The impact of share buybacks on stocks in Europe and their significance from stock downturns

Master Thesis Finance

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Abstract

This thesis examines the impact of open market share buybacks announcements made by STOXX Europe 600 companies between 2006 and 2023 to investigate their short- to long-term effects on company performance, particularly when announced during downturns. Using an event study methodology and regression analysis, the research assesses the Cumulative Average Abnormal Returns (CAAR) and changes in Return on Equity (ROE) and Return on Assets (ROA) following buyback announcements. The findings indicate that buybacks, especially those announced during downturns, result in significantly higher CAAR in both the short and medium term, with a positive long-term effect on ROE. Buybacks during downturns can be viewed as an effective timing strategy, rather than being driven by short-term objectives like hitting earnings per share targets, boosting managerial compensation or supporting stock prices- actions that often lead to long-term underperformance due to reduced investments. These results support both the signaling hypothesis and capital allocation hypothesis.

This research contributes to the academic literature by providing empirical evidence on the effectiveness of buybacks in Europe, particularly during downturns. It demonstrates their positive impact on company performance over both the short and long term, underscoring the importance of strategic capital allocation. Given that previous studies have not thoroughly explored the long-term effects of performance metrics related to share buybacks during downturns, this analysis offers valuable insights for investors and analysts to incorporate into their valuations and investment decisions. Additionally, it provides policymakers with a deeper understanding of the effects of share buybacks conducted during downturns.

1. Introduction

Share buybacks have become an increasingly important tool for companies to distribute cash. In 2022, public companies worldwide repurchased about $1.8 trillion worth of shares, a figure that has tripled compared to 2012 (Scheid & Dholakia, 2023). Share buybacks can serve as important tool in managing the capital structure. Another significant aspect is the use of share buybacks as a form of signaling, implying that the company perceives itself as undervalued and expresses confidence in its future prospects. Most research on share buybacks has focused on the United States (US), with limited studies examining the impact of buybacks during stock downturns. This study aims to fill this gap by analyzing share buybacks in Europe and their effectiveness during downturns.

This is an important economic topic as it evaluates the significance of signaling and optimal capital structure management. Additionally, it provides insights into the effects of varying legal frameworks and market dynamics across different European countries. Signaling can generally generate significant short-term value for a company through share buyback announcements, as they are often interpreted by the market as positive indications of the company's health and future prospects. This value creation can extend into the longer term if it becomes evident that the company is genuinely engaged in optimal capital management, effectively using its resources to enhance long-term profitability and financial stability. The insights gained from this analysis helps investors, analysts and policymakers in understanding the influence of share buybacks on market behavior, valuations and investor sentiment. Furthermore, it provides insights into risk management during stock downturns, offering guidance to investors in assessing company performance. Additionally, it gives an economic indicator for policymakers in how companies anticipate with their corporate foresight and strategic planning.

The main research question of this study is: "What is the impact of share buybacks on stocks in Europe and their significance from stock downturns?"

Whereby 'downturn' is defined as: when a stock has decreased more than 20% in the six months prior to a buyback announcement. The focus is exclusively on the STOXX Europe 600 companies, which cover approximately 90% of the total market capitalization of the European stock market. The time period analyzed spans from 2006 to 2023.

The research question is divided into three subquestions. First, "What is the impact of share buybacks on signaling?". Secondly, "Is optimal capital allocation employed regarding buybacks in downturns?". Thirdly, "How do the underlying European countries perform based on their legal origins?".

The impact of share buybacks, particularly during downturns, will be analyzed from both short-term and long-term perspectives. Information asymmetry, and predictability influence how these buybacks signal to the market, affecting investor reactions to buyback announcements in the short term. In Europe, different legal origins across countries result in varying effects of share buybacks, primarily due to differences in tax structures and agency costs. These variations highlight the role of local regulatory environments in shaping the effectiveness of buyback strategies. Signaling is closely tied to optimal capital allocation, as management's belief in the company's undervaluation reflects confidence in its financial stability and efficient use of capital. The long-term impact of buybacks, including those announced during downturns, are assessed through performance metrics.

The data used in this study includes open market share buyback announcements and stock prices from STOXX Europe 600 companies for the period 2006-2023. Additionally, factors related to information asymmetry and predictability such as market capitalization, frequency of share buybacks, pre-event stock price returns, and legal origin are retrieved. Furthermore, data for performance metrics Return on Equity (ROE) and Return on Assets (ROA) are also collected.

To analyze the short-term effects of buybacks, an event study approach is employed to examine the impact on the Cumulative Average Abnormal Return (CAAR) across the various factors. To test the differences in factors influencing the signaling effect of buybacks, an Independent Sample T-Test is utilized. For the long-term analysis, a regression model is applied to assess the impact of buybacks, particularly those executed during downturns, on changes in ROE and ROA.

The findings from the event study and regression analysis provide significant insinghts into the short-term and long-term effects of share buybacks. Overall, share buybacks tend to have a positive effect with a CAAR of 1.35% in the event window [-1;+1]. This effect is more pronounced for companies with lower frequencies of buybacks (2.11%), smaller market capitalizations (1.51%), and lower pre-event stock price returns, particularly during downturns (2.02%). All categories within these factors are significant at the 1% level. The differences in

categories within factors are also statistically significant, except for market capitalization. Overall these results support the signaling hypothesis.

The effect on CAAR for companies with English, French, and German legal origins is quite similar, with coefficients of 1.51%, 1.56%, and 1.67%, respectively. Only Scandinavian legal origin do not significantly show a positive CAAR. This disparity suggests that legal frameworks and market dynamics influence the effectiveness of buybacks.

In the long-term analysis, the regression results demonstrate that buybacks, especially those conducted during downturns, are associated with significant improvements in ROE. This is particularly notable when buybacks occur during downturns, indicating that these companies likely benefit from a strategic capital allocation in challenging times. However, the impact on ROA is less pronounced, indicating limited gains in overall asset efficiency. This suggests that companies use, besides equity, substantial amounts of debt to finance buybacks as part of a strategy to optimize their capital structure. Overall, these findings underscore the relevance of buybacks as a tool for signaling and optimal capital management, particularly during downturns.

The findings related to the frequency of buybacks align with those of Andriosopoulos and Lasfer (2015). However, unlike their study, the difference in market capitalization between smaller and larger companies is not statistically significant in my analysis. This discrepancy could be attributed to the absence of very small companies in my sample, as the smallest company included has a market capitalization of approximately €1.9 billon.

Despite this, the findings related to legal origins differ from those of Andriosopoulos and Lasfer (2015). This discrepancy is likely due to differences in the scope of our studies; while they analyzed open market buybacks between 1997 and 2006 in the United Kingdom (UK), France, and Germany, my research covers all European countries represented in the STOXX Europe 600. They found a substantially higher CAAR for companies announcing buybacks in Germany and a noticeably lower CAAR for France compared to my results.

Vermaelen (2005) demonstrated that low-performing stocks, based on pre-event stock price returns, experience a substantially higher CAAR, than those with higher pre-event stock price returns, which is consistent with my findings. He also observed that these companies maintained a significantly higher CAAR over a longer period. In my study I found that stocks in downturn experienced a CAAR of 6.81% in the medium term [+1;+50], which also aligns

with Vermaelen's results. There is no research based on the long-term effects of buybacks on ROE and ROA to which I can compare my findings.

I can conclude that share buybacks, particularly those announced during downturns, create value from the short to longer term, as evidenced by statistically higher CAARs in both the short and medium term. This indicates that the market views these buybacks as a strong signal of confidence in the company, especially during periods of higher information asymmetry. While the longer-term effects on ROE are positive, the impact on ROA is more limited. From this, I can conclude that companies announcing buybacks during downturns are strategically optimizing their capital structure to achieve a lower Weighted Average Cost of Capital (WACC) whereby buying back their stock at a bargain price.

The rest of the thesis is organized as follows: first, I will review the current state of the literature, followed by an explanation of the hypotheses. In section 4, I provide an overview of the data used in this study. Section 5 details the methodology used, while Section 6 presents and discusses the results. Finally, the thesis concludes with a conclusion.

