greater percentage of shares should have a higher conviction of the company being severely undervalued, consistent with the TSH. Consequently, this further supports that the abnormal returns around the announcement day can be explained as an undervaluation signal.

If the market reacts positively to repurchase announcements because they serve as an undervaluation signal, the reaction should be larger for small firms according to the TSH, since they carry more information asymmetry. Therefore, we examine the difference in CARs between large and small firms in our sample. In general, both small and large firms experience positive and significant abnormal returns around the announcement. However, the reaction is double as large for small firms (CAR 1.42%) compared to large firms (CAR 0.73%). However, in the period 3 to 10 days following the announcements, small firms have slightly negative CARs, but these results are non-significant. Still, it indicates that liquidity effects are not influencing the results, which would be more probable for small firms, compared to large firms. Consequently, we find support that small firms experience larger abnormal returns than large firms following repurchase announcements in the short-run.

Furthermore, we investigate whether value stocks experience higher abnormal returns from share repurchase announcements than glamour stocks. As argued by (Ikenberry et al., 1995), if the purpose of buybacks is to signal undervaluation, we would expect its impact to be larger among value stocks, which are more conservatively valued. Despite this, the difference between the groups in initial reaction (-2 to 2 days period) is relatively small, 1.15% for value stocks and 0.89% for glamour stocks, with both being significant. Also, while only significant at the 10% level, glamour stocks exhibit CARs of 0.87% leading up to the announcement, which could be an indication of larger information leakage among these firms. While we expected CARs to be severely higher for value stocks compared to glamour stocks, a similarly small difference in the short-run analysis was identified by (Ikenberry et al., 1995), despite value stocks clearly outperforming in the long-run analysis. Consequently, the market does not seem to interpret the share repurchase announcement of value stocks as a clearer signal of undervaluation compared to by glamour stocks.

Additionally, as shown in Table 2, our data contains a substantial portion of repeat announcements. While repeat announcements could be a consequence of management believing the firm is still undervalued, many announcements rather seem to be a routinized way of returning cash to shareholders, and hence containing less information. Ideally, to estimate the signaling effect of repurchases, our dataset would only contain "unexpected" announcements. This, because the risk of having a lot of repeat announcements (with potentially less information and lower CARs) is that they may dilute the effect of announcements conveying new information to the market. Because of this, we investigate the difference in how the market reacts to expected versus unexpected announcements. To filter out which announcements contain a signaling effect, they are divided into "large" and "small" (i.e. unexpected), and "normal" (i.e. expected) announcements. If the size of an announcement exceeds the median size of announcements by the same firm by more than 20%, it is characterized as large. Similarly,

if it is more than 20% smaller, it is characterized as small. After this, we examine changes in short-run CARs, and consequently the signaling effect of unexpected announcements. As shown in Figure A1, average CAR is 6.2% for large announcements, compared to 2-3% for small and normal announcements, indicating that larger than expected announcements are seen as more of an undervaluation signal. Thus, the large proportion of "expected" repeat announcements could have a dilutive effect on our results. If this is the case, this may help explain the low short-run CAR (-2 to 2 days) especially among large firms, since these conduct more repeat announcements. Furthermore, this would be consistent with the results of (Ding et al., 2020), who find that the returns from repeat share repurchases become gradually lower. However, because these cases (repeat announcements stating significantly different percentage of share to repurchase) are rare (most announcements in our sample do not even state size), we cannot draw any conclusions regarding the extent of this limitation.

In conclusion, our results show a positive abnormal return of approximately 1% around the announcement day, in line with previous studies of repurchase announcements in Europe (Råsbrant, 2013). While our results may be influenced by liquidity effects and repeat announcements with limited signaling value, our results point toward repurchase announcements effectively acting as a signaling effect to the market that the stock is undervalued, especially for small firms. Consequently, we find support for hypothesis one, and partly for hypothesis three.

