

CONFIDENCE ON CREDIT

A STUDY ON THE ROLE OF FINANCIAL DISTRESS IN SHAPING THE
CREDIBILITY OF SHARE REPURCHASE ANNOUNCEMENTS

ALMA SAMUELSSON

LINN JI

Bachelor Thesis

Stockholm School of Economics

2025



Confidence on credit: A study on the role of financial distress in shaping the credibility of share repurchase announcements

Abstract:

This thesis examines whether the informational value of open-market share repurchase announcements depends on firms' financial condition and the unexpectedness of the announcement. Using a panel of U.S. firms from 2016 to 2024, we combine an event-study framework with cross-sectional time-series regressions to test whether financial distress, measured by the Altman Z-score, and long periods of repurchase inactivity amplify short-term announcement-period abnormal returns. Contrary to signaling-based predictions, we find no evidence that distress or unexpectedness strengthens market reactions. However, probit results show that unexpected repurchases during volatile periods are more likely to be initiated by financially healthy firms. In doing so, the thesis not only extends prior work on repurchase signaling but also opens a path for future research to disentangle how evolving market structures, regulatory constraints, and firm-specific conditions jointly shape the informational role of repurchase announcements.

Keywords:

Financial distress, Altman Z-score, Unexpectedness, Signaling, Share repurchase, U.S. equity markets

Authors:

Alma Samuelsson (25934)
Linn Ji (25918)

Tutor:

Maira Sontag González, Teaching Assistant, Swedish House of Finance

Examiner:

Ramin Baghai, Professor, Department of Finance, Stockholm School of Economics

Bachelor Thesis

Bachelor Program in Business & Economics

Stockholm School of Economics

© Alma Samuelsson and Linn Ji, 2025

I. Introduction

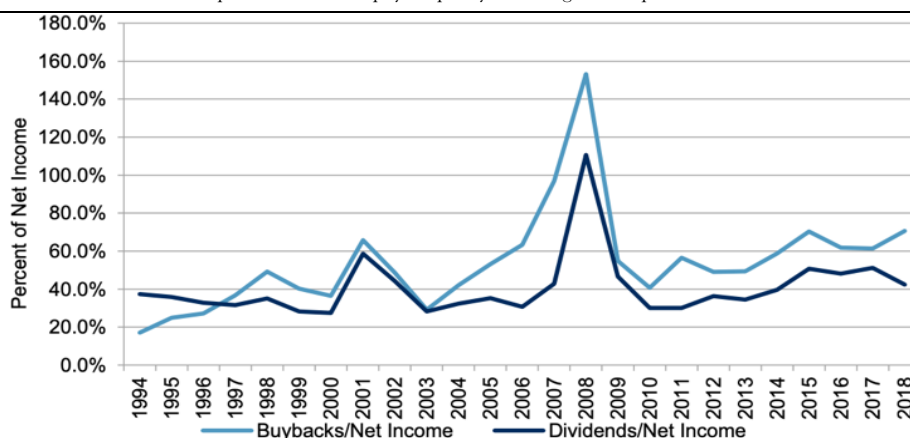
On 16 March 2020, the S&P 500 fell nearly 12% in a single trading day, its worst decline since 1987. Credit markets froze, volatility surged above VIX 80, and analysts warned of a looming corporate liquidity crisis (Bloomberg, 2020). Yet, even during this turmoil, dozens of U.S. firms announced new open-market share repurchase programs. At a time when external financing costs were spiking and companies were hoarding cash for survival, management teams were publicly committing capital to buy repurchase own shares (S&P Dow Jones Indices, 2020).

Such behavior challenges conventional expectations: repurchases require liquidity precisely when liquidity is most valuable. When firms commit scarce cash to share repurchase during market stress, it suggests that repurchase announcements may take on an entirely different role, less a routine payout decision and more a deliberate signal sent into an anxious market. Understanding this shift requires stepping back to consider how firms typically behave when financial pressure mounts. Periods of financial strain have long been recognized as moments when firms deviate meaningfully from their standard financial policies. When credit conditions tighten or uncertainty rises, companies often respond by preserving liquidity, cutting investment, reducing hiring, drawing down credit lines, or adjusting payout policies to safeguard financial stability (NBER, 2015). However, even under such circumstances, firms continue to engage in discretionary actions that commit capital, one of the most notable being open-market share repurchases, which makes them particularly interesting in stressed environments, as they may reflect managerial confidence, signal undervaluation, or represent strategic communication with the market.

Share repurchases have become a structural feature of U.S. corporate payout policy, especially since SEC Rule 10b-18 in 1982 established a safe harbor for open-market share repurchases (SEC, 2017). Today, repurchases routinely exceed dividends in aggregate payout volume and are used across industries to manage capital structure, return excess cash, and express managerial assessments of firm value (S&P Dow Jones Indices, 2018). The long-run evolution of repurchases relative to dividends is illustrated in Graph 1.

Graph 1: Share Repurchases and Dividends as a Percentage of Net Income for U.S. Firms (1998-2014)

The graph displays the long-run trends in aggregate share repurchases and dividends for S&P Composite 1500 firms. The figure highlights the structural shift toward repurchases in U.S. payout policy following the adoption of SEC Rule 10b-18.



S&P Dow Jones Indices LLC (2018)

A substantial empirical literature documents that repurchase announcements generate positive short-term abnormal returns, consistent with the view that share repurchases transmit new and value-relevant information to investors (Vermaelen, 1981; Ikenberry, Lakonishok & Vermaelen, 1995; Babenko, Tserlukevich & Vedrashko, 2012). However, less is known about when such signals become particularly credible or even informative.

Two firm characteristics stand out as potential amplifiers of a repurchase announcement's informational content: financial distress and unexpectedness. Financial constraints limit firms' ability to adjust payouts freely, making repurchases less routine and more informative when they occur. Consistent with this idea, Almeida, Fos & Kronlund (2016) show that firms actively manage their financial appearance around repurchases, highlighting that perceived financial strength influences investor reactions. Because firms typically follow stable repurchase routines (De Ridder, 2015), unexpected repurchases made after long periods of inactivity represent a clear departure from expected behavior. Such breaks in pattern may signal managerial timing ability or reflect changes in underlying firm conditions, leading investors to view these announcements as more deliberate and potentially more informative than routine share repurchases. Indeed, these mechanisms have been examined independently, but prior research has not reviewed whether distress and unexpectedness interact to produce stronger, weaker, or merely added-up market responses. Such question is particularly relevant given that both financially distressed repurchases and unexpected, pattern-breaking repurchases can reflect managerial discretion in timing share repurchases, potentially serving either as costly signals that reassure investors or as actions that raise concerns about firms' liquidity and underlying conditions.

Using a panel of U.S. listed firms from 2016 to 2024, we examine whether open-market repurchases by financially distressed firms generate stronger abnormal returns, and whether the degree of unexpectedness conditions this effect, addressing the gap previous studies have not filled. In addition, we consider the managerial perspective by examining whether firms' financial condition and deviations from their usual repurchase patterns reflect deliberate timing choices or strategic signaling by managers. Formally, the thesis investigates three research questions: *(1) Do repurchase announcements by financially distressed firms generate stronger short-term market reactions than those by financially healthy firms? (2) Does the unexpectedness of a repurchase announcement amplify (or moderate) the effect of financial distress on abnormal announcement-period returns? (3) Are financially distressed firms more likely to announce unexpected repurchases during periods of elevated market volatility?*

In guiding our analysis, we turn to the framework established by Babenko, Tserlukevich and Vedrashko (2012), whose treatment of repurchase announcements provides both a conceptual foundation and a methodological outline for our study, and they represent one of the most comprehensive analyses of announcement-period stock returns associated with open-market share repurchases. Two main reasons represent the suitability of their framework for this paper: First, they examine the immediate market reaction to repurchase announcements using an event-study design combined with cross-sectional regressions, allowing abnormal returns to be linked directly to firm and deal characteristics. Second, their emphasis on the informational role of repurchases aligns closely with our objective of understanding how markets interpret share repurchases under varying financial conditions. Babenko et al. show that announcement-period abnormal returns vary systematically with firm characteristics, establishing that repurchase do not produce uniform market reactions; stressing the importance for us to test which specific characteristics might drive that variation. Still, our study extends their framework in several important directions.

Their analysis focuses primarily on the average announcement effect across firms, whereas we investigate how this effect differs specifically for financially distressed firms. Furthermore, Babenko et al. do not incorporate repurchase unexpectedness as an explanatory factor; we build on extended literature suggesting that irregular or infrequent repurchases carry additional informational value (De Ridder, 2015; Peyer & Vermaelen, 2009). Integrating unexpectedness into the empirical design allows us to test whether departures from a firm's historical payout behavior amplify (or possibly weaken) the signaling role of a repurchase announcement. Finally, we complement the announcement-return analysis with a

probit framework that examines whether financial distress and pre-announcement market volatility jointly predict the likelihood of a firm issuing an unexpected repurchase announcement, allowing us to explore the decision environment surrounding share repurchases from a managerial rather than purely market-reaction perspective.

By combining an event-study methodology with cross-sectional time-series regressions, we estimate three-day buy-and-hold abnormal returns (BHARs) around the announcement date and relate their variation to financial distress (via the Altman Z -score), measures of unexpectedness, and their interaction. Repurchase-announcement data are obtained from the SDC Platinum database while daily stock returns and firm-level financial information are retrieved from Refinitiv Datastream, with missing accounting observations supplemented by S&P Capital IQ Pro to ensure completeness of our core variables. The empirical specification incorporates standard controls including firm size, valuation (Tobin's Q), pre-announcement stock run-up, insider activity, the percentage of shares sought, and stated repurchase-reason dummies, as well as industry and year fixed effects.

Our results provide no evidence that financial distress or announcement unexpectedness strengthen short-term market reactions to repurchase announcements. Instead, firm size and pre-announcement stock-price run-up emerge as the most consistent predictors of abnormal returns. Quantile regressions further show that distress plays only a marginal role even within the lowest Z -score quintile. Meanwhile, the probit analysis shows that unexpected repurchases in volatile markets are more likely to be initiated by financially healthy firms. The detailed findings are presented in later chapters.

II. Theoretical Framework and Literature Review

A. Foundation

Market reactions to share repurchase announcements draw on several core ideas in corporate-finance theory, including signaling, financial constraints, and managerial timing. This section introduces the key concepts that inform our approach. We first summarize the economic role of repurchases and the main theoretical explanations for their associated abnormal returns, covering classic signaling arguments as well as liquidity and agency-based perspectives. We then highlight the empirical foundations of modern repurchase research, with particular emphasis on Babenko et al. (2012), whose framework shapes our methodological choices, alongside the foundational contributions of Vermaelen (1981, 1995).

Next, we turn to the two firm characteristics central to our study: financial distress and the unexpectedness of repurchase activity. We review how distress affects the cost and credibility of corporate actions and how deviations from firms' historical repurchase patterns may amplify informational effects. We conclude by positioning our study within these literatures and explaining how our contribution arises from integrating distress and unexpectedness into a joint empirical setting. The section ends by presenting our hypotheses.