2. Literature Review

Share buybacks and dividends are the two primary ways for a company to distribute cash to their shareholders. There has been an increasing number of companies in Europe that repurchase shares and a reduction in companies paying dividends during the period from 1989-2005 (von Eije & Megginson, 2008). However, the total real dividends paid have increased, just as share repurchases have. In this section, I will first discuss the main differences between share buybacks and dividends, followed by an examination of the different types of share buybacks. Thirdly, the main reasons and effects of share buybacks are discussed.

2.1 Dividends versus Share buybacks

Dividends are seen as a more certain return, with most companies aiming to increase them annually, signaling stable earnings and confidence in future cash flows. Conversely, share buybacks reduce the number of outstanding shares, potentially increasing the value of the remaining shares. Further, they offer a flexible mechanism to manage capital structure without committing to ongoing payments. The preference between dividends and buybacks can be influenced by tax considerations, market conditions, and investor demographics. Dividends are typically subject to income tax, whereas share buybacks are generally subject to capital gains tax when the shares are sold. In worse market conditions, share buybacks are favored because a company can buy back shares at a lower price. For investors needing a stable income, dividends are preferred as they provide a consistent cash flow.

2.2 Types of Share buybacks

(1) Open market buyback

With Open market buybacks, companies publicly announce their intent to buy back shares before executing the buybacks, allowing them to decide the timing and quantity of shares to be repurchased. This method accounted for more than 90% of total share buyback value (Grullon & Ikenberry, 2000). One key advantage is the ability to adjust buyback activities based on market conditions, providing flexibility in timing and enhancing cash flow management. However, the method's reliance on market conditions can also be a disadvantage, as rising share prices may lead to higher costs and fewer shares repurchased.

(2) Fixed-price tender offer

This method of share buyback involves a company offering to purchase a specific number of its shares from shareholders at a fixed price, usually set at a premium above the current market price. This approach allows shareholders to sell their shares at a guaranteed price within a defined time frame. Tender offers often lead to a significant and immediate reduction in the number of shares outstanding. However, they can be costly due to the premium paid.

(3) Dutch auction tender offer

In a Dutch auction, a company specifies a price range within which it intends to repurchase shares. Shareholders are invited to offer their shares at prices within this range. The company then buys back the shares at the lowest price that allows it to buy back the desired number of shares. The advantage is that it can potentially reduce the overall cost of the buyback compared to a fixed-price tender offer. Disadvantage is that it is more complex to execute.

(4) Private direct negotiation

A privately negotiated buyback involves a company buying back its shares directly from one or several large shareholders through private negotiations. This method allows direct negotiations, which can result in lower transaction costs compared to other types of buybacks. Nevertheless, it may raise concerns about preferential treatment since not all shareholders are given the opportunity to participate.

2.3 Signaling

Companies use share buybacks as a signal to the market that their shares are undervalued.

A study surveying top financial managers from companies that announced share buybacks, found that the two most frequently cited reasons for repurchasing shares of common stock are to add value to shareholders and to acquire stock at a bargain price (Baker, Powell, & Veit, 2003). These motivations support the signaling hypothesis, suggesting that share buybacks are driven by management's belief that the stock is undervalued.

Andiosopoulos and Lasfer (2015) conducted a study on share buyback announcements in France, Germany, and the UK, examining both initial and subsequent announcements. An initial announcement is defined as the first time a company makes an announcement, while subsequent announcements are defined as the announcements that occurred after the initial

announcement. They analyzed market responses to these announcements for the period 1997-2006. Their findings showed that initial announcements generally resulted in higher cumulative abnormal returns (CAR) compared to subsequent announcements. In the UK, initial announcements were 2.34% return compared to 1.02% for subsequent announcements. Similarly, in Germany, the returns were 3.07% for initial announcements versus 0.90% for subsequent ones. However, France exhibited different results, with a 0.74% return for initial announcements and 0.94% for subsequent announcements. The study concludes that the significantly higher returns for initial announcements are associated with a stronger signaling effect, where the market views the first announcement as a more credible signal of undervaluation compared to subsequent announcements.

Size is also an important factor in signaling, implying that small companies have a higher degree of information asymmetry due to less coverage by analysts and media (Vermaelen T. , 1981). Andiosopoulos and Lasfer (2015) examined the effect of size by using the natural logarithm of a company's market capitalization as a proxy. This method, also employed by Grullon and Michaely (2002), and Renneboog and Trojanowski (2011), revealed a significantly negative relationship between size and market reaction to share buybacks. They observed a coefficient of -0.003, indicating that for each one-unit increase in the natural logarithm of a company's market capitalization, the CAR decreases by 0.3%.

During periods of sharp stock declines, the effect of share buybacks is even greater. Vermaelen (2005) demonstrated this by analyzing a sample of global stocks, divided into five quintiles based on their performance in the six months preceding a buyback announcement. Stocks in the lowest-performing quintile experienced a larger increase at the announcement date and over the longer term compared to the other quintiles, thereby also significantly outperforming the market.

Anolick et al. (2021) conducted research on market uncertainty in Europe using the variable ΔVSTOXX, which represents the 30-day change in the VSTOXX, the European equivalent of the VIX volatility index. The VSTOXX is negatively correlated with the Euro STOXX 50 and functions as an indicator of investor sentiment and market volatility. High VSTOXX indicate increased uncertainty and a higher likelihood of stocks in downturns. Their findings revealed a positive and significant relationship between ΔVSTOXX and abnormal returns, suggesting that the companies should consider announcing share buybacks during periods of high market uncertainty to maximize shareholder wealth. These buybacks in market

uncertainty and declines can be linked to the higher information asymmetry during such periods, which intensifies the strength of the signaling effect.

Overall, this research shows that share buybacks signal undervaluation, leading to higher abnormal returns during initial announcements and for smaller companies, and even greater effects during stock declines and periods of high uncertainty.

2.4 Agency theory and tax efficiency in different legal origins

Agency theory addresses the conflicts of interest between management and shareholders. One example of this conflict is when management undertakes high-risk projects with retained earnings that lead to negative Net Present Value (NPV) outcomes. Jensen (1986) highlights the importance of financial discipline and the market for corporate control in aligning managerial actions with shareholder interests. He argues that agency costs can be mitigated by minimizing the level of free cash flows held by the company, by distributing it to shareholders.

Countries have different legal origins, which influences the role between managers and shareholders. According to La Porta et al. (1998), there are four legal origins: English, German, French and Scandinavian. The English legal origin is considered the most shareholder-friendly, followed by Scandinavian. German and French are viewed as the least shareholder-friendly.

Taxes also influence the performance of legal origins around announcements. Grullon and Michaely (2002) found that the increase in buybacks is more positive when the tax gains from buybacks relative to dividends are larger. In the US and most European countries, laws provide favorable tax treatment for share buybacks over cash dividends. German and French legal origins offer the most favorable tax treatment for capital gains over dividends. In contrast, Scandinavian and English legal origins have the least favorable tax treatment. In the UK, as main contributor in Europe for the English origins, there is no dividend tax, while in some Scandinavian countries, the capital gains tax is substantially higher than the dividend tax.

It would be expected that German and French legal origins have the highest CAR due to their favorable tax treatment for buybacks. Additionally, they are the least shareholder-friendly, implying that if they do share buybacks, it will reduce agency costs between managers and shareholders. However, the results regarding legal origins are mixed and do not confirm this expectation. Manconi et al. (2014) examined global announcements across the four legal

origins and discovered that English legal origins have the highest announcement returns (2.05%), followed by German (1.4%), Scandinavian (1.1%) and French (0.4%) legal origins. In contrast, Andriosopoulos and Lasfer (2015) focused on the three major economies in Europe and found that German legal origins have the highest announcement returns (2.32%), followed by English (1.68%) and French (0.80%). The Scandinavian legal origin was not included in this sample.

2.5 Takeover deterrence

Share buybacks can function as a defense mechanism against takeover by potentially increasing the stock price, thereby increasing the takeover costs (Bagwell, 1991). This strategic use of buybacks can protect the company from unwanted acquisition bids, ensuring that control remains with current management and shareholders. The main insight is that share buybacks remove shareholders with the lowest threshold values, leaving the company with remaining shareholders who have relatively higher valuations. Billett and Xue (2007) found a significant positive relationship between open market buybacks and takeover probability. While abnormal returns from buyback announcements align with previous studies, the effect is notably larger for smaller companies, which is consistent with information asymmetry.