Table 3: Short-run average CAR summary
*Abnormal returns around share repurchase announcements in Sweden during 2010-2019, measured against the OMXS30 over, -20 to -3, -2 to 2, and 3 to 10 days relative to the announcement. CARs and t-statistics are displayed per time period announced, percentage of shares to be repurchased, firm size, where small firms have market capitalizations below the sample median in that year, and large firms have market capitalizations above the sample median, and per valuation, where value stocks have P/B ratios below the sample median in that year, while glamour stocks have P/B ratios above the sample median. ***, **, * refer to significance under the 1%, 5%, and 10% confidence levels.*

		Days relative to repurchase announcement					
		-20 to -3		-2 to 2		3 to 10	
	n	CAR %	T-statistic	CAR %	T-statistic	CAR %	T-statistic
Announcement year							
2010-2013	302	0.63	1.40	0.57	2.16**	-0.38	-1.29
2014-2016	98	1.28	2.14**	1.82	3.81***	0.19	0.38
2017-2019	58	-1.05	-1.16	2.02	2.83***	0.59	1.03
All periods	458	0.56	1.62	1.02	4.59***	-0.14	-0.59
Percentage repurchased							
0-2.5%	37	-1.01	-0.78	0.77	1.11	-0.35	-0.39
2.5%-5%	7	0.10	0.02	2.37	0.93	0.20	0.06
5%-10%	63	0.80	1.21	0.70	1.26	-0.19	-0.34
At or above 10%	97	1.13	1.50	1.72	3.50***	0.37	0.74
Not disclosed	254	0.51	1.10	0.83	2.68***	-0.30	-0.96
Size							
Small	192	0.95	1.44	1.42	3.37***	-0.44	-1.09
Large	266	0.27	0.78	0.73	3.16***	0.08	0.30
Valuation							
Value	229	0.24	0.50	1.15	4.05***	0.25	0.75
Glamour	229	0.87	1.78*	0.89	2.60***	-0.53	-1.63

5.2. Long-term market reaction to share repurchase announcements

5.2.1. Abnormal returns under the FF3 market model

In the short-run analysis, we found an abnormal positive return directly following the repurchase announcement of 1.02%. However, as noted by (Ikenberry et al., 1995), it seems unlikely that management would identify an undervaluation of merely 1%, and more so, decide to act upon it. According to the UH, markets might underreact to the information conveyed through the announcement and only adjust toward the firm's intrinsic value over an extended period of time. Consequently, we investigate long-run CARs too.

Table 4 provides long-run average CARs for our dataset, calculated over one-, two-, and three years following the announcement. Over all three horizons, CARs are positive and significant, at 8.24% (t-statistic 5.57), 9.90% (t-statistic 3.56), and 18.06% (t-statistic 4.82). Had the initial response to the buyback announcement been correct, we would expect the market to fully internalize the undervaluation already in the short-run reaction, and no abnormal returns would be identified in the long-run analysis. Thus, there seems to be evidence of an underreaction to the initial repurchase announcement, giving room for the sustained abnormal return, as argued by (Ikenberry et al., 1995).

Even though the two-year CAR is significant, CARs over one- and two years are quite similar, because of which we further investigate the significance of CARs between year one and two specifically. As shown in Table A3, average CAR between these years is only 2.03% and non-significant (t-statistic 1.03), implying significant CARs can only be established in the first year, which is also the conclusion drawn by (Råsbrant, 2013). Furthermore, as discussed by (Peyer & Vermaelen, 2009), there are measuring errors with the FF3 model, which coupled with (Råsbrant, 2013) highlighting the limitations of the CAR methodology for long-run estimations, make us consider the one-year results to be a sufficient indicator of long-run abnormal returns and the time period we focus on.

Interestingly, we only find significant one-year CARs during the three years 2012, 2013, and 2014, indicating our results are influenced by the specific time period during which the announcement is made. Additionally, these years follow the Eurozone crisis, strengthening the findings by (Peyer & Vermaelen, 2009), that buybacks are most effective in the long-run after a large drop in share price. While we remain skeptical toward the accuracy of CARs in excess of one year, we notice that the two and three year CARs for announcements made in 2010 are significantly negative, which may indicate that these firms spent cash on buying back their shares at relatively high prices, right before the market deteriorated, making the repurchases value destroying.