B. Core Theories and Market Evidence on Share Repurchases

Share repurchases have evolved into a dominant component of U.S. corporate payout policy and represent one of the most extensively studied information-bearing corporate actions (S&P Dow Jones Indices, 2018). A large body of work documents that repurchase announcements are followed by statistically significant positive abnormal returns, suggesting that they communicate new and value-relevant information to investors. The foundational contribution of Vermaelen (1981) first established this empirical regularity, interpreting repurchases as credible signals of undervaluation. He used short-horizon event-study framework and documented significantly positive announcement-period CARs interpreting open-market repurchases as credible signals of undervaluation. If such signaling dynamics still hold in modern markets, we would expect distressed firms, to generate stronger announcement

returns. Ikenberry, Lakonishok and Vermaelen (1995) expanded the analysis by examining long-run post-repurchase performance (48-month post-repurchase horizon) and showed that firms with low market-to-book ratios experience particularly pronounced announcement effects, consistent with managerial trials to correct perceived market mispricing. If this mechanism applies today, distress (often correlated with low valuations) should amplify short-term CARs, making it empirically meaningful for us to test whether financially weaker firms experience stronger announcement effects. As presented earlier, the central empirical foundation for this thesis is Babenko et al. (2012), whose study advanced this transition by analyzing large-scale U.S. repurchase data with richer cross-sectional firm characteristics, thereby remains one of the most comprehensive analyses of open-market share repurchase. Babenko et al. demonstrate that the announcement alone, regardless of subsequent execution, generates economically meaningful abnormal returns.

We emphasize how their work highlights two insights essential to our study: (1) Open-market announcements themselves carry informational value, independent of realized repurchase activity; and (2) Announcement effects vary systematically with firm and deal characteristics, motivating the inclusion of control variables such as firm size, market-to-book ratio, insider activity, run-up, and repurchase program size, all of which we adopt from their empirical framework.

C. Emerging Perspectives: Distress and Surprise

Building on this core evidence that repurchases carry informational content, a substantial body of work examines when and why these announcements become particularly credible to investors. Brav et al. (2005) show that managers view repurchases as opportunistic tools for communicating new information to the market, in contrast to dividends, which represent long-term payout commitments. Similarly, Jagannathan, Stephens and Weisbach (2003) emphasize the flexibility of repurchases under uncertainty, while Skinner (2008) documents the broader shift from dividends toward repurchases partly due to their informational advantages. Together, these studies establish repurchases as strategic actions whose signal strength varies with firm characteristics and timing.

Research increasingly examines how a firm's financial condition influences both the credibility and the consequences of share repurchase announcements. Almeida, Fos and Kronlund (2016), using detailed data on repurchase volumes and corporate investment, show that repurchases crowd out future investment and tighten financial flexibility. Using RD-IV design, they document that EPS-motivated repurchases have material impact, for example part of their results indicate; capex decline by 0.10-0.22% of assets, R&D reduction by 0.03-0.06% of assets as well as employment reduction by roughly 0.5 employees per million USD of assets. Although their design focuses on EPS-motivated repurchases, not undervaluation or signaling per se, these results highlight that financial condition materially shapes the credibility and implications of repurchase decisions and that repurchase signals should vary systematically with financial condition, which comparably could be applied to this study. Complementing this, Massa, Schumacher and Wang (2025) analyze U.S. firms across periods of heightened volatility, using a natural experiment based on mergers between asset managers, they implement a "difference-in-difference" design and demonstrate that firms' repurchase decisions are shaped by the market environment – particularly liquidity and price-impact conditions. Together with Almeida et al., these studies underscore that both firm condition and market structure shape how repurchase announcements are interpreted. Hillert, Maug and Obernberger (2016) offer related evidence using high-frequency trade data: repurchases reduce adverse-selection risk and improve market liquidity, effects that are most pronounced for firms with deteriorating financial conditions. While these studies demonstrate that financial condition can heighten the economic cost and potential credibility of a repurchase or not, they do not directly speak to how distress or inactivity shapes the

announcement-period returns associated with open-market repurchases and Babenko et al (2012) remain the most established and modern empirical reference for open-market announcement return studies. Interestingly, Bonaimé, Öztekin and Warr (2014) adds a capital-structure perspective to this discussion combined with the usage of announcement-period returns and show that these differ systematically depending on whether firms are underlevered or overlevered. They estimate three-day CARs $[-1, +1]$ around each announcement using a standard market model (CRSP VW index), results equaled following, overvalued: 1.4% CAR, undervalued: 2.3% CAR, both highly significant. The interpretation of this is that repurchases by undervalued firms create more value because the stock is “cheap.” To add more dimension to this the authors also included an interaction term which captured strong significant of underlevered + undervalued firms having the highest CARs. They concluded that managers incorporate leverage position and perceived mispricing when deciding whether to announce repurchases.

Another dimension that increases the informational value of repurchases is whether the announcement is expected or unexpected: the so called “surprise” perspective of our study. De Ridder (2015) builds monthly portfolios of firms with infrequent programs (≤ 2 programs) and frequent programs (≥ 3 programs), and through these show that firms with infrequent or irregular repurchase activity experience significantly larger announcement-period returns, consistent with the idea that departures from a firm’s usual repurchase pattern convey more new information to investors. Stating that unexpected repurchases matter because of pattern deviation, not because managers buy “cleverly” at low prices. Supporting this view, Skinner (2008) conducts a large-scale empirical study of how U.S. firms’ payout policies evolve over 1980 to 2005 and through the classic Lintner (1956) dividend model, shows that repurchase flexibility allows firms to time announcements strategically. We also find contributing aspects to this theme from the field-study of Brav et al. (2005). Using a large-scale survey of 384 executives and 23 in-depth interviews, they show that managers view share repurchases as a flexible, discretionary payout tool used after investment needs are met. Results reflected that repurchases are accelerated when managers perceive their stock as undervalued, hence that managers repurchase when they have something meaningful to reveal. Combined these studies indicate that repurchase frequency influences market reactions, which foundational work such as Vermaelen (1981, 1995) do not investigate as they center around the average announcement effects and do not distinguish between expected and unexpected repurchases. Similarly, Babenko et al. (2012) document how firm and program characteristics shape returns but do not incorporate a history-based “surprise” measure. Hence, above findings give us further base to elaborate our study on.

D. Contribution

This thesis contributes to the repurchase literature by extending existing frameworks in three key directions. First, while prior studies such as Vermaelen (1981; 1995) and Babenko et al. (2012) examine average market reactions without conditioning returns on firms’ financial health, we explicitly condition market reactions on firms’ financial health. By incorporating the Altman Z-score, we evaluate whether financially distressed firms experience systematically different short-term abnormal returns when announcing open-market repurchases. Second, we test the interaction between distress and inactivity, an angle absent from foundational signaling papers such as Babenko et al. (2012) and Bonaimé et al. (2014). Third, extending insights from Brav et al. (2005), Skinner (2008), and Massa et al. (2025), we move beyond market reactions and examine whether distress and market volatility jointly shape managerial timing incentives. Finally, we strengthen the empirical foundation of prior studies by using a modern 2016-2024 panel enriched with stated-reason controls, industry and year fixed effects, and extensive robustness checks.

E. Hypothesis

i. Unprofitable firms announcing share repurchases experience stronger cumulative abnormal returns (CARs) than profitable firms

The premise behind this hypothesis rests on classic signaling theory, which predicts that costly managerial actions convey more credible information to investors. Repurchases undertaken by financially distressed or unprofitable firms are inherently more costly because these firms have limited liquidity and impaired access to external financing; undertaking a share repurchase therefore reflects a stronger commitment of scarce resources. Existing research supports this reasoning; Dittmar (2000) shows that firms with greater financial flexibility use repurchases to signal undervaluation and managerial confidence; related evidence in Almeida, Fos & Kronlund (2016) highlights that repurchases are often shaped by managerial incentives and balance-sheet constraints, reinforcing the idea that payout decisions respond to financing frictions. Empirical evidence also indicates that investors reward firms more when share repurchases convey information that is difficult to reveal through cheaper mechanisms, such as voluntary disclosures (Vermaelen, 1981; Ikenberry, Lakonishok & Vermaelen, 1995). Based on this logic, we expect unprofitable or financially distressed firms to generate stronger positive announcement effects, as the market interprets their repurchases as more informative and more credible.

ii. Abnormal returns are higher when the repurchase is a surprise (i.e., not recurring in recent years)

Firms that frequently repurchase shares may be perceived as following a standard payout policy, while unexpected share repurchase announcements are more likely to convey new and value-relevant information to investors: This hypothesis draws on the idea that the informational content of repurchase announcements depends heavily on whether the action deviates from a firm's historical payout behavior. Frequent repurchasers may be viewed as following a routine payout strategy, meaning investors anticipate and discount the announcement (Peyer & Vermaelen, 2009; Stephens & Weisbach, 1998). In contrast, unexpected repurchases, those announced after a long period of inactivity, are more likely to provide new information about managerial beliefs regarding valuation. Earlier studies find that infrequent repurchasers experience significantly stronger announcement-period abnormal returns, consistent with these events being perceived as "news shocks" rather than typical corporate actions (De Ridder, 2015; Ikenberry et al., 1995). Because these announcements deviate from established patterns, investors may interpret them as reflecting new managerial information, prompting stronger short-term price reactions. We therefore expect higher abnormal returns for unexpected repurchases.

iii. Unexpected repurchase announcements are more likely to occur when financially distressed firms face high market volatility

This hypothesis posits that financial distress and market volatility jointly shape firms' likelihood of making unexpected share repurchase announcements, with distressed firms becoming particularly inclined to break from prior payout patterns when operating in uncertain market environments. During periods of heightened market volatility, uncertainty about external financing increases, and firms, particularly those with elevated financial risk, face stronger incentives to use internal policy tools to communicate stability or confidence. Past research shows that firms facing valuation frictions or financing constraints adjust repurchase activity strategically, using repurchases as a mechanism to address information asymmetry and signal firm value (Almeida, Fos & Kronlund, 2016). By employing market volatility as an indicator of uncertainty, inspired by Massa et al. (2025), this hypothesis proposes that distressed firms become more likely to issue unexpected share repurchases precisely when market conditions are turbulent.

III. Data

A. The Ideal Data Set

In an ideal empirical setting, the informational role of share repurchase announcements would be evaluated using a dataset in which firms are identical across all relevant dimensions except for the two mechanisms of interest: financial distress and the unexpectedness of repurchase activity. In such a setting, the same firms would issue repurchase announcements under randomly varying financial conditions and at exogenously determined intervals, allowing distress and announcement surprise to be isolated as clean, unconfounded shocks. Firms would also reveal their true repurchase motives, enabling the researcher to distinguish signaling-driven announcements from routine capital-management actions with perfect accuracy. Additionally, insider activity would be more appropriately captured through a continuous metric rather than a binary dummy as used in our models, which cannot reflect the magnitude or intensity of insider trading. Furthermore, it would contain precise intraday timestamps for every repurchase announcement, ensuring that event dates align exactly with the first moment at which markets could incorporate the information. It would also include complete forward-looking execution data, daily repurchase volumes, prices, and broker identities, eliminating the need to infer informational effects from announcements alone. Moreover, all firms would have complete accounting information for every quarter, with no missing values for variables required to construct distress measures, market-to-book ratios, run-up metrics, or any other firm-level characteristic. Finally, macroeconomic conditions would remain constant across firms and over time, so that observed market reactions could be attributed solely to the firm-specific informational content of the announcement. Periods such as the TCJA-driven repurchase wave or the Covid-19 liquidity shock would either be absent or perfectly observable in the form of exogenous, firm-specific shocks rather than economy-wide shifts, eliminating concerns regarding time trends or regime changes.