2.6 Optimal capital structure and efficiency

The optimal capital structure is important to achieve the lowest WACC because it directly influences the cost of financing and the overall value of the company. By buying back shares, the total amount of shareholders' equity and the assets will reduce, which can improve the ROE and ROA. This reduction in equity and assets can make the company more efficient in terms of utilizing its capital to generate profits, thereby enhancing financial performance and value. Dittmar (2000) found that there is a relationship with companies repurchasing stock if their leverage ratio is below a targeted level. Whereby it is found that companies that repurchase shares for a targeted leverage ratio see on the longer term positive abnormal returns (Chan, Ikenberry, & Lee, 2004).

Thorndike (2012) explored the management strategies of eight CEOs who outperformed their peers through unconventional and innovative approaches. These CEOs demonstrated exceptional capital allocation skills, with share buybacks being one of the key

tools they used to maximize shareholder value. They practiced buybacks to optimize their capital structure, and often bought back shares in declines. This illustrates that share buybacks can be a powerful tool for enhancing shareholder value. Warren Buffet commended the book, calling it "An outstanding book about CEOs who excelled at capital allocation".

Liu and Swanson (2016) assert that price support serves as a significant motive for share buybacks. They explain that managers increase share buybacks when the company is in a stock market downturn and seem likely to decline further because the company is about to experience a substantial decline in profitability. The subsequent multi-quarter effect is that while the decline in earnings per share is modest, a sharp decline in ROA is observed. This is in line with Grullon and Michaely (2004), who found that a company's operational performance does not tend to improve following share buyback announcements.

At some companies, managers choose to allocate more funds to share buybacks to boost their compensation by artificially inflating their EPS. Research has shown that when the managerial compensation is closely tied to EPS targets or stock return performance, there is an increase in the frequency of share buybacks ((Cook & Zhang, 2022); (Young & Yang, 2011); (Kahle, 2002); (Fenn & Liang, 2001)). Kahle (2002) found that the market is aware of this motive and reacts less positively to buybacks announced. Moreover, Cook & Zhang (2022) observed that this focus on buybacks leads to reduced investments in research and development (R&D) and human capital, which can negatively affect long-term company performance. This aligns with Almeida et al. (2016), who found that some companies substantially decrease capital expenditures and, to slightly lesser extent R&D and employment, to favor share buybacks, thereby driving up EPS to meet analyst forecasts. These cuts in real investments can have more negative consequences for long-term value creation, whereas companies utilizing cash tend to perform better.

Overall, these findings suggest that share buybacks can enhance financial performance and shareholder value if used strategically. However, there are mixed implications. Companies experiencing a substantial decline in profitability and those that reduce real investments in favor of buybacks to meet certain EPS expectations or managerial compensation targets are likely to become underperforming companies.

3. Hypotheses Development

In this section, I will present the hypotheses guiding this study. As mentioned in the introduction, the main research question is:

"What is the impact of share buybacks on stocks in Europe and their significance from stock downturns?

Reflecting on the previous sections of this study, various reasons for and effects of share buybacks have been highlighted and explained by using earlier research. This section, will primarily address the signaling hypotheses and the optimal capital structure hypotheses, as they are most relevant to the research question and in the scope of this study. Furthermore, the agency cost and tax efficiency hypotheses will be discussed, considering the differences among European countries and their corresponding legal origin.

Signaling hypotheses

There can be several factors impacting the signal of share buybacks. Therefore, I have split this hypothesis into four underlying hypotheses, to determine if all these factors support the signaling hypothesis.

The general hypothesis is as follows:

H1: *The signaling hypothesis has a positive effect on cumulative abnormal returns.*

This hypothesis will be discussed in the four underlying hypotheses below:

H1a: *Share buybacks will have a positive CAR.*

Previous studies have found a positive CAR in the short-term relating to an announcement. It is highly likely that this will be the case again. However, it is important to examine the magnitude and significance of the CAR within the context of the current sample.

H1b: *Companies that announce share buybacks more frequently have a lower CAR than companies that do this less frequently.*

For companies engaging in regular buybacks, these buybacks are often part of their annual payout policy. In such cases, buybacks are not typically a signal of undervaluation but rather a method of distributing retained earnings. Conversely, for companies that conduct buybacks

less frequently, these buybacks are not likely to be part of a regular payout policy and more likely to signal that the company sees itself as undervalued.

H1c: *High market capitalization companies will negatively impact the CAR compared to lower market capitalization companies.*

Large companies typically receive much more coverage by analysts and media (Vermaelen T. , 1981), leading to greater transparency about their status. Consequently, an announcement from a large company will result in a lower CAR than from a smaller company, where information asymmetry is higher. This negative relationship between company size and CAR is observed in numerous studies (Anolick et al. (2021); Andriosopoulos and Lasfer (2015); Grullon and Michaely (2002); Ikenberry and Vermaelen (1995)).

Since I specifically research share buybacks of the STOXX Europe 600, there are no small companies with the lowest market capitalization around 1.9 billion euros. Previous studies often used a diverse sample, so including small companies. Hence, it is interesting to see whether market capitalization still has a significant impact on the CAR with companies worth 1.9 billion euros or more.

H1d: *Companies in stock market downturns that do buybacks have a higher CAR.*

There has been limited concrete research on companies in a downturn making an announcement. Studies on volatility (Anolick et al. (2021)) and lower performing quintiles of samples (Vermaelen (2005)) show a higher CAR, but it is not explicitly observable that these companies were in a downturn when the announcements were made. This study aims to examine the effect on companies that experienced a downturn before an announcement, comparing their CAR to those that did not. Announcements during downturns can be interpreted as extra strong signals that the stock is undervalued, and that the company's management has strong confidence in its long-term value.

Agency costs and tax efficiency

There is not yet much consensus in previous research on the CAR differences around announcements among the different legal origins (Andriosopoulos and Lasfer (2015); Manconi et al. (2014)). This may be partly because only a few studies have examined a broad sample that includes all legal origins. Therefore, it will be valuable to investigate whether any changes

have occurred and if there is now greater alignment with the theories agency costs and tax efficiency. In addition, within the scope of this research focusing on larger European companies, it is relevant to explore the differences in CAR among the different European countries based on legal origins. Hence, the hypothesis is as follows:

H2: Companies operating in countries with German and French legal origins experience higher CAR than those in countries with English and Scandinavian legal origins.

Optimal capital allocation

The impact of share buybacks on the longer term is sometimes quite vague in the lights of performance metrics. Although, it is likely that the timing component of buybacks plays a role in this. Companies making buybacks at the right moments are in general achieving higher abnormal returns (Dittmar (2000); Chan et al. (2004); (Vermaelen (2005); Thorndike (2012)), also for the longer term. Unfortunately, the difference in performance metrics on the longer term are more unknown.

Liu and Swanson (2016) noted that some companies attempt to maintain artificially high EPS through buybacks while having decreasing earnings, resulting in decreased ROA. In some cases, these buybacks are made possible by reducing investments (Almeida et al. (2016)). This suggests that these buybacks are not aimed in timing at the right moment for value creation but rather at sustaining current circumstances, where the underlying operational performance of the company is deteriorating. Consequently, it is obvious that these companies will underperform on the longer term. In addition, the use of share buybacks to boost short-term compensation for managers are not likely to be aimed in timing for value creation.

It is therefore important to investigate whether share buybacks impact long-term performance metrics. Additionally, it is relevant to examine the impact in long-term performance metrics when considering the combination of share buybacks made during downturns, as this can be seen as a timing component to optimize capital allocation. Thus, the following hypothesis is formulated:

H3: Share buybacks and share buybacks in downturns have a positive impact on the ROE and ROA on the longer term.

4. Data

The market capitalization, listed country, shares outstanding and ISIN for companies in the STOXX Europe 600 index per 31-12-2023 were gathered using the SDC Platinum application within the LSEG Workspace. Additionally, share buyback announcements were collected from SDC Platinum's Mergers and Acquisitions database. This involved a search for all share buyback announcement dates of all European-based companies for the period from 2006 through 2023. ISIN codes were also retrieved during this process and matched with those of the companies in the STOXX Europe 600 Index, thereby collecting all share buyback announcement dates for each company in the index.