While our findings strengthen that the UH still holds true in the modern capital market, similar to what was found by (Peyer & Vermaelen, 2009), our results regarding firm size are unexpected. In the first year following the repurchase announcement, large firms experienced higher CARs than small firms, 9.77% (t-statistic 5.93) versus 5.87% (t-

statistic 2.11). When examining share repurchase announcements made during 1991 to 2001, (Peyer & Vermaelen, 2009) find that smaller firms exhibit larger abnormal returns, contrary to our findings. Likewise, due to information asymmetry, we would expect the long-run CAR to be larger for small firms, as investors have less information to correctly price their shares directly following the announcement. While small firms exhibit larger short-run abnormal returns, these are not enough to offset the large discrepancy between small and large firms in long-run CARs. Therefore, either large firms are severely mispriced leading up to the announcement relative to small firms, or other factors impact the results.

Because large firms should have less information asymmetry towards the market, them being more mispriced than small firms is counterintuitive. Rather, we argue that large firms may have a better ability to continuously repurchase shares, acting on opportunities over time which they find favorable (for example their share price decreasing substantially), while small firms are more constrained in their ability to act upon these opportunities. This, because larger firms generally have better access to capital than small firms, as found by (Gorman, 2021). During the three years with the highest one-year CARs (2012-2014), large firms accounted for a significantly larger proportion of announcements than small firms (see Table A4), potentially making more effective use of these opportunities.

Lastly, we investigate whether value stocks experience larger long-run abnormal returns than glamour stocks, which is one of the key findings by (Ikenberry et al., 1995). While both value and glamour stocks pose positive and significant CARs during the first year following announcement, value stocks significantly underperform relative to glamour stocks, with average CARs of 6.13% (t-statistic of 2.74) versus 10.28% (t-statistic of 5.28). Although these results are contradictory to the literature, one possible explanation could be that the investigated time period experienced an extraordinary monetary environment, with, at times, negative interest rates. As shown by (Barua & Buckley, 2019), corporate debt levels grew constantly during the 2010s. This, we argue, may have allowed particularly glamour firms (with potentially more attractive investment opportunities) to pursue buybacks without having to sacrifice necessary investments, following the low cost and accessibility of capital. This, in contrast to the findings of (Wang et al., 2021) who examine buybacks between 1985 to 2010 and find that firms pursuing buybacks do it at the expense of value-creating investments, hurting long-run performance. Notably, their findings are based on a higher interest rate environment. However, under this hypothesis, small firms (which may have more value-creating projects to pursue than large firms) should also benefit disproportionately. Still, while access to capital increased, large firms should have had better access to it, per (Gorman, 2021), which may help explain this discrepancy.

Table 4: Long-run average CAR summary (under the FF3 model)
*Long-run average cumulative abnormal return under the FF3 market model over one-, two-, and three-year horizons. Repurchases in Sweden made during 2010-2017 are investigated due to data limitations of firms after these years. Results are sorted after the year the announcement was made, size of firms where small firms have market capitalizations below the sample median in that year, and large firms have market capitalizations above the sample median in that year, and valuation where value stocks have P/B ratios at or below the sample median in that year, while glamour stocks have P/B ratios above the sample median in that year. ***, **, * refer to significance under the 1%, 5%, and 10% confidence levels.*

	1-year (250d)			2-Year (500d)			3-Year (750d)		
	n	CAR %	T-statistic	n	CAR %	T-statistic	n	CAR %	T-statistic
Announcement year									
2010	76	3.95	1.20	74	-27.43	-3.66***	72	-35.84	-3.53***
2011	73	-4.76	-1.50	76	-3.18	-0.55	75	12.98	1.74*
2012	75	12.85	3.51***	74	33.93	6.16***	75	47.51	6.70***
2013	72	19.73	6.90***	74	34.30	6.62***	73	42.43	6.93***
2014	55	14.04	4.27***	54	22.36	4.96***	55	29.20	3.46***
2015	18	8.46	1.55	19	18.32	1.94*	19	0.24	0.02
2016	22	-1.45	-0.15	21	-21.51	-1.82*			
2017	22	7.89	0.99						
All years	413	8.24	5.57***	392	9.90	3.56***	369	18.06	4.82***
Size									
Small	162	5.87	2.11**	153	2.83	0.53	146	16.34	2.24**
Large	251	9.77	5.93***	239	14.43	4.83***	223	19.19	4.84***
Valuation									
Value	203	6.13	2.74***	197	6.04	1.47	187	17.84	3.27***
Glamour	210	10.28	5.28***	195	13.80	3.68***	182	18.29	3.57***