B. Share Repurchase Data

This thesis focuses exclusively on open-market repurchases. Although firms may repurchase shares through different mechanisms, open-market repurchases are widely regarded as the standard and most commonly used method of share repurchase in the U.S. (Jagannathan & Stephens 2003; Dittmar 2000; Grullon & Michaely 2004; Babenko et al. 2012). Unlike tender offers with fixed premia, open-market announcements require investors to infer managerial intent, making them the most suitable setting for analyzing informational effects. Information on open-market share repurchase programs was collected from Refinitiv Workspace (Eikon) via SDC Platinum, a leading global database for corporate actions and the same primary source used by Babenko et al. (2012) to identify repurchase announcements. SDC Platinum provides consistent identification of firm-level repurchase events, including the announcement date, Datastream identifiers, tickers, the repurchase mechanism (open-market, tender offer, etc.), the number of shares sought, market cap, the stated reason for the share repurchase, and the firm's SIC classification. However, while they supplement SDC Platinum with CRSP return data and proprietary Thomson insider-trading filings, we construct variables absent from SDC Platinum (such as shares outstanding on the announcement date, market capitalization, and financial-statement inputs for Z-scores and control variables) by merging the SDC Platinum dataset with LSEG Workspace/Datastream. LSEG provides high-frequency market and accounting data analogous to CRSP and Compustat, ensuring complete firm-level information while maintaining internal consistency across observations. We concluded that this integrated approach preserves the methodological logic of Babenko et al. while appropriately adapting the data sources to the requirements of our study.

Given this data architecture, which relies on detailed event disclosures and high-frequency market information, the United States provides an especially suitable setting for

our analysis. U.S. equity markets combine deep liquidity, consistent reporting standards, and a transparent regulatory environment that facilitates accurate identification and interpretation of repurchase announcements. In particular, the legal framework governing repurchases is shaped by SEC Rule 10b-18, adopted in 1982, which establishes a “safe harbour” from market-manipulation liability for firms conducting open-market repurchases, provided that four execution conditions are met: (1) manner of purchase (repurchases must be executed through a single broker or dealer per day), (2) timing limitations (firms may not repurchase at the opening trade or during the last 10-30 minutes of trading, depending on listing venue), (3) price limitations (repurchase prices may not exceed the highest independent bid or last transaction price), and (4) volume limitations (daily repurchases must not exceed 25% of average daily trading volume). Although the rule does not mandate disclosure or require firms to follow these parameters, compliance provides legal protection and has led to a standardized institutional environment in which open-market repurchases are executed. This kind of regulatory consistency enhances comparability across firms and ensures that repurchase announcements occur within a transparent and well-understood framework, enhancing the quality of our dataset (Fama & French, 1992; Bonaimé, Öztekin & Warr, 2014). As discussed, since this thesis examines the informational content of discretionary repurchase activity, the sample is restricted to announcements explicitly identified as open-market programs (constituting the vast majority of U.S. share repurchase activity, S&P Dow Jones Indices, 2018) consistent with prior literature.

The initial download contained all repurchase announcements made by U.S. firms listed on Nasdaq, NYSE, NYSE Arca, NYSE American, and NYSE MKT between 1 January 2016 and 31 December 2024. This horizon captures a period of unusually active repurchase behavior, making it suitable for studying how distress interacts with repurchase signaling. In particular, two structurally distinct phases in U.S. corporate payout behavior: the post-Tax Cuts and Jobs Act (TCJA) repurchase wave beginning in 2018, and the Covid-19 liquidity shock of 2020-2021. The TCJA generated an unprecedented surge in repurchases, driven largely by firms’ repatriation of foreign earnings and newly available excess cash, rather than informational motives. In contrast, the COVID-era market stress and liquidity compression induced firms to reassess financing policies, making repurchases far more sensitive to balance-sheet conditions. Because these macro-regime shifts materially affect both the volume and the motivation behind repurchase announcements, it is essential to incorporate controls that are introduced in detail further.

SDC Platinum reports repurchase announcement dates but does not indicate whether announcements were released during or outside of trading hours. Because event studies require the event date to correspond to the first moment at which markets could react, we adjust all announcement dates to ensure alignment with actual trading opportunities. First, announcements dated on weekends are reassigned to the next available trading day. Second, U.S. federal holidays are identified using the NASDAQ/NYSE Trading Calendar (see Appendix C) to prevent assigning event dates to days on which markets were closed. These adjustments follow standard practice in event-study methodology, where the precise mapping between the information-release date and the market’s first reaction window is critical for isolating announcement effects (Grullon & Michaely, 2004). Third, cases in which SDC Platinum did not report data stream identifiers but rather only tickers, the Datastream identifiers were manually searched and filled in. Observations with missing Datastream identifiers were removed and announcements linked to repurchase mechanisms other than open-market programs were excluded. In addition, all firms trading below 1\$ immediately prior to our event window: $t = -2$ were also not included, following Babenko et al. (2012).

As SDC Platinum frequently logs multiple announcements referencing the same authorization, often because news is disseminated through several channels. To avoid

overstating event frequency: When a firm made multiple announcements within the same calendar month, only the first was retained. Following Grullon & Michaely (2004), financial and regulated firms were not excluded, as they represent more than 55% of repurchasing firms in our period. Nonetheless, robustness tests excluding these sectors confirm that our primary results are not driven by their inclusion. Finally, announcements for which required trading or financial data were unavailable were removed from the sample. A complete overview of all filtering steps is summarized in Table 1.

Table 1: Mapping of Filtering Actions

| Filtering Action | Number of Data Points | |
|--|-----------------------|-------|
| | Before | After |
| 1. Removal of all repurchase techniques other than open-market | 3 214 | 3 153 |
| 2. Removal of missing identifiers | 3 153 | 3 148 |
| 3. Removal of multiple announcements within the same month | 3 148 | 3 115 |
| 4. Removal of firms trading under \$1 at $t = -2$ | 3 115 | 3 083 |
| 5. Removal of firms with missing trading and/or financial data | 3 083 | 2 426 |

C. Trading and Financial Data

To evaluate market reactions and construct firm-level characteristics, our analysis integrates daily return data and accounting fundamentals from LSEG workspace and S&P Capital IQ Pro for all firms included in the repurchase sample extracted from SDC Platinum. This allowed the construction of daily raw returns, buy-and-hold abnormal returns (BHARs) over the event window and market-model estimates for robustness testing. As the SDC Platinum dataset does not report the exact intraday timing of repurchase announcements, it is not possible to determine whether the announcement occurred pre-open, intraday, or post-close. Consequently, share price reactions are measured using a three-day event window centered on the effective announcement date $[-1, +1]$, which mitigates timing uncertainty and is consistent with established methodologies in the share repurchase literature (e.g., Grullon & Michaely, 2004; Bonaimé, Öztekin & Warr, 2014). This approach mirrors the event-study design in Babenko et al. (2012), who likewise combine SDC Platinum announcement data with daily stock returns to compute short-horizon abnormal performance.

To construct the explanatory variables used in our analysis, we retrieve firm-level accounting and market data from Refinitiv Datastream, more specifically information on total assets, working capital, EBIT, retained earnings, total liabilities, sales/revenue, cash flow, market-to-book value of equity, operating income before depreciation, net income, and depreciation and amortization, as well as the number of shares outstanding. All financial statement items and market-value measures are retrieved in U.S. dollars (USD). All firm-level variables are recorded as of the fiscal period closest to and preceding the announcement date, ensuring that they reflect information available to the market at the time of the repurchase announcement. Although Datastream provides comprehensive coverage for most firms, certain variables (particularly working capital) were missing for a subset of observations. To ensure complete computation of key ratios, most notably the Altman Z-score, missing values were supplemented using S&P Capital IQ Pro. After applying the filtering procedures described above (summarized in Table 1), the final dataset comprises 2,426 repurchase announcements with complete return and financial information. Table 2 presents descriptive characteristics of this sample by industry, year, and stated repurchase purpose.

Table 2: Repurchase Announcement Data by Industry, Year and Repurchase Purpose

| |
|---|
| This table summarizes the 2,426 open-market share repurchase announcements in our final sample during 2016–2024. Panel A reports the distribution by 2-digit SIC industry, Panel B by announcement year, and Panel C by the firm’s stated repurchase purpose. |
|---|

Table 2 (Continued): Repurchase Announcement Data by Industry, Year and Repurchase Purpose

| <i>Panel A: Distribution by Industry</i> | | | <i>Panel B: Distribution by Year</i> | |
|--|-----------------------------------|---------------|--------------------------------------|---------------|
| 2-digit SIC | Industry | Announcements | Year | Announcements |
| 01-09 | Agriculture, forestry and fishing | 4 | 2016 | 261 |
| 10-14 | Mining | 23 | 2017 | 237 |
| 15-17 | Construction | 27 | 2018 | 238 |
| 20-39 | Manufacturing | 485 | 2019 | 160 |
| 40-49 | Transportation and communication | 109 | 2020 | 189 |
| 50-51 | Wholesale trade | 46 | 2021 | 271 |
| 52-59 | Retail trade | 147 | 2022 | 457 |
| 60-67 | Finance and insurance | 550 | 2023 | 315 |
| 70-89 | Services | 346 | 2024 | 298 |
| 91-99 | Public administration | 689 | | |

| <i>Panel C: Distribution by Repurchase Purpose</i> | |
|--|---------------|
| Repurchase Purpose | Announcements |
| General Corporate | 2 063 |
| Employee Benefit | 4 |
| Enhance Shareholder Value | 325 |
| Offset Dilution | 11 |
| Stock Option | 2 |
| Undervalued | 30 |

D. Time series regression

Our empirical design embeds the event-study measures within a modern time-series cross-sectional regression framework, allowing repeated announcements per firm and enabling industry and year fixed effects to absorb unobserved heterogeneity. This panel structure enhances identification and aligns the abnormal-return analysis with contemporary empirical standards.

Abnormal Returns

To quantify the informational content of share repurchase announcements, we compute abnormal stock returns over a short event window surrounding the effective announcement date. Following the established framework of Babenko et al. (2012), abnormal performance is measured using three-day buy-and-hold abnormal returns (BHARs), defined as the firm's realized buy-and-hold return from trading day -1 to $+1$ relative to a broad market benchmark (see Appendix B for the full mathematical specification). Formally, BHAR captures the cumulative return an investor would earn by holding the stock across the announcement window, net of what would have been earned by instead holding the market portfolio over the same horizon.

In line with standard practice in U.S. event-study research, we benchmark firm returns against the S&P 500 index, whose breadth, liquidity, and extensive empirical validation make it the dominant proxy for market-wide movements (Fama & French, 1993; Campbell, Lo & MacKinlay, 1997). The chosen three-day window $[-1, +1]$ serves several methodological purposes and again gives consistency by following Babenko et al. (2012). First, it captures the immediate price adjustment to newly released repurchase information, isolating the market's short-run interpretation of managerial intent. Second, the inclusion of day -1 accommodates information releases that occur after market close on the SDC-stamped date, disclosures that market participants may begin processing before the next trading session. Third, day $+1$ allows for post-announcement drift arising from delayed processing or intraday release timing, a consideration particularly relevant because SDC Platinum does not report intraday timestamps. The three-day window therefore mitigates measurement noise associated with unknown disclosure timing while maintaining a sufficiently narrow horizon to isolate event-driven effects.