To ensure the completeness and accuracy of these announcements, a sampling of several companies was conducted to verify that all share buybacks were recorded during the period. This verification was based on the daily trading volumes of these companies and shares outstanding. First, I examined the daily volume from 20 days before to 10 days after a share buyback announcement. If the daily volume on the announcement day was unusually low, I checked for accuracy, as daily trading volumes are typically high on share buyback announcement dates. The daily volumes were sourced form NL.investing.com. Secondly, I investigated whether there was a decline in shares outstanding over the years without any corresponding announcement to confirm this.

After these checks, I discovered that some share buyback announcements were missing from SDC Platinum, and some were related to employee-based incentive plans or other forms of buyback, rather than open market buybacks. Since the research focuses solely on open market buybacks and excludes buybacks related to employee compensation, these entries were removed from the sample.

Due to these discrepancies, a manual search was conducted to collect additional share buybacks announcements. These were primarily gathered from the investor relations webpages of the STOXX Europe 600 companies. Table 1 provides a complete overview of all the share buyback announcements.

Table 1: *Buyback announcement overview*

Summary of the count of sample buyback announcements per year and per country. AU, BE, CH, DE, DK, ES, FI, FR, IE, IT, LU, NL, NO, PL, PT, SE and UK stand for Austria, Belgium, Switzerland, Germany, Denmark, Spain, Finland, France, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Poland, Sweden and United Kingdom.

Announcements by Country

Year	AU	BE	CH	DE	DK	ES	FI	FR	IE	IT	LU	NL	NO	PL	PT	SE	UK	Total
2006	0	1	9	6	4	1	2	12	1	2	0	7	2	0	0	7	14	68
2007	0	2	11	9	6	1	3	11	2	4	2	10	2	0	0	5	25	93
2008	1	0	10	9	3	3	2	8	3	1	0	4	2	0	0	3	13	62
2009	0	1	1	2	3	3	1	1	0	2	0	1	2	0	0	1	3	21
2010	0	0	5	1	5	1	0	4	0	0	1	4	2	0	0	1	5	29
2011	0	1	6	1	7	4	3	4	0	0	0	4	0	0	0	9	11	50
2012	1	0	5	1	3	3	1	2	1	0	1	3	2	0	0	1	10	34
2013	1	2	5	4	5	1	0	6	0	0	0	6	2	0	0	1	9	42
2014	0	0	7	3	9	4	2	6	1	0	0	3	1	0	0	1	13	50
2015	0	2	3	3	12	3	0	8	2	0	0	8	0	0	0	2	9	52
2016	0	1	3	1	12	1	0	9	2	2	1	6	1	0	0	2	11	52
2017	0	0	6	7	12	2	0	7	1	2	0	6	1	0	0	1	15	60
2018	3	1	11	4	8	5	2	4	4	3	1	9	2	0	0	2	17	76
2019	1	3	3	6	10	4	0	6	3	2	1	7	3	0	0	4	23	76
2020	1	2	6	5	7	3	0	3	1	3	1	7	2	1	0	1	11	54
2021	0	2	10	11	11	3	2	11	2	3	6	14	2	0	0	6	40	123
2022	3	3	12	16	10	2	5	16	5	7	3	19	3	0	1	7	49	161
2023	2	6	8	14	8	6	2	12	4	6	3	15	5	1	1	6	51	150
	13	27	121	103	135	50	25	130	32	37	20	133	34	2	2	60	329	**1253**

For all 600 companies, daily stock price data was obtained (for the period that they were listed on the stock exchange), from 2006 to 2023. Additionally, for a few companies that had made share buyback announcements in 2006, daily stock data for the period 13 April 2005 to 31 December 2005 was also collected. This data was necessary for the estimation window of the event studies. All daily stock price data is sourced from Compustat Global Security Daily of Wharton Research Data Services (WRDS). The descriptive statistics for share buyback announcements are shown in Table 2.

Table 2: *Descriptive statistics regarding share buyback announcements*

Frequency is the number of share buybacks per company during the period 2006-2023. Market Cap represents the market capitalizations of the companies as of 31-12-2023, measured in billion EUR. Pre return is the six-month pre-event stock price return, measured in relative change. P10, p25, p50, p75, p90 denote the 10th, 25th, 50th, 75th and 90th percentiles, respectively. Min and Max represent the minimum and maximum observations in the sample. N refers to the number of observations; Frequency and Market Cap are characteristics of the STOXX Europe 600 companies, while Pre return is related to the share buyback announcements.

Variable	N	Mean	Min	p10	p25	p50	p75	p90	Max
Frequency	600	2.0883	0	0	0	1	3	6	15
Market Cap	600	21,376	1,862	3,032	4,583	8,803	21,315	48,3	368,303
Pre return	1253	0.0452	-0.6015	-0.2038	-0.0741	0.0385	0.1625	0.2800	1.0873

Out of the 600 companies, 346 conducted at least one buyback, while 254 companies did not conduct any buybacks.

Regarding legal origins, countries are matched to the legal origin with which they are most familiar with. Based on La Porta et al. (1998), the countries and their respective legal origin are listed in Table 3.

Table 3: *Underlying countries of legal origins*

In brackets the number of companies in the STOXX Europe 600 is showed.

Legal Origin	Underlying Countries
English (142)	Cyprus (1), Ireland (12) and United Kingdom (129).
French (204)	Belgium (16), France (75), Italy (35), Luxembourg (8), Netherlands (34), Poland (9), Portugal (4) and Spain (23).
German (138)	Austria (8), Germany (70) and Switzerland (60).
Scandinavian (116)	Denmark (24), Faroe Islands (1), Finland (19), Norway (13) and Sweden (59).

Data for ROA and ROE was collected, to analyze long-term performance effects. The following components were gathered from WRDS for the period 2014 through 2023 to calculate ROA and ROE: total assets, total common equity, and consolidated net income (loss). The intention is to examine the effect of share buybacks and downturns over the longer term.

Given the large year-over-year fluctuations in ROE and ROA at most companies, I chose to use the average ROE and ROA for the period 2014-2018 and 2019-2023. Average ROE and ROA are defined as the average over the five-year period of 2014-2018 and 2019-2023. The difference in ROE and ROA between 2019-2023 and 2014-2018 will be examined to assess the longer-term effects of share buybacks and downturns. Companies that have had a ROE (ROA) change greater than 0.40 (0.125) or less than -0.40 (-0.125) in relative change are excluded from the sample, because in most cases these companies have a distorted change. In addition, companies that are not listed before 2014 are excluded. The descriptive statistics for ROE and ROA are presented in Table 4.

Table 4: *Descriptive statistics regarding ROE and ROA*

The descriptive statistics are based on a sample of 506 remaining companies after exclusions. The periods 2019-2023 and 2014-2018 are denoted by 19-23 and 14-18. ROE19-23 is thus the average ROE during the period 2019-2023. Buyback refers to the number of buybacks conducted in the period 2014-2023. Downturn is a dummy variable for whether the company conducted a buyback in a downturn. Buyb*Down stands for the number of buybacks conducted in a downturn. P10, p25, p50, p75, p90 denote the 10th, 25th, 50th, 75th and 90th percentiles, respectively. Min and Max represent the minimum and maximum observations in the sample.

Variable	N	Mean	SD	Min	p10	p25	p50	p75	p90	Max
ROE19-23	506	0.1255	0.1097	-0.3429	0.0154	0.0711	0.1106	0.1656	0.2451	0.7009
ROE14-18	506	0.1347	0.1108	-0.3314	0.0318	0.0729	0.1198	0.1808	0.2657	0.7495
ROE change	506	-0.0092	0.0850	-0.3108	-0.1109	-0.0474	-0.0045	0.0302	0.0761	0.3861
ROA19-23	506	0.0476	0.0476	-0.16660	0.0035	0.0128	0.0396	0.0690	0.1049	0.2685
ROA14-18	506	0.0536	0.0516	-0.1805	0.0038	0.0177	0.0431	0.0766	0.1137	0.3667
ROA change	506	-0.0060	0.0288	-0.1219	-0.0441	-0.0176	-0.0012	0.0074	0.0266	0.0828
Buyback	506	1.5060	2.0202	0	0	0	1	2	4	12
Downturn	506	0.1186	0.3236	0	0	0	0	0	1	1
Buyb*Down	506	0.1522	0.4109	0	0	0	0	0	1	3

Out of the 506 companies, 255 conducted at least one buyback in the period 2014-2023, and 60 companies conducted at least one buyback in a downturn.