5.2.2. Abnormal returns under the CAPM market model

Because our results related to size and valuation under the FF3 model varied from the dominating view within the literature, we investigate long-run CARs under the CAPM as an estimator for expected excess return, to better understand model choice implications. This, as a consequence of the necessity to use different methods for the long-run analysis, as discussed by (Råsbrant, 2013). The results can be found in Table 5. Under the CAPM, CARs are higher and more significant over all three investigated periods, at 12.05% (t-statistic 9.95), 23.14% (t-statistic 11.69), and 37.73% (t-statistic 14.18). Thus, abnormal return appears to increase approximately linearly, compared to the pattern found under the FF3 (see Figure 1). However, while CARs seem significant during all three years, compared to under the FF3 model, we focus on the one-year results for comparability.

Additionally, while these findings strengthen the hypothesis of long-run abnormal CARs, the most interesting findings are that small firms persistently exhibit higher CARs than large firms, with CARs of 6.17% (t-statistic 7.39) versus 9.36% (t-statistic 6.79). Additionally, value stocks also experience higher abnormal returns than glamour stocks, with CARs of 13.54% (t-statistic 7.72) versus 10.63% (t-statistic 6.36). Small firms experiencing higher long-run CARs are consistent with the TSH as they carry higher information asymmetry, and value stocks experiencing higher long-run CARs is similar to the results of (Ikenberry et al., 1995).

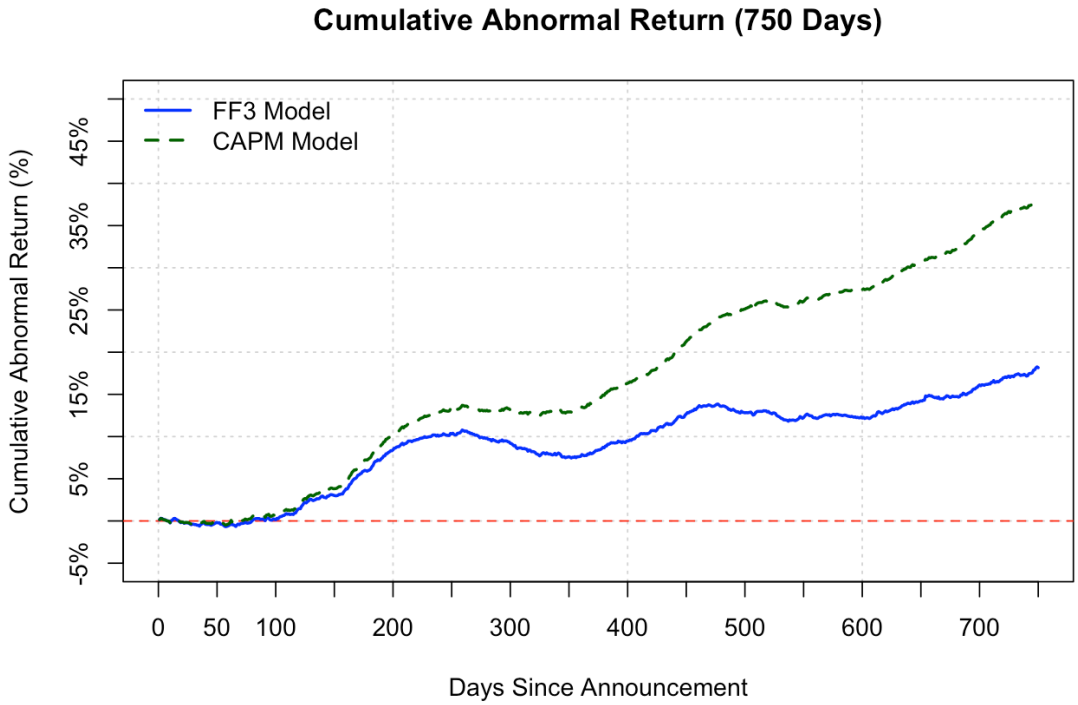
While these results are more in line with the literature, we consider them primarily to be a consequence of controlling for less risk factors, whereby small and value stocks earn higher returns because they contain more risk, as argued by (Fama & French, 1993), and consequently not “true” abnormal returns. Similarly to our results, (Ikenberry et al., 1995) experience varying magnitudes of abnormal returns under different benchmarks, further highlighting the importance of model choice.