E. Variables

Explanatory variables

The explanatory variables are selected to capture the two core mechanisms theorized to shape the informational value of repurchase announcements: financial distress, which affects the credibility and costliness of repurchase signals (Almeida, Fos & Kronlund, 2016), and unexpectedness, which determines whether the announcement conveys new information to the market (De Ridder, 2015). These mechanisms are grounded in established signaling theory, where costly actions (such as repurchases by financially constrained firms) and deviations from prior behavior (such as irregular or infrequent repurchases) enhance the informativeness of corporate announcements.

Financial Distress

Financial distress is measured using the Altman Z-score, a widely applied composite indicator that integrates profitability, leverage, liquidity, and solvency dimensions (Altman, 1968; Altman, 2000). The Z-score is constructed as a linear combination of five accounting-based ratios; working capital/total assets, retained earnings/total assets, EBIT/total assets, market value of equity/total liabilities, and sales/total assets, originally derived using multiple discriminant analysis to maximize separation between bankrupt and non-bankrupt firms (Altman, 1968). In this thesis, the Z-score is used as a continuous variable, where lower values indicate heightened distress and reduced financial flexibility (see Appendix B for the full mathematical specification). Consistent with the original framework, firms with Z-scores below the lower threshold are interpreted as financially distressed, while those in the intermediate “gray zone” indicate elevated (but not critical) risk. This coding approach leverages the established interpretive boundaries (e.g., scores below 1.81 indicating high distress) of the Z-score without imposing arbitrary cutoffs. Using the continuous Z-score rather than a binary distressed/non-distressed dummy preserves variation in financial condition across firms, allowing more precise estimation of how distress interacts with other signaling mechanisms such as announcement surprise.

Unexpectedness

To capture the unexpectedness of repurchase announcements, we construct firm-level proxies based directly on each company’s historical repurchase activity. Following the empirical approach of De Ridder (2015), who models announcement reactions using cross-sectional CAR regressions conditioned on repurchase history, we define unexpectedness using two complementary measures. First, we compute the number of months since the firm’s last repurchase announcement, which provides a continuous measure of announcement inactivity. Second, we create a binary indicator for unexpected repurchases that equals 1 when the firm has not made any repurchase announcement in the previous three years. In line with Peyer and Vermaelen (2009), who emphasize the relevance of past payout behavior for explaining short-term CARs, this three-year threshold allows us to classify announcements following prolonged inactivity as unexpected. Announcements by firms that have repurchased within the last three years are coded as 0.

Market Volatility

Market-wide uncertainty is captured using a measure of pre-announcement volatility computed over the same window used to calculate the stock-price run-up, trading days -43 to -3 relative to each repurchase announcement. Volatility is calculated as the standard deviation of daily returns on the S&P Composite Index over this horizon, providing a broad, liquid benchmark for aggregate market conditions. We adopt the -43 to -3 window following Babenko et al. (2012), who use this pre-announcement horizon to measure stock-price run-up. Aligning our volatility measure with the established run-up window ensures methodological consistency with prior repurchase studies and allows both firm-level and

market-level conditions to be captured over an identical information set. Using a pre-event window also ensures that the volatility measure reflects the information environment managers face when deciding whether to initiate a repurchase, rather than movements influenced by the announcement itself. Specifically, we incorporate the market volatility into the probit regression model, where it serves as a key explanatory variable for predicting the likelihood of an unexpected repurchase announcement under varying levels of market uncertainty. By incorporating this volatility measure, the analysis gains a macroeconomic dimension that sharpens our third hypothesis by showing how repurchase decisions are shaped not only by firm fundamentals but also by broader shifts in market sentiment and financing conditions.

Interaction term

To assess whether different signaling channels reinforce one another, this thesis examines interaction effects in both the return regressions and the probit model. In the OLS specifications, we include an interaction between financial distress and announcement unexpectedness, capturing whether distressed firms generate disproportionately stronger abnormal returns when they repurchase after long periods of inactivity, when both the credibility of the signal (distress) and the novelty of the announcement (unexpectedness) are high. This interaction tests for a potential “double-layered” signaling effect, where repurchases by financially weak firms may be interpreted as especially informative when they occur unexpectedly. In the probit regression, we incorporate an interaction between financial distress and market volatility to evaluate whether firms’ likelihood of initiating an unexpected repurchase depends jointly on internal financial conditions and the external information environment. This allows us to test whether distressed firms behave differently under high market uncertainty, shedding light on how macroeconomic conditions shape repurchase timing decisions.

Control variables

Firm Size

Firm size is measured as the natural logarithm of market capitalization. Although much of the repurchase-announcement literature, including Babenko et al. (2012), uses the logarithm of book assets as a scale measure, market capitalization is an equally established and widely used alternative for capturing firm size in empirical asset-pricing and corporate-finance research (e.g., Fama & French, 1992; Berk, 1995). Using a market-based measure is particularly appropriate in our setting, as the study focuses on financial distress proxied by the Altman Z-score, which itself incorporates book-value components such as total assets. Employing $\log(\text{market cap})$ therefore avoids mechanical overlap with the distress measure and provides a cleaner control for firm size when examining cross-sectional variation in announcement-period abnormal returns.

Market-to-Book Ratio (Tobin’s Q)

The market-to-book ratio serves as an established proxy for growth opportunities and perceived undervaluation. Babenko et al. (2012) include Tobin’s Q as a key firm characteristic in their announcement-return regressions, noting that valuation levels meaningfully shape market reactions to repurchase signals. Firms with low Q-ratios are more likely to regard their shares as undervalued (Ikenberry et al., 1995), and such valuation gaps can enhance the credibility of signaling motives associated with repurchases (Dittmar, 2000). Incorporating Tobin’s Q as a control therefore helps capture cross-sectional differences in firm fundamentals and ensures that estimated announcement returns reflect informational effects rather than systematic variation in growth prospects or valuation conditions.

Pre-Announcement Stock Run-Up

The pre-announcement stock run-up variable measures the firm's abnormal stock return over the period from trading day -43 to trading day -3 relative to the repurchase announcement date. Abnormal returns are calculated using the market model, ensuring that the measure captures price movements beyond market-wide effects. This variable accounts for recent short-term performance trends that may influence announcement-window returns. Consistent with the empirical design in Babenko et al. (2012), controlling for pre-announcement run-up helps separate the effect of the repurchase announcement itself from preceding stock-price dynamics.

Repurchase Program Size

The relative size of the repurchase authorization is captured by the percentage sought. Babenko et al. (2012) measure repurchase program size using the announced dollar value of the intended share repurchase normalized by the firm's market value of equity. Due to data limitations, the dollar value of the authorization is not available in our dataset. We therefore construct an analogous measure based on the number of shares rather than dollar amounts. Specifically, repurchase program size is calculated as the number of common shares the firm announces it intends to repurchase divided by the total number of shares outstanding at the announcement date. This approach preserves the relative scale interpretation used in Babenko et al. (2012) while adapting the variable to the data available for our sample.

Insider Trading

Insider trading activity is included as a control variable to account for the possibility that managers with private information may trade around repurchase announcements, thereby influencing observed market reactions. Prior research shows that insider purchases frequently accompany undervaluation signals and can strengthen the credibility of repurchase announcements (Babenko et al., 2012). To capture this channel, we construct a dummy variable equal to 1 if the firm reports any insider trading activity during the fiscal year preceding the announcement date, and 0 otherwise. Insider-trading information is sourced from LSEG Insiders Data, which covers transactions disclosed in SEC Forms 3, 4, 5, and 144. Including this variable helps ensure that estimated announcement-period abnormal returns reflect the informational content of the repurchase itself rather than confounding effects from managerial trading, thereby isolating the incremental role of financial distress and unexpectedness in shaping market reactions.

Cash Flow

Firm cash flow is measured as operating income before depreciation scaled by the book value of assets, consistent with the definition used by Babenko et al. (2012). Operating income before depreciation captures the firm's underlying operating cash generation prior to non-cash charges, while scaling by book assets adjusts the measure for firm size.

Stated reason for Repurchase Dummies

To capture managerial intent behind share repurchases, we introduce a set of stated-reason dummy variables based on the textual disclosures in each announcement. These categories include general corporate purposes, employee-benefit purpose, stock-option purpose, offsetting dilution purpose, enhancing shareholder value, and undervaluation. Importantly, Peyer and Vermaelen (2009) show that stated motives contain insider information: in particular, announcements citing undervaluation are associated with significantly higher abnormal returns. Although Babenko et al. (2012) do not control for stated motives, incorporating them allows us to account for variation in managerial objectives that may shape how investors interpret the announcement. This addition aligns with signaling theory, as the perceived credibility and economic meaning of a repurchase can vary markedly depending on

the motive the firm communicates, making it important to control for these differences in our empirical setup.

Year Fixed Effects Dummies

To account for time-specific shocks that may influence repurchase announcements or market reactions, we include year fixed-effects dummies for each calendar year in our sample period (2016 to 2024). These indicators control for macroeconomic conditions, regulatory changes, and market-wide fluctuations that could otherwise confound the estimated relationships. By absorbing variation attributable to a specific year, the fixed effects ensure that the empirical results reflect cross-sectional differences between firms rather than year-driven patterns in repurchase activity or announcement returns.

Industry Fixed Effects Dummies

To control for systematic differences in repurchase behavior and announcement returns across sectors, we include industry fixed effects based on 2-digit SIC classifications, following Babenko et al. This approach groups firms into economically meaningful sectors (Agriculture, Forestry&Fishing; Mining; Construction; Manufacturing; Transportation&Communication; Wholesale Trade; Retail Trade; Finance&Insurance; Real Estate; Services; and Public Administration). Using the 2-digit SIC level strikes a balance between granularity and sample size: it is detailed enough to capture sector-specific variation in payout norms, information environments, and operating characteristics, while still ensuring sufficient observations within each category for reliable estimation. Each industry dummy equals one if the firm belongs to the corresponding SIC sector and zero otherwise, allowing the regression to absorb systematic cross-industry differences in announcement behavior and market reactions.

Table 3 reports summary statistics for all continuous variables used in the regression analysis; indicator (dummy) variables are excluded.