5. Methodology

In this section, the empirical methodology will be introduced. These models will be used to test the hypotheses presented in section 3, "Hypotheses Development", using the sample as discussed in section 4 "Data". The empirical results will be analyzed and discussed in section 6, "Results".

The empirical methodology will consist of event studies, Independent Sample T-Tests, and regressions. First, the event study methodology will be explained, followed by a description of the Independent Sample T-Tests, and finally, the regression models will be explained.

Event study methodology

This research will use the event study methodology, following the three steps by de Goeij and de Jong (2011).

The first step is identifying the event of interest and timing of the event. In this study, the event is the share buyback announcement. The estimation window used is from 200 days before the event up to 21 days before the event. The primary event window is a three-day period [-1;+1], which is commonly used in studies (Andriosopoulos and Lasfer (2015); Anolick et al. (2021); Manconi et al. (2014)). In addition, other event windows within the range [-20;+50]* will be used. This approach allows for a comparison of results across different windows and helps to observe the longer-term impact of downturns. The timeline around the event is shown graphically in Figure 1 below.

Figure 1: Investigated timeline for event studies
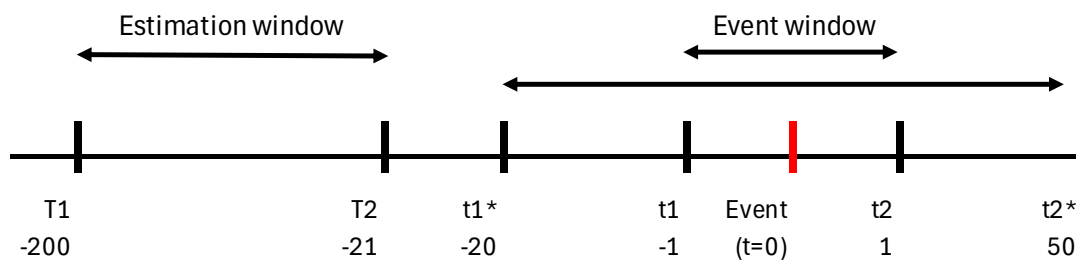
The benchmark model that I will use to obtain the normal stock return is the Market model. This model accounts for sensitivity to market risk exposure, making it more accurate than the market-adjusted return model, as different companies have varying levels of market risk. Furthermore, unlike the CAPM model, the Market model is independent of the risk-free rate.

This independence is important because estimating the risk-free rate accurately across different countries is difficult, by avoiding it reduces potential estimation errors.

For any company i, the Market model is defined as:

$$NR_{it} = \alpha_i + \beta_i R_{mt} + \varepsilon_{it}$$

Where α_i and β_i are Ordinary Least Square (OLS) estimators of the regression equation estimated on the estimation window [-200; -20]:

$$R_{it} = \alpha_i + \beta_i R_{mt} + \varepsilon_{it} \qquad \text{with E } (\varepsilon_{it} = 0)$$

Within the Market model, it is assumed that the returns of all the given companies are jointly multivariate normal and independently and identically distributed. The chosen market portfolio is the STOXX Europe 600, as it comprises all the stocks in the sample that I use.

Using the normal returns, the abnormal returns (AR) can be calculated to estimate the effect of the announcement on the stock price with the following formula:

$$AR_{it} = R_{it} - NR_{it}$$

Where R_{it} is the actual return for company i in event time t and NR_{it} is the normal return for company i in event time t estimated with the Market model.

To study share price changes around events, the returns of all companies are averaged together to obtain the average abnormal return (AAR) using the formula:

$$AAR_t = \frac{1}{N} \sum_{k=0}^{n} AR_{it}$$

The AAR provides the performance of the event day. In this study the event windows [-20;-3], [0], [-1;+1], [-2;+2], [-5;+5], [0;20], [+1;+20], [-20;+20] and [+1;+50] are considered. For other event windows than [0], the cumulative abnormal returns (CAR) are used, which compute abnormal returns over a specified period surrounding the event date into one value. The CAR is calculated by cumulating the abnormal returns for company i within the event window:

$$CAR_i = \sum_{t=t1}^{t2} AR_{it}$$

To observe the effects for all companies, the cumulative abnormal returns are averaged to obtain the cumulative average abnormal return (CAAR):

$$CAAR_i = \frac{1}{N} \sum_{i=1}^{N} CAR_{it}$$

The final step is to test for significance. The null hypothesis to be tested is:

$$H_0 : E(CAR_i) = 0$$

To determine if the CARs are significantly different from zero, the t-statistic is calculated:

$$TS_2 = \sqrt{N} \frac{CAAR}{s} \approx N(0,1)$$

Under the stated assumptions, TS_2 follows a standard normal distribution. The standard deviation s is used since σ is unknown:

$$s = \sqrt{\frac{1}{N-1} \sum_{i=1}^{N} (CAR_i - CAAR)^2}$$

Independent Sample T-Tests

To test whether factors regarding CAAR are statistically different from each other, an Independent Sample T-Test with unequal variances is used. This test is chosen because it is more robust and reliable when there are unequal variances between the factors, ensuring that the results are accurate even when the assumption of equal variances is violated.

The formula for this T-Test is shown below:

$$T = \frac{\bar{x}_1 - \bar{x}_2 - (\mu_1 - \mu_2)}{\sqrt{\frac{s_1^2}{n_1} + \frac{s_2^2}{n_2}}} \sim t(m)$$

On the right side the degrees of freedom are approximated by $m = \min(n_1, n_2) - 1$, which is the smallest sample size minus 1. Here, $\bar{x}$ represents the average of a factor.

Regression analysis

The regression models related to hypothesis H3 are described below. The models are estimated using OLS.

$$ROE \text{ change} = \alpha_0 + \beta_1 \times Buyback_{t14-23} + \beta_2 \times Downturn_{t14-23}$$
$$+ \beta_3 \times (\#Downturn \times \#Buyback)_{t14-23} + \varepsilon$$

The ROE represents the change in Return on Equity from the period 2014-2018 to 2019-2023. 'Buyback' is the number of buyback announcements; 'Downturn' is a dummy variable indicating whether a company announced a buyback during downturn; and '#Downturn × #Buyback' is the interaction term representing the number of buybacks announced during downturn periods.

First, I test the signs β_1, β_2 and β_3 individually if they are positive and statistically significant. Then, I test them together using the regression model above.

In addition to ROE, the same regression and tests will be performed for ROA to provide a comprehensive analysis of how buyback announcements and buyback announcements in downturns affect both profitability metrics. By examining both metrics, I can ensure that the analysis accounts for different financing methods of share buybacks. If the buybacks are primarily debt-funded, ROE may be impacted while ROA remains unaffected, ceteris paribus.

$$ROA \text{ change} = \alpha_0 + \beta_1 \times Buyback_{t14-23} + \beta_2 \times Downturn_{\,t14-23}$$
$$+ \beta_3 \times (\#Downturn \times \#Buyback)_{t14-23} + \varepsilon$$

See above for the regression model for ROA, where ROA represents the change in Return on Assets for the period 2014-2018 to 2019-2023.

6. Results

This section presents an overview of the empirical findings from the event study and regression.

First, the event study for different event windows will be discussed, with a primary focus on the [0], [-1;+1], [-5;+5] windows, as these windows best capture the short-term reaction surrounding the buyback announcement.

Table 5: *Cumulative Average Abnormal Returns for short-term event windows*
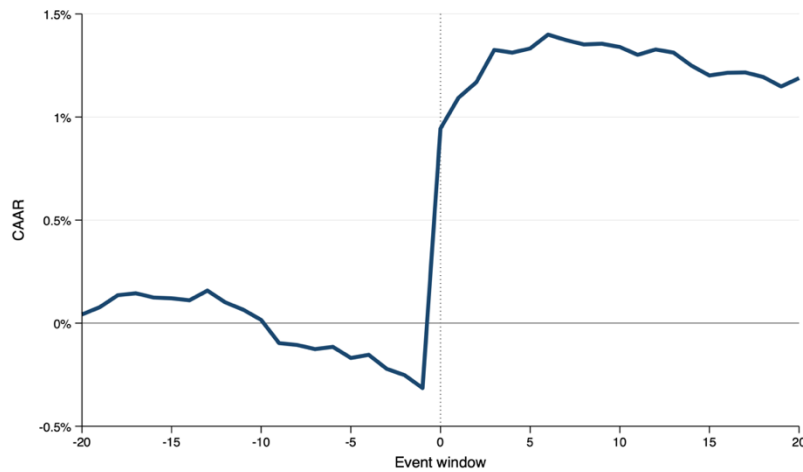
This table includes all buyback announcements from the sample, without subdivisions. Standard errors are clustered at the company level, and robust t-statistics are reported in parentheses. Significance is denoted with ***, ** and * for the 1%, 5% and 10% significance levels, respectively.