Conclusively, having investigated long-run CARs under both FF3 and the CAPM, we conclude that the CAR results under different subgroups such as size and valuation are highly dependent on the choice of model used. Thus, making verdicts related to hypothesis 3 inconclusive. However, the results also illustrate the consistency across models in showing a positive and significant one-year CAR, supporting the idea that the initial market reaction is too small, meaning the announcement is met with partial skepticism. Hence, we find support for hypothesis 2.

Table 5: Long-run average CAR summary (under the CAPM model)
*Long-run CARs under the CAPM market model over one-, two-, and three-year horizons. Repurchases in Sweden made during 2010-2017 are investigated due to data limitations of firms after these years. Results are sorted after the year the announcement was made, size of firms where small firms have market capitalizations below the sample median in that year, and large firms have market capitalizations above the sample median in that year, and valuation where value stocks have P/B ratios at or below the sample median in that year, while glamour stocks have P/B ratios above the sample median in that year. ***, **, * refer to significance under the 1%, 5%, and 10% confidence levels.*

	1-year (250d)			2-Year (500d)			3-Year (750d)		
	n	CAR %	T-statistic	n	CAR %	T-statistic	n	CAR %	T-statistic
Announcement year									
2010	76	14.97	5.15***	76	14.62	3.44***	74	26.74	5.15***
2011	73	3.75	1.38	75	11.95	2.54**	74	36.47	6.11***
2012	75	11.21	3.62***	74	32.12	6.62***	75	47.52	6.90***
2013	72	20.46	6.88***	71	38.01	8.42***	72	47.48	8.29***
2014	54	16.30	5.66***	55	25.75	5.52***	55	36.31	5.31***
2015	18	10.58	2.09**	19	24.72	3.65***	19	13.95	1.82*
2016	22	7.33	1.75*	22	4.70	0.69			
2017	23	0.74	0.18						
All years	413	12.05	9.95***	392	23.14	11.69***	369	37.73	14.18***
Size									
Small	163	16.17	7.39***	153	29.53	7.81***	145	51.58	10.12***
Large	250	9.36	6.79***	239	19.05	8.95***	224	28.77	10.52***
Valuation									
Value	201	13.54	7.72***	194	27.31	10.13***	186	44.86	12.30***
Glamour	212	10.63	6.36***	198	19.06	6.63***	183	30.48	7.99***

Figure 1: Average CAR over three years following buyback announcements
CARs under the FF3 and CAPM models plotted over the three-year horizon (750 trading days), following share repurchase announcements in Sweden made during the years 2010 to 2017.



6. Conclusions

There are many ways in which firms can use excess cash, of which share repurchases is one. In the literature, one of the primary reasons to conduct buybacks, as laid out by (Vermaelen, 1981), is the signaling effect from management to shareholders that the stock is undervalued. Our findings from the Swedish market during 2010-2019 are largely consistent with previous literature, showing that while the market initially reacts positively to the repurchase announcement, this is an underreaction, allowing for positive abnormal returns in the long-run too.

On average, we find an initial positive cumulative abnormal return around the repurchase announcement of 1.02%, indicating that the market interprets the announcement as an undervaluation signal. Consistent with the TSH, this reaction is larger for small firms with an average CAR of 1.42%.