Table 3: Summary Statistics of Main Continuous Variables

| Variable | Mean | Median | 1 st | 99 th | St. Dev. | t-Test |
|-------------------------|---------|---------|-----------------|------------------|----------|------------|
| 3-day BHAR | 0.0139 | 0.0071 | -0.1822 | 0.2539 | 0.0650 | 10.5397*** |
| 5-day BHAR | 0.0034 | 0.0008 | -0.1882 | 0.2321 | 0.0617 | 2.7109** |
| 3-day CAR | 0.0142 | 0.0071 | -0.1969 | 0.2605 | 0.0657 | 10.6375*** |
| 5-day CAR | 0.0126 | 0.0079 | -0.2613 | 0.3041 | 0.0839 | 7.3676*** |
| Z-score | 3.5730 | 2.1041 | -11.4063 | 39.6652 | 6.6103 | |
| O-score | 0.2598 | 0.2485 | -9.1049 | 9.8453 | 2.9552 | |
| Firm Size | 6.9216 | 6.8085 | 2.3978 | 12.3782 | 2.0758 | |
| Tobin's Q | 3.1681 | 1.7050 | -13.3681 | 35.7212 | 5.5897 | |
| Repurchase Program Size | 0.2289 | 0.0507 | 0.0008 | 9.0098 | 1.0469 | |
| Stock Price Runup | -0.0237 | -0.0193 | -0.5413 | 0.4310 | 0.1649 | |
| Cash Flow | 0.0823 | 0.0777 | -0.5142 | 0.3980 | 0.1323 | |

This table presents summary statistics for the main continuous variables used in the empirical analysis. The variables include abnormal announcement-period returns, financial distress measures, valuation ratios, firm size, pre-announcement price dynamics, repurchase program size, and operating cash flow. For each variable, we report the mean, median, 1st and 99th percentiles, standard deviation, and the t-statistic from a two-sided test of whether the mean differs from zero. Statistical significance at the 1%, 5%, and 10% levels is denoted by ***, **, and *, respectively

IV. Methodology

A. Background

The empirical strategy of this thesis builds on the event-study and cross-sectional framework established by Babenko et al. (2012), who show that open-market repurchase announcements produce immediate, measurable stock-price reactions. While their design provides a natural foundation for analyzing how firm characteristics shape announcement returns, our research question requires extending it to isolate the joint role of financial distress and announcement unexpectedness in shaping informational content. Ideally, identification would rely on exogenous variation in firms' financial conditions or randomized repurchase opportunities, but, as in most corporate-finance settings, firms endogenously choose both when and whether to repurchase, and distress co-moves with other unobservable

determinants of payout policy. As a result, the analysis necessarily relies on observational data and careful modelling choices rather than experimental variation.

Against this backdrop, we adopt a two-stage empirical approach that adapts but meaningfully extends the methodology of Babenko et al. Following the established methodology of Ikenberry et al. (1995), Grullon and Michaely (2004), and Babenko et al. (2012), we first compute abnormal stock returns surrounding the repurchase announcement to capture the market’s immediate reaction. Second, rather than estimating purely cross-sectional regressions, we employ a time-series cross-section (panel) framework that incorporates year and industry fixed effects. This allows us to absorb macroeconomic regimes (e.g., post-TCJA repurchase surges or COVID-era liquidity constraints), sectoral patterns in payout policy, and unobserved time-invariant firm characteristics. This structure is better suited to our objective of isolating how distress and unexpectedness shape announcement returns in the presence of endogenous timing. Third, we complement the return-based analysis with a Probit regression that models the probability of an announcement being unexpected, thereby evaluating whether distress and market-wide conditions jointly influence firms’ repurchase timing decisions.

B. Statistical T-tests

As an initial step in the empirical analysis, we evaluate whether repurchase announcements are associated with statistically significant abnormal stock-price reactions. Consistent with the approach introduced by Vermaelen (1981), we conduct two-sided t-tests of the null hypothesis that the mean abnormal return in the event window equals zero. These tests assess whether the announcement-period abnormal returns observed in our sample reflect systematic market reactions rather than random variation. Rejecting the null hypothesis provides evidence that share repurchase announcements convey information to the market and generate measurable short-term price effects, thereby motivating the subsequent cross-sectional regression analysis.

C. Time Series Regression

In the second step, we estimate Ordinary Least Squares (OLS) regressions to examine whether firm-level characteristics explain cross-sectional variation in the three-day buy-and-hold abnormal return (BHAR). While Babenko et al. (2012) adopts a purely cross-sectional approach, our dataset contains repeated repurchase announcements from the same firms across multiple fiscal years. We therefore implement a time-series cross-sectional OLS framework, with standard errors clustered at the firm level, allowing us to account for serial correlation within firms and exploit the full panel structure of the data.

All regressions use the repurchase announcement as the unit of observation, with firm characteristics measured as the latest financial information reported prior to the announcement date. To ensure comparability across specifications, a consistent set of controls is included: firm size, market-to-book (Tobin’s Q), stock-price run-up, repurchase-program size, cash flow, and insider trading. In addition, each model incorporates vectors of dummy variables for stated repurchase motives, announcement years (2016 to 2024), and 2-digit SIC industries. To avoid perfect multicollinearity (the dummy-variable trap) one category within each dummy set is omitted and serves as the reference group (General Corporate Purpose, 2016, and Manufacturing). All continuous variables are winsorized at the 1st and 99th percentiles to limit the influence of extreme observations and align with standard empirical practice.

Building on the baseline regressions, we further examine whether the relationship between firm characteristics and announcement-period abnormal returns varies systematically across the financial-distress distribution. Firms are sorted into quintiles based on their Altman Z-scores, and the BHAR regressions are re-estimated separately within each quintile. This subsample strategy, consistent with Babenko et al. (2012), enables us to assess

whether the drivers of BHARs are concentrated among firms at particular distress levels or whether the patterns observed in the full sample persist across varying degrees of financial health. Beyond these shared elements, the two regression models differ in their dependent variables and in the specific mechanisms they are designed to test.

Model 1: Financial Distress and Control Variables

The baseline specification assesses whether financial distress alone helps explain cross-sectional variation in announcement-period abnormal returns. Distress is proxied by the Altman Z-score, entered as a continuous variable. The dependent variable is the three-day BHAR around the repurchase announcement. The unit of observation is the repurchase announcement itself, such that i indexes unique announcement events rather than firms. Repurchase motives, announcement years, and 2-digit SIC industries enter the model as sets of dummy variables to flexibly absorb categorical variation. A full expanded version of the model equation is provided in Appendix B.

$$BHAR_i = \alpha + \beta_1 Zscore_i + \beta_2 Size_i + \beta_3 Q_i + \beta_4 Runup_i + \beta_5 ProgSize_i + \beta_6 Cashflow_i + \beta_7 Insider_i + \delta' Reason_i + \gamma' Year_i + \theta' Industry_i + \varepsilon_i$$

Model 2: Financial Distress, Unexpectedness, and Their Interaction

Model 2 extends the baseline by incorporating the informational dimension of whether a repurchase announcement deviates from a firm's historical payout behavior. Announcement unexpectedness is defined as an indicator equal to 1 if the firm has made no repurchase announcements in the preceding three years. To facilitate interpretation of the interaction between financial distress and unexpectedness, both the Altman Z-score and the unexpectedness indicator are mean-centered, following standard guidance for interaction models. As before, i indexes unique announcement events and repurchase motives, announcement years, and 2-digit SIC industries continue to enter as sets of dummy variables, with the same omitted single category per group serving as the reference.

When estimating the quintile-sorted regressions, the continuous variables used in the interaction (Z-score and Unexpectedness) are centered within each Z-score quintile, rather than globally. This ensures that the interaction effects are interpreted relative to the local distress distribution in each subsample. The extended model takes the form (see Appendix B for full model specification):

$$BHAR_i = \alpha + \beta_1 Zscore_i + \beta_2 Unexpected_i + \beta_3 (Zscore_i \times Unexpected_i) + \beta_4 Size_i + \beta_5 Q_i + \beta_6 Runup_i + \beta_7 ProgSize_i + \beta_8 Cashflow_i + \beta_9 Insider_i + \delta' Reason_i + \gamma' Year_i + \theta' Industry_i + \varepsilon_i$$

D. Probit Regression

To analyze the determinants of unexpected repurchase announcements from the managerial perspective, we estimate a probit model in which the dependent variable equals 1 if the repurchase is classified as unexpected and 0 otherwise. Consistent with the OLS specifications, all previously included control variables enter this model unchanged, with the addition of a measure of market volatility. Market volatility enters the model both directly and through an interaction with financial distress, allowing us to assess whether firms' deviations from historical payout behavior depend jointly on internal (distress-related) and external (market-related) conditions. The model is specified as (see Appendix B for full model specification):

$$P(Unexpected_i = 1) = \Phi(\beta_1 Zscore_i + \beta_2 Market Volatility_i + \beta_3 (Zscore_i \times Market Volatility_i) + \beta_4 Size_i + \beta_5 Q_i + \beta_6 Runup_i + \beta_7 ProgSize_i + \beta_8 Cashflow_i + \beta_9 Insider_i + \delta' Reason_i + \gamma' Year_i + \theta' Industry_i)$$

Both the Z-score and market volatility are mean-centered to improve interpretability of the interaction term. Because Probit models are more sensitive to sparse or low-frequency categorical variables, all motive categories with limited representation (Offset Dilution, Stock

Option, Undervalued, Employee Benefit) are collapsed into a single “Other” category, with General Corporate Purpose retained as the reference group. As in the main regressions, standard errors are clustered at the firm level to account for repeated observations per firm and ensure robust inference. Importantly, we did not estimate quantile-sorted regressions for the Probit model, since doing so would produce unreliable and unstable results: once the sample is split into quintiles, the Probit specification drops most observations due to insufficient variation across industry dummies, making the estimates statistically inaccurate and not comparable to those in Models 1 and 2.

V. Empirical Results

A. Statistical T-test Result

Table 4 reports the results of a t-test examining whether the average 3-day BHAR following share repurchase announcements differs from zero. The results show that firms experience a statistically significant positive abnormal return of approximately 1.39% over the event window, with a t-statistic of 10.5397 and a two-sided p-value below 0.001. This indicates that repurchase announcements in our sample are associated with meaningfully positive short-term price reactions. The magnitude and significance of the effect support the view that share repurchases convey value-relevant information to the market, leading to immediate upward price adjustments, and are fully consistent with prior empirical evidence documenting positive announcement returns for open-market repurchases (e.g., Vermaelen, 1981; Ikenberry et al., 1995; Grullon and Michaely, 2004).

Table 4: T-Test of Mean 3-Day BHAR

| Change in Return |
|------------------|
| 1.39%*** |

The table reports the mean 3-day BHAR and its associated t-statistic from a two-sided test of zero mean. ***, **, and * denote significance at the 1%, 5%, and 10% levels, respectively.

B. Time Series Regression Results

Model 1: Announcement Returns and Financial Distress

Table 5a reports the results from the baseline regressions examining the cross-sectional determinants of 3-day announcement returns around share repurchase announcements. Across all specifications, financial distress (measured by the Altman Z-score) does not appear to explain short-term abnormal returns. The coefficient on Z-score is consistently small and statistically insignificant, indicating that a firm’s financial condition prior to the announcement does not meaningfully influence the immediate market reaction. Instead, several control variables emerge as key drivers of announcement-period returns. Firm size is the strongest and most consistently significant predictor: across all columns, its coefficient is negative and highly significant at the 1% level, suggesting that larger firms experience substantially smaller price reactions, whereas smaller firms earn meaningfully higher abnormal returns, in line with Babenko et al.’s findings. Stock price runup is also negative and strongly significant in every specification, in line with Babenko et al.’s findings. Firms that have experienced strong pre-announcement appreciation generate lower BHARs over the event window, likely because recent positive momentum reduces the incremental signaling value of the repurchase, either by raising the likelihood that the market already anticipates such activity or by incorporating optimism into prices beforehand. Among the repurchase-motive controls, only the stock-option-related motive exhibits a statistically significant relationship with announcement returns, with negative coefficients across several specifications. Although this suggests that repurchases conducted to offset option dilution are viewed less favorably by the market, the limited number of observations associated with this motive warrants caution in interpretation.