	Event window							
	[-20;-3]	[0]	[-1;+1]	[-2;+2]	[-5;+5]	[0;+20]	[+1;+20]	[-20;+20]
CAAR	-0.0022	0.0126***	0.0135***	0.0139***	0.0145***	0.0149***	0.0024	0.0119***
	(-1.16)	(12.00)	(9.66)	(8.72)	(7.81)	(7.07)	(1.32)	(3.95)
N	1253	1253	1253	1253	1253	1251	1251	1251

All event windows show positive and statistically significant CAARs at the 1% level, except for the pre-announcement [-20;-3] and post-announcement [+1;+20] windows. On the announcement day [0], the CAAR is 1.26%, indicating an overall positive response to buyback announcements.

The window [-1;+1] captures if a buyback announcement is made aftermarket, where the effect is not fully reflected until the next trading day. Focusing on the [-5;+5] window allows for observing trends for a slightly longer period of how the market incorporates the information over time. On [-1;+1] and [-5;+5], the CAAR is 1.35% and 1.45%, respectively, suggesting the presence of aftermarket announcements and the extended period that the market incorporates the information. Subsequently, the CAAR stabilizes with the window [0;+20] showing minimal differences from the [-5;+5] window, which is also been graphically illustrated in Figure 2. Since the [+1;+20] window is not positively significant, it cannot be concluded that outperformance can be achieved by buying shares of the company on the announcement day.

Figure 2: Graph of Cumulative Average Abnormal Returns (CAAR) for the event window [-20;+20]

Now, all the buyback announcements will be categorized into subdivisions to examine the impact of various factors related to the signaling hypothesis. The factors are the frequency of share buybacks, market capitalization, and pre-event performance. The primary event window used for this analysis is [-1;+1].

Table 6: *Frequency of share buyback announcements by companies*

The frequency of share buyback announcements by companies is categorized into three categories. Standard errors are clustered at the company level, and robust t-statistics are reported in parentheses. Significance is denoted with ***, ** and * for the 1%, 5% and 10% significance levels, respectively.

	Frequency of Share Buybacks		
Event window [-1;+1]	1-2 buyback(s)	3-5 buybacks	≥ 6 buybacks
CAAR	0.0211^{***}	0.0150^{***}	0.0091^{***}
	(7.18)	(6.75)	(4.28)
N	238	439	576

As shown in Table 6, all categories of share buyback frequency exhibit a positive and statistically significant CAAR at the 1% level. Companies with a low frequency (1-2) of share buybacks have the highest CAAR with 2.11%, followed by companies with moderate buybacks (3-5) at 1.50%, and companies with regular buybacks at 0.91%. Furthermore, companies that conduct fewer buybacks achieve a statistically higher CAAR (Table A1 in the Appendix). The statistically and substantially higher CAAR for companies with a low frequency of share buybacks support the signaling hypothesis.

Table 7: *Market Capitalization of companies*

The Market Capitalization is divided into two categories: one for smaller companies and one for larger companies. Market Capitalization is displayed in EUR. Standard errors are clustered at the company level, and robust t-statistics are reported in parentheses. Significance is denoted with ***, ** and * for the 1%, 5% and 10% significance levels, respectively.

Event window [-1;+1]	Market Capitalization in EUR	
	≤10 billion	>10 billion
CAAR	0.0151***	0.0124***
	(5.88)	(7.76)
N	475	778

Table 7 shows that both market capitalization categories have a positive and statistically significant CAAR. Smaller companies exhibit a substantially higher CAAR of 1.51% compared to 1.24% for larger companies. However, the difference between smaller and larger companies is not statistically different from each other (Table A2 in the Appendix). This finding is not fully consistent with the signaling hypothesis.

Table 8: *pre-event performance of companies for short-term*

Categorized based on the six-month pre-event stock price return. Standard errors are clustered at the company level, and robust t-statistics are reported in parentheses. Significance is denoted with ***, ** and * for the 1%, 5% and 10% significance levels, respectively.

Event window [-1;+1]	Six-month Pre-event performance			
	< -20%	[-20% , 0%)	[0% , +20%)	> +20%
CAAR	0.0202***	0.0160***	0.0113***	0.0102***
	(3.85)	(7.02)	(5.96)	(4.45)
N	130	385	495	243

In Table 8, all the categories of six-month pre-event performance show a positive and statistically significant CAAR. Companies experiencing a downturn before an announcement have the highest CAAR at 2.02%. As the pre-event stock price return increases, the CAAR decreases. Additionally, companies with lower pre-event stock price returns exhibit a statistically higher CAAR than those with higher pre-event returns (Table A3 in the Appendix). Notably, stocks that declined pre-event show a statistically higher CAAR than those that appreciated pre-event.

This indicates that the market interprets announcements during downturns (and declines) as particularly strong signals.

Considering the differences in agency costs and tax efficiency among European countries, the impact of legal origins on buyback announcements is examined. See Table 9 below.

Table 9: *Influence of Legal Origins*
The European countries are divided into their respective legal origins. Standard errors are clustered at the company level, and robust t-statistics are reported in parentheses. Significance is denoted with ***, ** and * for the 1%, 5% and 10% significance levels, respectively.

Event window [-1;+1]	Legal Origins			
	English	French	German	Scandinavian
CAAR	0.0151^{***}	0.0156^{***}	0.0167^{***}	0.0047
	(6.62)	(6.57)	(5.20)	(1.40)
N	361	401	237	254

All the legal origins show a positive and statistically significant CAAR, except for Scandinavian. The CAAR for English, French and German legal origins is quite similar, with German being slightly higher at 1.67%. It has also been shown that the CAAR for English legal origins is not statistically different from that of French and German origins (Table A4 in the Appendix). Conversely, the CAAR for Scandinavian legal origin, is statistically lower than that of French and German origins. Contrary to the hypothesis, English legal origin countries did not underperform compared to French and German legal origins.

Table 10: *pre-event return of companies for the medium term*
Categorized based on the six-month pre-event stock price return. Standard errors are clustered at the company level, and robust t-statistics are reported in parentheses. Significance is denoted with ***, ** and * for the 1%, 5% and 10% significance levels, respectively.

Event window [+1;+50]	Six-month Pre-event performance			
	< -20%	[-20% , 0%)	[0% , +20%]	> +20%
CAAR	0.0681^{***}	0.0176^{***}	-0.0093^{**}	-0.0373^{***}
	(5.29)	(3.31)	(-1.99)	(-5.49)
N	128	371	483	242

Table 10 displays the impact of pre-event stock price return for the medium term, covering the period from one day after the announcement to 50 days after the announcement [+1;+50].

The results show tremendously differences. Announcements made in downturns achieved a 6.81% CAAR for the event window [-1;+50], while companies with positive and extreme positive pre-event stock price performance achieved CAARs of -0.93% and -3.73%, respectively.

In Figure 3 the differences in the four pre-event stock price return categories are illustrated.