If management considered the stock to be undervalued by only 1.02%, we would not expect them to initiate share repurchases, at least not as a signal of undervaluation. In the long-run analysis, we find a significant and positive average CAR over the one-year horizon of 8.24%, a more reasonable undervaluation to be identified and acted upon by management. Our results thus support the UH, since the market fails to fully internalize the information conveyed through the repurchase announcement in the short-run. Similarly to (Råsbrant, 2013), we do not find a significant long-run CAR in excess of the one-year horizon, in contrast to the findings by (Peyer & Vermaelen, 2009). Furthermore, our long-run analysis highlights the importance of model choice in estimating abnormal returns, with contradicting results between the FF3 and CAPM market models concerning size and valuation.

Although small firms experience a higher average CAR than large firms under the CAPM, when controlling for the size factor under the FF3, the result is the opposite. Hence, we cannot conclude whether small firms experience higher long-run abnormal returns due to information asymmetry. Furthermore, previous literature, most notably (Ikenberry et al., 1995), finds that value stocks experience higher abnormal returns than glamour stocks in the long-run, following share repurchase announcements. Under the CAPM, this relationship holds true for our dataset. However, under the FF3, glamour stocks experience higher average CAR than value stocks. Consequently, we cannot confidently confirm that the market has become more efficient in correctly pricing these shares.

Furthermore, similar to (Ikenberry et al., 1995), our study supports the theory that management exhibits skills in timing decisions to the market, with the majority of repurchase announcements commencing in the aftermath of the Financial Crisis and Eurozone crisis. However, the market does not seem to sufficiently reward this in the short-run, as indicated by our long-run results.

Our paper contributes to the literature by investigating the signaling effect of Swedish repurchase announcements, a relatively untouched field. Furthermore, we build upon earlier studies by examining a more recent dataset. Our findings strengthen the

predominant theory in the literature, that the market underreacts to the signal by management that the firm is undervalued, also in today's market. Additionally, this paper attempts to further explore the relationship between information asymmetry, proxied by firm size, and abnormal returns, although with inconclusive results. Lastly, our study touches upon the potential impact of expected versus unexpected announcements, which may affect our results. However, due to data limitations prohibiting us from investigating this further, it poses an interesting topic for future research in the field. Of special interest is developing a more detailed framework for determining what repurchase announcements are "unexpected" (or non-routine) to more precisely identify the undervaluation signaling effect.

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Appendix A. Supplementary Material

Table A1: Excluded buyback announcements
S&P Capital IQ Transaction IDs of excluded repurchase announcements following the data cleaning methodology outlined in Section 3.1.1., excluding announcements with too limited accessible information.

S&P Capital IQ Transaction ID		
IQTR263715207	IQTR260908888	IQTR305032009
IQTR263511356	IQTR244754787	IQTR263768284
IQTR205266625	IQTR104812721	IQTR133105779
IQTR104812585	IQTR202613013	

Table A2: Classification of firms for each investigated year
Classification of firms in our sample, consisting of share repurchase announcements in Sweden made during 2010-2019, into value stocks or glamour stocks and small firms or large firms. Value stocks have P/B ratios at or above the sample median in that year, while glamour stocks have P/B ratios below the sample median in that year. Small firms have at or below sample median market capitalization in that year, while large firms have above sample median market capitalization in that year. Please note that while the sum of value and glamour stocks does not equal the sum of small and large stocks during years 2016, 2018, and 2019 by a total of four classifications. However, none of these firms with a missing classification announces a repurchase program in that year, whereby it does not affect our results.

Year	Value	Glamour	Small	Large
2010	49	49	49	49
2011	50	49	50	49
2012	51	51	51	51
2013	51	51	51	51
2014	51	51	51	51
2015	53	52	53	52
2016	54	53	55	54
2017	57	56	57	56
2018	58	55	57	57
2019	58	57	58	58

Figure A1: Average CAR of buyback announcements of unexpected size
Abnormal return over day -2 to 2 from announcement of repurchases in Sweden during 2010-2019, divided into "normal" announcements (announcements where the stated percentage of shares to be repurchased is within 20% of the median amount of repurchases by the firm), "small" announcements (smaller than "normal" announcements), and "large" announcements (larger than "normal" announcements). Only firms that experience any of these unusually small or large announcements are included, which is quite few, because most announcements did not include a statement of percentage of shares to be repurchased. Average CARs for the subgroups are also included.