Time-related and industry-related factors further shape the cross-sectional variation in announcement returns. Announcements made in 2021, 2022, and 2023 are associated with significantly higher abnormal. These years correspond to heightened uncertainty and post-pandemic adjustment, during which repurchases may have functioned as particularly credible signals of managerial confidence. Industry patterns also emerge: firms in the Mining industry earn significantly higher BHARs, perhaps due to greater commodity-driven volatility and the higher informational content of financial announcements in this sector. By contrast, firms in the Finance and Insurance industry generate significantly lower announcement returns, potentially reflecting more rigid regulatory environments and lower information asymmetry relative to other industries.

Although clear economic patterns appear across several variables, the overall explanatory power of the regressions remains low, reflected in modest R^2 values. This is common in short-window event-study settings, where abnormal returns are inherently noisy and influenced by many unobservable factors outside the model. Prior research documents similarly low explanatory power in return-based regressions, and several influential studies (e.g. as Babenko et al. (2012)) do not report R^2 values at all, reflecting the consensus that R^2 is not an informative indicator of model quality in this context. Instead, the focus lies on the statistical and economic significance of the coefficients, which in our case display consistent and robust patterns across specifications.

Column 5 of Table 5a presents the full specification. The results remain materially unchanged, indicating that the findings are not sensitive to the inclusion of additional controls.

Table 5a: Announcement Returns and Financial Distress

| Model | 1 | 2 | 3 | 4 | 5 |
|----------------------------------|----------------------|------------------------|------------------------|------------------------|------------------------|
| Intercept | 0.01327*** (8.58) | 0.02803*** (3.78) | 0.02911*** (3.92) | 0.02487*** (3.13) | 0.02734*** (3.11) |
| Z-score | 0.00018 (0.81) | 0.00032 (1.31) | 0.00032 (1.30) | 0.00032 (1.29) | 0.00021 (0.85) |
| Firm Size | | -0.00234*** (-2.68) | -0.00236*** (-2.70) | -0.00251*** (-2.85) | -0.00238*** (-2.72) |
| Tobin's Q | | 0.00002 (0.08) | 0.00003 (0.09) | 0.00000 (0.01) | -0.00006 (-0.20) |
| Stock Price Runup | | -0.03690*** (-3.38) | -0.03719*** (-3.40) | -0.03538*** (-3.22) | -0.03383*** (-3.05) |
| Repurchase Program Size | | 0.00346* (1.67) | 0.003482* (1.68) | 0.00348* (1.68) | 0.00314 (1.55) |
| Cash Flow | | 0.00620 (0.34) | 0.00663 (0.36) | 0.01174 (0.64) | 0.00300 (0.16) |
| Insider Trading | | -0.00162 (-0.48) | -0.00193 (-0.56) | -0.00163 (-0.48) | -0.00008 (-0.02) |
| Reason:Employee Benefit | | | 0.00194 (0.20) | 0.00299 (0.27) | 0.00258 (0.21) |
| Reason:Enhance Shareholder Value | | | -0.00467 (-1.21) | -0.00337 (-0.85) | -0.00452 (-1.14) |
| Reason:Offset Dilution | | | -0.01760 (-1.21) | -0.01945 (-1.23) | -0.02041 (-1.24) |
| Reason:Stock Option | | | -0.02544*** (-3.05) | -0.02640** (-2.11) | -0.02543* (-1.68) |
| Reason:Undervalued | | | -0.01011 (-0.57) | -0.01024 (-0.58) | -0.01605 (-0.88) |
| Year:2017 | | | | -0.00159 (-0.31) | -0.00199 (-0.39) |
| Year:2018 | | | | 0.00387 (0.70) | 0.00397 (0.72) |
| Year:2019 | | | | 0.00015 (0.03) | 0.00065 (0.12) |
| Year:2020 | | | | -0.00346 (-0.58) | -0.00268 (-0.45) |
| Year:2021 | | | | 0.01092** (2.15) | 0.01171** (2.31) |
| Year:2022 | | | | 0.00939* (1.93) | 0.00990** (2.05) |

Table 5a (Continued): Announcement Returns and Financial Distress

| | | | | | |
|--|---------|---------|---------|----------|------------|
| Year:2023 | | | | 0.01036* | 0.01026* |
| | | | | (1.95) | (1.93) |
| Year:2024 | | | | 0.00247 | 0.00234 |
| | | | | (0.47) | (0.44) |
| Industry:Agriculture, forestry and fishing | | | | | -0.02284 |
| | | | | | (-1.30) |
| Industry:Mining | | | | | 0.03994** |
| | | | | | (2.40) |
| Industry:Construction | | | | | -0.00593 |
| | | | | | (-0.83) |
| Industry:Transportation&Communication | | | | | 0.00048 |
| | | | | | (0.08) |
| Industry:Wholesale Trade | | | | | 0.00170 |
| | | | | | (0.19) |
| Industry:Retail Trade | | | | | 0.00054 |
| | | | | | (0.08) |
| Industry:Finance&Insurance | | | | | -0.00989** |
| | | | | | (-2.37) |
| Industry:Services | | | | | 0.00078 |
| | | | | | (0.17) |
| Industry:Public administration | | | | | -0.00513 |
| | | | | | (-1.14) |
| No. of obs. | 2 426 | 2 426 | 2 426 | 2 426 | 2 426 |
| R ² | 0.00 | 0.02 | 0.02 | 0.03 | 0.03 |
| Adjusted R ² | -0.00 | 0.02 | 0.02 | 0.02 | 0.02 |
| Mean dep. var | 0.01391 | 0.01391 | 0.01391 | 0.01391 | 0.01391 |

To further explore whether distress effects vary across firms, we sorted the sample into quintiles based on the Altman Z-score and re-estimated the regressions within each group. Table 5b presents the results for the lowest Z-score quintile (the most financially distressed 20% of firms) where any distress-related effects are most likely to appear. Full quintile-sorted results are provided in Appendix D.

Table 5b: Announcement Returns for Most Financially Distressed Firms

The dependent variable in columns (1)–(5) is the 3-day BHAR around the repurchase announcement. The table reports OLS regressions for firms in the lowest Altman Z-score quintile, examining whether financial distress explains cross-sectional variation in announcement-period abnormal returns among the most financially distressed firms. Coefficients represent the change in BHAR associated with a one-unit increase in the explanatory variable. Standard errors are clustered at the firm level, and t-statistics are reported in parentheses. Statistical significance at the 1%, 5%, and 10% levels is denoted by ***, *, and *, respectively.

Panel A: Z-score Quintile 1 (Most Financially Distressed)

| Model | 1 | 2 | 3 | 4 | 5 |
|----------------------------------|-----------------------|-----------------------|-----------------------|-----------------------|---------------------|
| Intercept | 0.00666** (2.50) | -0.00269 (-0.15) | 0.00248 (0.13) | -0.01222 (-0.64) | 0.01930 (0.61) |
| Z-score | -0.00349** (-2.22) | -0.00283** (-1.96) | -0.00297** (-2.07) | -0.00326** (-2.22) | -0.00219 (-1.18) |
| Firm Size | | 0.00004 (0.02) | -0.00044 (-0.24) | -0.00067 (-0.36) | -0.00031 (-0.17) |
| Tobin's Q | | 0.00245* (1.69) | 0.00241* (1.66) | 0.00252* (1.78) | 0.00257* (1.92) |
| Stock Price Runup | | 0.00744 (0.28) | 0.00505 (0.19) | 0.00635 (0.25) | 0.00573 (0.23) |
| Repurchase Program Size | | 0.00320 (0.91) | 0.00268 (0.77) | 0.00264 (0.77) | 0.00234 (0.72) |
| Cash Flow | | -0.01740 (-0.39) | -0.02436 (-0.56) | -0.01998 (-0.49) | -0.02116 (-0.49) |
| Insider Trading | | 0.00655 (0.68) | 0.00551 (0.55) | 0.00692 (0.69) | 0.00348 (0.34) |
| Reason:Employee Benefit | | | -0.00000 (-0.41) | -0.00000 (-1.21) | -0.00000 (-0.36) |
| Reason:Enhance Shareholder Value | | | -0.01232 (-1.36) | -0.01048 (-1.08) | -0.01039 (-1.05) |
| Reason:Offset Dilution | | | 0.02574 (1.64) | 0.01915 (1.04) | 0.02193 (0.93) |
| Reason:Stock Option | | | 0.00000 (0) | -0.00000 (-0.70) | -0.00000 (-0.23) |
| Reason:Undervalued | | | -0.09299 (-0.96) | -0.09030 (-0.93) | -0.09005 (-0.96) |
| Year:2017 | | | | 0.02488 (1.49) | 0.02084 (1.31) |
| Year:2018 | | | | 0.01328 (0.94) | 0.01377 (0.97) |
| Year:2019 | | | | -0.00005 (-0.00) | -0.00048 (-0.04) |
| Year:2020 | | | | 0.00937 (0.80) | 0.00773 (0.66) |
| Year:2021 | | | | 0.02618** (2.20) | 0.02502** (2.09) |

Table 5b (Continued): Announcement Returns for Most Financially Distressed Firms

| | | | | | |
|--|---------|---------|---------|-------------------|---------------------|
| Year:2022 | | | | 0.01857 (1.60) | 0.01705 (1.47) |
| Year:2023 | | | | 0.01877 (1.56) | 0.01738 (1.43) |
| Year:2024 | | | | 0.01086 (0.86) | 0.00806 (0.63) |
| Industry:Agriculture, forestry and fishing | | | | | -0.00000 (-0.12) |
| Industry:Mining | | | | | 0.00000 (0.54) |
| Industry:Construction | | | | | -0.00000 (-0.90) |
| Industry:Transportation&Communication | | | | | -0.00000 (-0.92) |
| Industry:Wholesale Trade | | | | | 0.00000 0 |
| Industry:Retail Trade | | | | | 0.00000 0 |
| Industry:Finance&Insurance | | | | | -0.03084 (-1.31) |
| Industry:Services | | | | | -0.03939 (-1.16) |
| Industry:Public administration | | | | | -0.02566 (-1.08) |
| No. of obs. | 486 | 486 | 486 | 486 | 486 |
| R ² | 0.03 | 0.05 | 0.07 | 0.08 | 0.10 |
| Adjusted R ² | 0.02 | 0.04 | 0.05 | 0.05 | 0.06 |
| Mean dep. var | 0.01194 | 0.01194 | 0.01194 | 0.01194 | 0.01194 |

The results in Table 5b provide mixed evidence on whether financial distress influences announcement-period returns among the most distressed firms. In the initial specifications, the Altman Z-score is negative and statistically significant, indicating that within this lowest quintile, firms with weaker financial conditions tend to earn higher 3-day BHARs following repurchase announcements. This pattern suggests that distress may carry some incremental informational value in this subsample. However, the effect weakens and ultimately becomes statistically insignificant once additional controls, particularly when industry fixed effects are introduced. This attenuation implies that the marginal explanatory power of distress is sensitive to broader structural factors and not robust across model specifications.

The behavior of the control variables largely mirrors the full-sample results. Firm size remains negatively related to announcement returns, and stock price runup continues to exhibit a strong negative association, indicating that these factors dominate the cross-sectional variation even among distressed firms. Among the year effects, only the 2021 indicator is statistically significant. Notably, the R² values in the quintile-sorted regressions are higher than in the full-sample models, suggesting that within-quintile homogeneity improves explanatory power, even though distress itself does not emerge as a robust predictor.