Figure 3: *Graph of Cumulative Average Abnormal Returns (CAAR) for the event window [-20;+50]*
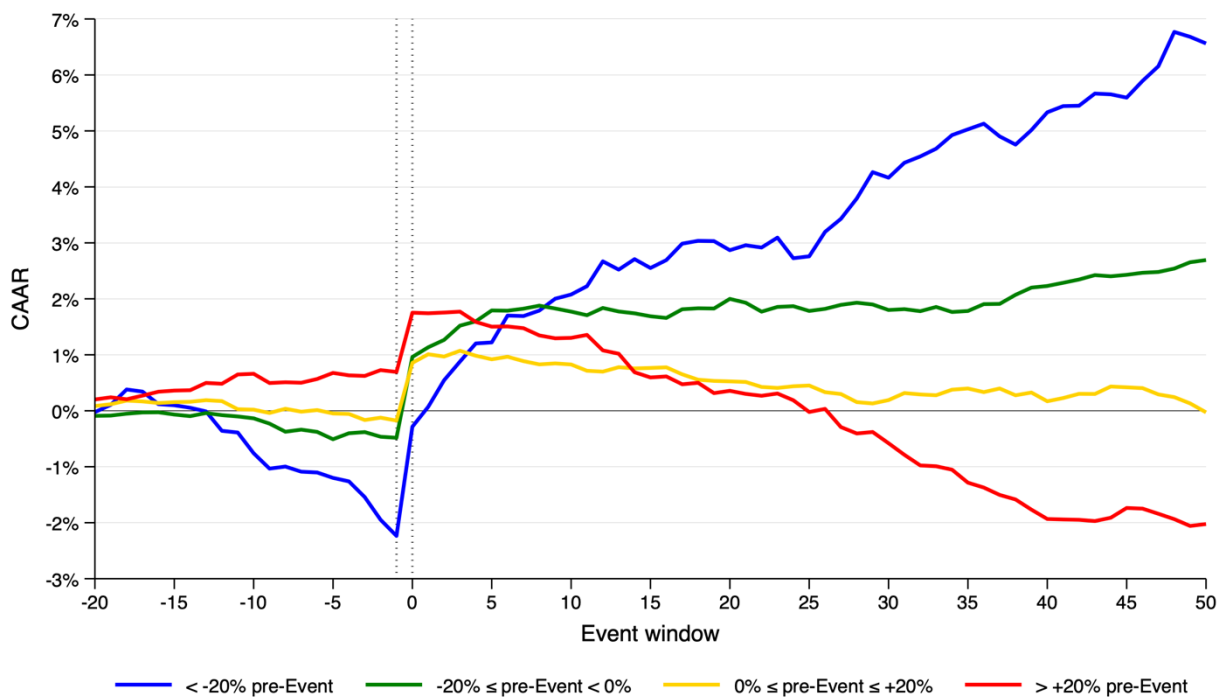
At the event [0], all the categories show a positive CAAR. However, after the announcement, companies that were in decline before the event experienced an uptrend, particularly those in downturn. This demonstrates that, by also considering the statistically significant positive CAAR, significant outperformance can be achieved by buying shares of a company that announces a buyback during a downturn. In contrast, companies with positive pre-event stock return saw a reversal. For companies that experienced an extreme downturn of less than -40%, the CAAR over the period [+1;+50] was even 14.1% at the 10% significance level, while companies with pre-event stock price return of more than 40% showed a CAAR of -4.98% at the 1% significance level (see Table A5 in the Appendix).

Similar to the short-term results, the medium-term analysis also reveals a statistically higher CAAR for companies with lower pre-event stock price returns compared to those with higher pre-event returns (Table A6 in Appendix).

These findings clearly indicate that companies experiencing a downturn achieve a substantially and significantly higher CAAR, even extending into the medium term. This underscores the market's strong reaction to buyback announcements during periods of prior poor stock performance.

With the optimal capital allocation hypothesis, the effects on the longer-term performance metrics are highlighted. Tables 11 and 12 display the effects on the performance metrics ROE and ROA over the longer term.

Table 11: *Regression results for Return on Equity (ROE)*

The dependent variable is the change in ROE from the period 2014-2018 to 2019-2023. Buyback refers to the number of buybacks conducted in the period 2014-2023. Downturn is a dummy variable for whether the company conducted a buyback in a downturn. Buyback*Downturn is an interaction variable for the number of buybacks conducted in a downturn. This sample consists of 506 companies from the STOXX Europe 600. The data were winsorized to mitigate the impact of extreme outliers and includes only companies that were listed before 2014 already. Robust t-statistics are denoted in parentheses. Significance is represented with ***, ** and * for the 1%, 5% and 10% significance levels, respectively.

	Dependent Variable: Change in Return on Equity (ROE)			
	(1)	(2)	(3)	(4)
Buyback	0.0046***			0.0031*
	(2.75)			(1.74)
Downturn		0.0224*		-0.0105
		(1.84)		(-0.55)
Buyback*Downturn			0.0273***	0.0272*
			(2.81)	(1.79)
Constant	-0.0162***	-0.0119***	-0.0134***	-0.0168***
	(-3.66)	(-2.98)	(-3.37)	(-3.77)
N	506	506	506	506

Table 12: *Regression results for Return on Assets (ROA)*

The dependent variable is the change in ROA from the period 2014-2018 to 2019-2023. Buyback refers to the number of buybacks conducted in the period 2014-2023. Downturn is a dummy variable for whether the company conducted a buyback in a downturn. Buyback*Downturn is an interaction variable for the number of buybacks conducted in a downturn. This sample consists of 506 companies from the STOXX Europe 600. The data were winsorized to mitigate the impact of extreme outliers and includes only companies that were listed before 2014 already. Robust t-statistics are denoted in parentheses. Significance is represented with ***, ** and * for the 1%, 5% and 10% significance levels, respectively.

	Dependent Variable: Change in Return on Assets (ROA)			
	(1)	(2)	(3)	(4)
Buyback	0.0011*			0.0007
	(1.66)			(1.19)
Downturn		0.0045		-0.0041
		(1.02)		(-0.45)
Buyback*Downturn			0.0064	0.0073
			(1.48)	(0.89)
Constant	-0.0076***	-0.0065***	-0.0070***	-0.0077***
	(-4.98)	(-4.88)	(-5.26)	(-4.97)
N	506	506	506	506

The coefficients for Buyback, Downturn and Buyback*Downturn in relation to ROE change, as shown in Table 11, are all positive and statistically significant individually at their respective significance levels. In the full regression model, the coefficient for Buyback is 0.31% and is statistically significant at the 10% level, while Downturn is not statistically significant. On the other hand, Buyback*Downturn is positive and statistically significant, with a coefficient of 2.72% at the 10% level. This can be explained by the partial overlap in the effect captured by the Downturn and Buyback*Downturn variables. This suggests that the more buybacks conducted during downturns, the greater the positive impact on ROE, as the coefficient for Buyback*Downturn would otherwise be less positive than that of the Downturn variable alone.

From the full regression model, companies that announced a buyback experience, on average, a 0.31% higher ROE change than those that did not. While a share buyback announced in a downturn leads to an average of 3.03% (0.31% + 2.72%) higher ROE change than those that did not announce a buyback, and 2.72% higher than for companies that conducted a buyback not in a downturn.

The economic effect of a buyback is calculated as $\frac{0.0031 \times 2.0202}{0.0092}$, resulting in a 68.07% increase in ROE change. The economic effect of a buyback conducted during a downturn is $0.68 + \frac{0.0272 \times 0.4109}{0.0092}$, leading to a 189.55% increase in ROE change. These effects are very large, partly due to the very small average change in ROE.

Regarding the ROA change in Table 12, only the Buyback variable is positive and statistically significant at the 10% level, with a coefficient of 0.11%. The other variables are not significant.

This indicates that the profitability of companies engaging in buybacks, especially in downturns, improved significantly in terms of ROE, while the improvement in ROA was very limited. This suggests that companies used substantial amounts of both debt and equity to finance their share buybacks, potentially as a strategic move to lower their WACC and optimize their capital allocation.

In addition to analyzing changes in ROE and ROA, I examined the effects of buybacks and buybacks during downturns on the average ROE and ROA in 2019-2023. I found that only buybacks conducted during a downturn resulted in statistically higher ROE and ROA (Table A7 in Appendix), with an on average 4.62% higher ROE and a 3.47% (0.0365 – 0.0018) higher ROA. The economic effects are also substantial, leading to a 15.13% increase in ROE $\left(\frac{0.0462 \times 0.4109}{0.1255} \right)$ and a 23.89% increase in ROA $\left(\frac{-0.0018 \times 2.0202}{0.0476} + \frac{0.0365 \times 0.4109}{0.0476} \right)$.

On the next page, I included Table 13 to see in one overview all the hypotheses that I discussed and whether I found evidence or not.