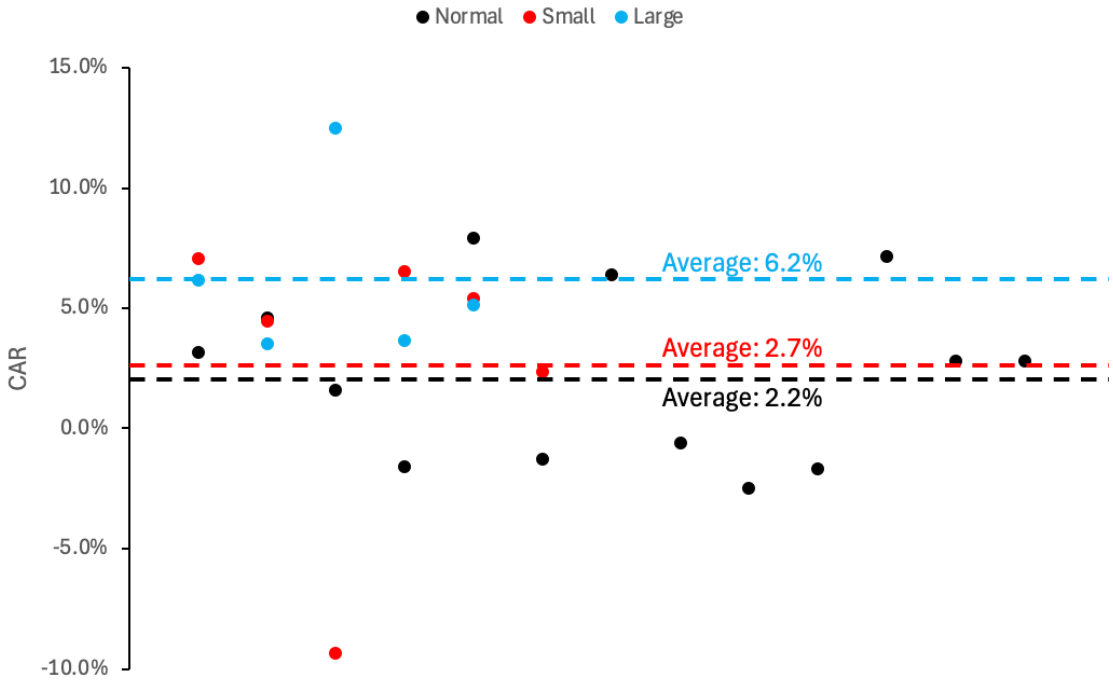

Table A3: Average CAR between year one and two (under the FF3 model)
*Average CAR and associated t-statistic between the first and second year (trading day 251 to 500) following announcement, for repurchase announcements in Sweden made during the years 2010 to 2016. ***, **, * refer to significance under the 1%, 5%, and 10% confidence levels.*

1-2 year (250-500d) horizon

n	CAR %	T-statistic
392	2.03	1.03

Table A4: Classification of repurchasing firms for each investigated year
Classification of announcements made each year into value stocks or glamour stocks and small firms and large firms. Value stocks have P/B ratios above the sample median in that year, while glamour stocks have P/B ratios below the sample median in that year. Small firms have below sample median market capitalization in that year, while large firms have above sample median market capitalization in that year.

Year	Value	Glamour	Small	Large
2010	38	38	32	44
2011	42	34	34	42
2012	37	39	30	46
2013	35	39	30	44
2014	29	27	18	38
2015	9	10	9	10
2016	9	14	7	16
2017	8	15	12	11
2018	12	6	11	7
2019	10	7	9	8

Appendix B. AI Appendix

ChatGPT has been used as a supportive tool in this thesis, primarily for proofreading, debugging R code, checking grammar, and assisting in the exploration of previous research. All AI-generated suggestions have been carefully reviewed and fact-checked. Importantly, AI has not been used to directly write any part of this thesis.