Overall, the quintile-specific regressions suggest that any potential distress effect is modest and not persistent once richer controls are applied. Taken together, the findings reinforce the conclusion that financial distress does not systematically explain short-term market reactions to repurchase announcements, even in the subsample where such effects would be most likely to arise.

Model 2: Financial Distress, Unexpectedness, and the Interaction Effect

Table 6a presents the results from the extended specification that introduces announcement unexpectedness and the interaction between unexpectedness and financial distress. Across all columns, the coefficient on the Altman Z-score remains statistically insignificant, consistent with the baseline findings from Model 1, indicating that financial distress does not meaningfully influence the immediate market reaction when these additional dimensions are considered. The unexpectedness indicator also shows no significant relationship with announcement-period abnormal returns, suggesting that firms announcing share repurchases after a long period of inactivity do not, on average, experience different short-window returns compared to firms with more regular repurchase activity. The interaction between unexpectedness and financial distress is similarly small and insignificant across specifications,

implying that distressed firms do not elicit systematically different market reactions when their repurchase timing deviates from historical patterns.

The behavior of several control variables closely mirrors the patterns documented in Model 1, reinforcing the robustness of the underlying relationships. Firm size and stock price runup remain both negative and highly significant. Among the repurchase-motive indicators, the Stock Option-related motive continues to be associated with significantly lower abnormal returns in multiple specifications. However, as noted in Model 1, this result should be interpreted with caution given the relatively small number of observations in this category. As in the baseline model, temporal and industry patterns persist: announcements made in 2021, 2022, and 2023 yield significantly higher returns relative to the reference year, while firms in the Mining industry earn significantly higher abnormal returns and those in the Finance and Insurance sector earn significantly lower returns.

The explanatory power of the regressions remains modest, with R^2 values similar to those observed in Model 1. The similarity in R^2 across both models indicates that incorporating unexpectedness and the interaction term does not materially increase the model's ability to account for variation in 3-day BHARs, and the interpretation of the results therefore rests primarily on the significance and direction of the individual coefficients.

Column 5 presents the full specification, including all firm controls, repurchase motives, and year and industry fixed effects in Table 6a.

Table 6a: Announcement Returns, Financial Distress, Unexpectedness, and Their Interaction

| Model | 1 | 2 | 3 | 4 | 5 |
|----------------------------------|-----------------------|------------------------|------------------------|------------------------|------------------------|
| Intercept | 0.01389*** (10.24) | 0.02878*** (3.79) | 0.02978*** (3.91) | 0.02584*** (3.19) | 0.02812*** (3.17) |
| Z-score | 0.00018 (0.80) | 0.00032 (1.28) | 0.00032 (1.27) | 0.00031 (1.26) | 0.00021 (0.85) |
| Unexpected | 0.00355 (1.36) | 0.00132 (0.53) | 0.00164 (0.65) | 0.00104 (0.41) | -0.00003 (-0.01) |
| Zscore × Unexpected | -0.00012 (-0.44) | -0.00012 (-0.43) | -0.00020 (-0.47) | -0.00028 (-0.67) | -0.00023 (-0.55) |
| Firm Size | | -0.00231*** (-2.62) | -0.00231*** (-2.62) | -0.00249*** (-2.81) | -0.00239*** (-2.71) |
| Tobin's Q | | 0.00002 (0.06) | 0.00002 (0.07) | -0.00000 (-0.01) | -0.00006 (-0.22) |
| Stock Price Runup | | -0.03675*** (-3.37) | -0.03701*** (-3.38) | -0.03522*** (-3.21) | -0.03375*** (-3.04) |
| Repurchase Program Size | | 0.00341* (1.65) | 0.00343* (1.65) | 0.00342* (1.65) | 0.00310 (1.53) |
| Cash Flow | | 0.00618 (0.34) | 0.00667 (0.37) | 0.01143 (0.62) | 0.00265 (0.14) |
| Insider Trading | | -0.00143 (-0.42) | -0.00169 (-0.49) | -0.00151 (-0.44) | -0.00013 (-0.04) |
| Reason:Employee Benefit | | | 0.00037 (0.04) | 0.00104 (0.09) | 0.00112 (0.09) |
| Reason:Enhance Shareholder Value | | | -0.00484 (-1.25) | -0.00354 (-0.89) | -0.00458 (-1.15) |
| Reason:Offset Dilution | | | -0.01839 (-1.25) | -0.02007 (-1.26) | -0.02058 (-1.24) |
| Reason:Stock Option | | | -0.02645*** (-3.17) | -0.02715** (-2.17) | -0.02560** (-1.70) |
| Reason:Undervalued | | | -0.01016 (-0.57) | -0.01024 (-0.57) | -0.01601 (-0.87) |
| Year:2017 | | | | -0.00160 (-0.31) | -0.00202 (-0.39) |
| Year:2018 | | | | 0.00379 (0.69) | 0.00390 (0.71) |
| Year:2019 | | | | -0.00002 (-0.00) | 0.00064 (0.11) |
| Year:2020 | | | | -0.00362 (-0.61) | -0.00271 (-0.45) |
| Year:2021 | | | | 0.01084** (2.12) | 0.01178** (2.31) |
| Year:2022 | | | | 0.00934* (1.91) | 0.00996** (2.05) |

Table 6a (Continued): Announcement Returns, Financial Distress, Unexpectedness, and Their Interaction

| | | | | | |
|--|---------|---------|---------|----------|------------|
| Year:2023 | | | | 0.01038* | 0.01031* |
| | | | | (1.95) | (1.94) |
| Year:2024 | | | | 0.00246 | 0.00235 |
| | | | | (0.46) | (0.44) |
| Industry:Agriculture, forestry and fishing | | | | | -0.02280 |
| | | | | | (-1.31) |
| Industry:Mining | | | | | 0.04005** |
| | | | | | (2.40) |
| Industry:Construction | | | | | -0.00622 |
| | | | | | (-0.85) |
| Industry:Transportation&Communication | | | | | 0.00055 |
| | | | | | (0.09) |
| Industry:Wholesale Trade | | | | | 0.00172 |
| | | | | | (0.19) |
| Industry:Retail Trade | | | | | 0.00064 |
| | | | | | (0.09) |
| Industry:Finance&Insurance | | | | | -0.00973** |
| | | | | | (-2.35) |
| Industry:Services | | | | | 0.00089 |
| | | | | | (0.19) |
| Industry:Public administration | | | | | -0.00501 |
| | | | | | (-1.12) |
| No. of obs. | 2 426 | 2 426 | 2 426 | 2 426 | 2 426 |
| R ² | 0.00 | 0.02 | 0.02 | 0.03 | 0.03 |
| Adjusted R ² | -0.00 | 0.02 | 0.02 | 0.02 | 0.02 |
| Mean dep. var | 0.01391 | 0.01391 | 0.01391 | 0.01391 | 0.01391 |

As with Model 1, we also examine whether any effects emerge among the most financially distressed firms. Table 6b therefore reports the results for the lowest Altman Z-score quintile for Model 2.

Table 6b. Announcement Returns, Financial Distress, Announcement Unexpectedness, and Their Interaction Among the Most Financially Distressed Firms

The dependent variable in columns (1)-(5) is the 3-day BHAR around the repurchase announcement. The table reports OLS regressions for firms in the lowest Altman Z-score quintile, examining whether financial distress, announcement unexpectedness, and their interaction explain cross-sectional variation in announcement-period abnormal returns among the most financially distressed firms. Coefficients represent the change in BHAR associated with a one-unit increase in the explanatory variable. Standard errors are clustered at the firm level, and t-statistics are reported in parentheses. Statistical significance at the 1%, 5%, and 10% levels is denoted by ***, **, and *, respectively.

Panel A: Z-score Quintile 1 (Most Financially Distressed)

| Model | 1 | 2 | 3 | 4 | 5 |
|----------------------------------|-----------------------|-----------------------|-----------------------|-----------------------|----------------------|
| Intercept | 0.01127*** (4.44) | -0.00072 (-0.04) | 0.00453 (0.25) | -0.00796 (-0.42) | 0.02008 (0.65) |
| Z-score | -0.00291** (-2.21) | -0.00248** (-1.99) | -0.00261** (-2.08) | -0.00292** (-2.30) | -0.00190 (-1.14) |
| Unexpected | 0.00357 (0.71) | 0.00133 (0.29) | 0.00156 (0.33) | 0.00192 (0.39) | 0.00085 (0.17) |
| Zscore × Unexpected | -0.00389 (-1.45) | -0.00356 (-1.34) | -0.00374 (-1.40) | -0.00319 (-1.16) | -0.00358 (-1.22) |
| Firm Size | | 0.00021 (0.11) | -0.00026 (-0.14) | -0.00048 (-0.26) | -0.00014 (-0.07) |
| Tobin's Q | | 0.00244* (1.66) | 0.00239 (1.62) | 0.00250* (1.73) | 0.00259* (1.88) |
| Stock Price Runup | | 0.00667 (0.25) | 0.00417 (0.16) | 0.00551 (0.21) | 0.00478 (0.19) |
| Repurchase Program Size | | 0.00323 (0.90) | 0.00271 (0.77) | 0.00266 (0.76) | 0.00236 (0.72) |
| Cash Flow | | -0.00995 (-0.22) | -0.01650 (-0.38) | -0.01306 (-0.30) | -0.01301 (-0.31) |
| Insider Trading | | 0.00746 (0.76) | 0.00647 (0.63) | 0.00764 (0.75) | 0.00395 (0.38) |
| Reason:Employee Benefit | | | 0.00000 (1.13) | 0.00000 (0.91) | -0.00000 (- 0.34) |
| Reason:Enhance Shareholder Value | | | -0.01191 (-1.28) | -0.01028 (-1.04) | -0.00987 (-0.98) |
| Reason:Offset Dilution | | | 0.02662 (1.61) | 0.01946 (1.01) | 0.02299 (0.93) |
| Reason:Stock Option | | | 0.00000 () | 0.00000 (1.06) | 0.00000 (0.91) |
| Reason:Undervalued | | | -0.09665 (-0.98) | -0.09235 (-0.92) | -0.09277 (-0.97) |
| Year:2017 | | | | 0.02219 (1.33) | 0.01869 (1.19) |
| Year:2018 | | | | 0.00970 (0.66) | 0.00981 (0.66) |
| Year:2019 | | | | -0.00107 (-0.09) | -0.00147 (-0.12) |
| Year:2020 | | | | 0.00773 (0.67) | 0.00592 (0.52) |

Table 6b (Continued): Announcement Returns, Financial Distress, Announcement Unexpectedness, and Their Interaction Among the Most Financially Distressed Firms

| | | | | | |
|--|---------|---------|---------|---------------------|---------------------|
| Year:2021 | | | | 0.02467** (2.15) | 0.02344** (2.03) |
| Year:2022 | | | | 0.01692 (1.46) | 0.01496 (1.30) |
| Year:2023 | | | | 0.01703 (1.42) | 0.01502 (1.25) |
| Year:2024 | | | | 0.00945 (0.75) | 0.00607 (0.48) |
| Industry:Agriculture, forestry and fishing | | | | | 0.00000 (1.14) |
| Industry:Mining | | | | | 0.02107 (0.73) |
| Industry:Construction | | | | | 0.00000 (0.90) |
| Industry:Transportation&Communication | | | | | -0.03718 (-0.86) |
| Industry:Wholesale Trade | | | | | 0.00000 (0) |
| Industry:Retail Trade | | | | | 0.00000 (0) |
| Industry:Finance&Insurance | | | | | -0.02853 (-1.19) |
| Industry:Services | | | | | -0.03809 (-1.11) |
| Industry:Public administration | | | | | -0.02309 (-0.96) |
| No. of obs. | 486 | 486 | 486 | 486 | 486 |
| R ² | 0.03 | 0.06 | 0.07 | 0.09 | 0.11 |
| Adjusted R ² | 0.02 | 0.04 | 0.05 | 0.05 | 0.06 |
| Mean dep. var | 0.01194 | 0.01194 | 0.01194 | 0.01194 | 0.01194 |

The results in Table 6b show that, even within the most financially distressed quintile, the extended specification yields no systematic relationship between financial distress, unexpectedness, or their interaction and announcement-period abnormal returns. While Z-score is negative and marginally significant in the simplest specifications, the effect disappears once additional firm controls, repurchase motives, and fixed effects are included. This mirrors the pattern observed in Model 1, where distress-related effects were similarly weak and sensitive to model richness.