Table 13: *overview of all hypotheses tested*

Hypothesis no.	Hypothesis	Result
H1	The signaling hypothesis has a positive effect on cumulative abnormal returns.	Evidence found
H1a	Share buybacks will have a positive CAR.	Evidence found
H1b	Companies that announce share buybacks more frequently have a lower CAR than companies that do less frequently.	Evidence found
H1c	High market capitalization companies will negatively impact the CAR compared to lower market capitalization companies.	No evidence
H1d	Companies in stock market downturns that do buybacks have a higher CAR.	Evidence found
H2	Companies operating in countries with German and French legal origins experience higher CAR than those in countries with English and Scandinavian legal origins.	No evidence
H3	Share buybacks and share buybacks in downturns have a positive impact on the ROE and ROA on the longer term.	Evidence found

7. Conclusion

Using an event study and regression approach regarding share buyback announcements from STOXX Europe 600 companies during the period 2006-2023, I find that share buyback announcements made in downturns have a positive and statistically significant impact on both the short and longer term. In the short-term event window, the CAAR is 2.02%. This positive effect continues into the medium term, with a CAAR of 6.81%. Additionally, the long-term impact is reflected in improved profitability, evidenced by an on average 3.03% increase in ROE change and an economic effect resulting in a 189.55% increase in ROE change. Furthermore, the average ROE and ROA in 2019-2023 are positively influenced by buybacks conducted in downturns.

With these findings, I conclude that companies effectively optimize capital allocation by announcing share buybacks in a downturn. Furthermore, I find support for the signaling hypothesis, as the market responds positively to share buyback announcements made in a downturn, evidenced by the high CAAR in both the short and medium term. Also, the factor frequency of buybacks supported the signaling hypothesis, while market capitalization did not show significantly support.

This thesis contributes to the academic literature by providing empirical evidence on the short- and long-term effects of share buyback announcements made when a company was in a downturn. In addition, it demonstrates that the signaling hypothesis holds for the largest publicly listed companies in Europe, except for market capitalization. Considering that previous studies have largely overlooked the long-term effects of performance metrics related to share buybacks during downturns, this analysis fills a critical gap in the literature. By offering valuable insights, it enables investors and analysts to make more informed valuations and investment decisions, particularly in more turbulent market conditions. Investors should consider buying shares of a company in the STOXX Europe 600 when it announces a buyback during a downturn, as this strategy tends to result, on average, in positive and statistically significant long-term outperformance. Moreover, it provides policymakers with a deeper understanding of how share buybacks during downturns can influence corporate performance and broader economic stability, helping them compose more effective regulatory frameworks and economic policies.

The agency costs and tax efficiency hypothesis relating to legal origins was rejected. This topic is challenging to study due to several limitations. Firstly, countries grouped under the same

legal origins can differ drastically in various aspects. Secondly, regulations within these countries may have changed drastically over time. Conducting a comprehensive study of each European country, focusing on their specific tax structures and regulatory environments concerning share buybacks and shareholder policies over a relatively short period of five years, could potentially address these limitations.

Regarding the buyback announcements made in downturns, a key limitation is that the total sample consisted of only 130 buybacks, which is relatively small. Furthermore, my study focuses only on STOXX Europe 600 companies, potentially limiting the applicability of the results to other regions or smaller companies.

Future research could address these limitations by using a larger sample that includes companies from various continents and of different market capitalizations. Additionally, incorporating the impact of broader economic downturns, such as recessions and crises, could provide a more comprehensive understanding. Furthermore, qualitative research on managerial intentions behind buybacks could add valuable insights.

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Appendix

Table A1: *Difference test on the Frequency of share buyback announcements*

An Independent Sample T-test with unequal variances is used to test the differences in frequency of share buyback announcements. Robust T-statistics are reported in parentheses. Significance is denoted with ***, ** and * for the 1%, 5% and 10% significance levels, respectively.

	Difference Frequency of Share Buybacks
Event window [-1;+1]	CAAR
1-2 buyback(s) vs ≥ 6 buybacks	0,0120*** (3,45)
1-2 buyback(s) vs 3-5 buybacks	0,0062** (1,70)
3-5 buybacks vs ≥ 6 buybacks	0,0058** (2,03)

Table A2: *Difference test on Market Capitalization*

An Independent Sample T-Test with unequal variances is used to test the difference in Market Capitalization. All amounts are in EUR. Robust T-statistics are reported in parentheses. Significance is denoted with ***, ** and * for the 1%, 5% and 10% significance levels, respectively.

	Difference Market Capitalization
Event window [-1;+1]	CAAR
≤10 billion vs >10 billion	0,0027 (0,97)

Table A3: *Difference test on pre-event performance of companies for short-term*

An Independent Sample T-Test with unequal variances is used to test the differences in pre-event stock price return. Robust T-statistics are reported in parentheses. Significance is denoted with ***, ** and * for the 1%, 5% and 10% significance levels, respectively.

	Difference Six-month Pre-event performance
Event window [-1;+1]	CAAR
[< -20% , 0%) vs [0% , > +20%]	0,0061** (2,23)
< -20% vs [-20% , > +20%]	0,0075* (1,37)
< -20% vs [0% , > +20%]	0,0092** (1,66)
[-20% , 0%) vs [0% , > +20%]	0,0050** (1,85)
[0 , 20%] vs > +20%	0,0012 (0,36)

Table A4: *Difference test on Legal Origins*

An Independent Sample T-Test with unequal variances is used to test the differences in legal origins. Robust T-statistics are reported in parentheses. Significance is denoted with ***, ** and * for the 1%, 5% and 10% significance levels, respectively.

	Difference Legal Origins
Event window [-1;+1]	CAAR
English vs French and German	-0,0009 -(0,33)
Scandinavian vs French and German	-0,0113*** -(3,17)

Table A5: *pre-event performance effect of companies for the medium term subdivided*

Categorized in ten categories based on the six-month pre-event stock price performance. Significance is denoted with ***, ** and * for the 1%, 5% and 10% significance levels, respectively.

Event window [+1+50]	Six-month Pre-event performance									
	<-40%	[-40% , -30%)	[-30% , -20%)	[-20% , -10%)	[-10% , 0%)	[0% , 10%)	[10% , 20%)	[20% , 30%)	[30% , 40%]	>40%
CAAR	0.141*	0.0761***	0.0544***	0.0270***	0.0123*	0.0004	-0.0228***	-0.0309***	-0.0428**	-0.0498***
	(1.92)	(3.03)	(4.04)	(3.49)	(1.85)	(0.07)	(-3.31)	(-3.56)	(-3.51)	(-3.02)
N	13	29	86	133	238	281	202	141	52	49

Table A6: *Difference test on pre-event performance of companies for the medium term*

An Independent Sample T-Test with unequal variances is used to test the differences in pre-event stock price return. Robust T-statistics are reported in parentheses. Significance is denoted with ***, ** and * for the 1%, 5% and 10% significance levels, respectively.

	Difference Six-month Pre-event performance
Event window [+1;+50]	CAAR
[< -20% , 0%) vs [0% , > +20%]	0,0492*** (7,87)
< -20% vs [-20% , > +20%]	0,0744*** (5,65)
< -20% vs [0% , > +20%]	0,0867*** (6,50)
[-20% , 0%) vs [0% , > +20%]	0,0362*** (5,84)
[0 , 20%] vs > +20%	0,0269*** (4,03)

Table A7: *Regression results for the Average Return on Equity (ROE) and Return on Assets (ROA)*

Average ROE (ROA) is the average ROE (ROA) for the period 2019-2023. Buyback refers to the number of buybacks conducted in the period 2014-2023. Downturn is a dummy variable for whether the company conducted a buyback in a downturn. Buyback*Downturn is an interaction variable for the number of buybacks conducted in a downturn. Robust t-statistics are denoted in parentheses. Significance is represented with ***, ** and * for the 1%, 5% and 10% significance levels, respectively.

	Dependent Variable:	
	ROE 2019-2023	ROA 2019-2023
Buyback	0.0031	-0.0018*
	(1.11)	(-1.72)
Downturn	-0.0293	-0.0203
	(-1.11)	(-1.56)
Buyback*Downturn	0.0462**	0.0365***
	(2.12)	(3.20)
Constant	0.117***	0.0472***
	(20.47)	(17.93)
N	506	506