The control variables also behave differently than in the full-sample regressions. In the quintile-1 subsample, firm size and stock-price runup lose statistical significance, suggesting that their predictive power in the broader sample is driven primarily by variation across distress levels rather than within the most distressed firms. In contrast, Tobin's Q becomes positive and statistically significant, indicating that among financially distressed firms, those with stronger growth opportunities experience larger announcement-period abnormal returns. One interpretation is that the market views repurchases by distressed but high- Q firms as a more credible indication of undervaluation or as a signal of managerial confidence in future prospects. Notably, this finding differs from Babenko et al. (2012), who report that Tobin's Q is generally insignificant across their model specifications. Our results therefore suggest that the relationship between growth opportunities and announcement-period abnormal returns may only materialize within the most financially constrained segment of firms. Importantly, as in the baseline regressions, the R^2 values are higher in the quintile-sorted specifications.

Consistent with the baseline results, neither unexpectedness nor its interaction with financial distress explains short-term announcement returns within this subsample. This indicates that even among the firms where such effects would be most likely to arise, unexpected share repurchases do not generate systematically stronger market reactions.

C. Probit Regression Results

Table 7 presents the Probit regression estimates examining how financial distress, market volatility, and their interaction relate to the likelihood that a repurchase announcement is classified as unexpected. Across all specifications, the Altman Z-score remains small and statistically insignificant, mirroring the earlier return regressions and indicating that financial

distress does not meaningfully influence firms' propensity to initiate share repurchases after long periods of inactivity. By contrast, market volatility displays a strong and highly significant positive association with unexpected announcements in the initial models, suggesting that firms are much more likely to announce repurchases during periods of elevated uncertainty. However, this effect weakens and eventually becomes statistically insignificant once the full set of controls, particularly repurchase motives, year effects, and industry effects, are added, indicating that volatility's explanatory power is partly absorbed by broader structural factors.

The interaction between financial distress and volatility remains positive and statistically significant in all specifications, underscoring that the combined effect of firm financial strength and market-wide uncertainty is a robust driver of unexpected repurchase timing. This indicates that periods of heightened market volatility increase the likelihood of unexpected repurchase announcements primarily among financially healthier firms rather than the distressed ones. This pattern suggests that firms with stronger balance sheets are better positioned to initiate unanticipated share repurchases when market conditions are turbulent, whereas distressed firms appear more constrained in their ability to respond opportunistically to volatility.

Among the control variables, firm size remains consistently negative and significant. Cash flow and insider trading, which did not play a prominent role in the announcement-return regressions, are negative and statistically significant in the Probit model. This suggests that firms with stronger internal cash generation or concurrent insider trading activity are less likely to initiate unexpected repurchases, indicating that these factors are more important for the decision to deviate from past payout behavior than for the size of the market reaction once a repurchase is announced. Several repurchase-motive indicators also play a role. Announcements citing Enhance Shareholder Value or Other reasons are positively and significantly associated with unexpectedness, consistent with these motives reflecting more discretionary, non-routine repurchase activity. On the time dimension, year dummies for 2019–2023 are positive and significant, showing that unexpected announcements have become more prevalent in the later part of the sample, possibly reflecting post-TCJA and COVID-era shifts in payout policy. Industry effects are also present: firms in Construction, Retail Trade, and Finance & Insurance exhibit significantly lower propensities to announce unexpected repurchases, pointing to more stable or regulated payout patterns in these sectors. The pseudo R^2 values of approximately 0.08 are in line with typical magnitudes found in Probit models of corporate decision-making, indicating modest but meaningful explanatory power relative to a null specification.

Overall, the results indicate that unexpected announcements are shaped primarily by market-level conditions and their interaction with financial distress. Firm size, cash generation, repurchase motives, timing, and industry affiliation also contribute to the likelihood of an announcement being unexpected. Column 5 presents the full specification, which serves as the main model for interpreting the interaction effects reported in Table 7a.

Table 7: Probit Regression of Announcement Returns on Financial Distress, Market Volatility, and Their Interaction

| Model | 1 | 2 | 3 | 4 | 5 |
|----------------------------|-----------------------|------------------------|------------------------|------------------------|------------------------|
| Intercept | 0.10671*** (3.16) | 1.11195*** (7.70) | 1.06916*** (7.33) | 0.92625*** (5.63) | 1.14681*** (6.54) |
| Z-score | -0.00435 (-0.85) | 0.00771 (1.51) | 0.00716 (1.38) | 0.00868 (1.64) | 0.00095 (0.18) |
| Market Volatility | 25.53683*** (4.19) | 21.87894*** (3.52) | 23.03519*** (3.70) | 12.79848 (1.33) | 9.48764 (0.97) |
| Zscore × Market Volatility | 2.48706** (2.28) | 3.03209*** (2.68) | 3.02487*** (2.68) | 2.84886** (2.48) | 2.68571** (2.35) |
| Firm Size | | -0.08433*** (-4.72) | -0.08358*** (-4.68) | -0.08723*** (-4.81) | -0.08366*** (-4.57) |

Table 7 (Continued): Table 7: Probit Regression of Announcement Returns on Financial Distress, Market Volatility, and Their

| | Interaction | | | |
|--|------------------------|------------------------|------------------------|------------------------|
| Tobin's Q | 0.00296 (0.51) | 0.00305 (0.52) | 0.00213 (0.37) | -0.00203 (-0.34) |
| Stock Price Runup | -0.22269 (-1.39) | -0.21090 (-1.31) | -0.20522 (-1.27) | -0.19648 (-1.19) |
| Repurchase Program Size | 0.04340 (1.44) | 0.04226 (1.42) | 0.04784 (1.59) | 0.03885 (1.32) |
| Cash Flow | -0.80402*** (-3.08) | -0.82053*** (-3.14) | -0.69723*** (-2.65) | -0.86825*** (-3.26) |
| Insider Trading | -0.46671*** (-5.39) | -0.45572*** (-5.24) | -0.45564*** (-5.14) | -0.42443*** (-4.78) |
| Reason: Enhance Shareholder Value | | 0.16962** (2.12) | 0.21374*** (2.58) | 0.18572** (2.22) |
| Reason: Other | | 0.56173** (2.10) | 0.53766** (2.00) | 0.53499** (2.07) |
| Year:2017 | | | -0.02623 (-0.22) | -0.07957 (-0.66) |
| Year:2018 | | | -0.07668 (-0.65) | -0.09855 (-0.82) |
| Year:2019 | | | 0.34491*** (2.80) | 0.37250*** (2.94) |
| Year:2020 | | | 0.27848** (2.14) | 0.32818** (2.48) |
| Year:2021 | | | 0.44462*** (3.84) | 0.50218*** (4.27) |
| Year:2022 | | | 0.24073** (1.98) | 0.24603** (1.99) |
| Year:2023 | | | 0.10038 (0.93) | 0.05778 (0.52) |
| Year:2024 | | | 0.10253 (0.89) | 0.07533 (0.64) |
| Industry:Agriculture, forestry and fishing | | | | -0.42306 (-0.62) |
| Industry:Mining | | | | -0.22407 (-0.58) |
| Industry:Construction | | | | -0.87821* (-1.90) |
| Industry:Transportation&Communication | | | | 0.02214 (0.13) |
| Industry:Wholesale Trade | | | | 0.19657 (0.74) |
| Industry:Retail Trade | | | | -0.42730*** (-2.77) |
| Industry:Finance&Insurance | | | | -0.61379*** (-5.82) |
| Industry:Services | | | | -0.18810 (-1.53) |
| Industry:Public administration | | | | -0.11171 (-1.15) |
| No. of obs. | 2 426 | 2 426 | 2 426 | 2 426 |
| Pseudo R ² | 0.01 | 0.04 | 0.05 | 0.06 |
| Mean dep. var | 0.54081 | 0.54081 | 0.54081 | 0.54081 |

VI. Robustness

A. Adjustments to data

To reduce microstructure-related noise in return calculations, we exclude firms with share prices below \$1 at the beginning of the event window, following established event-study conventions. Because low-priced stocks tend to exhibit disproportionately high bid-ask bounce and price discreteness, this adjustment improves the reliability of short-horizon BHARs. As an additional data-quality refinement, we apply a stricter \$3 share-price cutoff, following Babenko et al. (2012), and find that the regression results remain qualitatively unchanged. In both Model 1 and Model 2, the coefficients on financial distress, unexpectedness, and their interaction remain statistically insignificant under either price threshold. The probit regressions also preserve their original significance patterns, indicating that the core inferences are not sensitive to the choice of price cutoff.

We also adjust the dataset by removing firms in heavily regulated industries; *Finance & Insurance*, *Transportation & Communication*, and *Public Administration*, to address concerns that regulatory frictions and disclosure requirements may systematically alter repurchase behavior and announcement dynamics. Excluding these industries does not materially change the main explanatory variables in Model 1 or Model 2: financial distress and unexpectedness continue to show no explanatory power for announcement-period returns, and firm size remains

strongly negative and significant. However, stock price run-up becomes insignificant under this restricted sample, suggesting that part of its predictive power in the baseline originates from industry-specific dynamics. In the probit regression, excluding these regulated sectors produces a shift: the Altman Z-score becomes significantly negative, indicating that within less regulated industries, more financially distressed firms are more likely to issue unexpected repurchase announcements. At the same time, the interaction between distress and market volatility loses significance, implying that the moderating effect of market conditions is less pronounced outside regulated industries. While some coefficient estimates shifted with these adjustments, the main empirical conclusions remain intact, indicating that the results are not purely artefacts of data construction or sectoral composition. Table 8 reports the regression estimates for these robustness checks.

Table 8: Robustness Checks: Price Filter Adjustment and Exclusion of Regulated Industries

| The dependent variable in Model 1 and Model 2 is the 3-day BHAR around the repurchase announcement. The Probit specification uses a binary dependent variable equal to 1 if the announcement is classified as unexpected and 0 otherwise. The table reports robustness checks applying (i) a stricter share-price filter of \$3, and (ii) the exclusion of regulated industries (Finance & Insurance; Transportation & Communication; Public Administration). Coefficients reflect the marginal effects in the case of the Probit model. Standard errors are clustered at the firm level. Significance at the 1%, 5%, and 10% levels is denoted by ***, **, and *, respectively. Only the key coefficients are reported due to space constraints. | | | | | | |
|---|------------------------|------------------------|------------------------|--------------------------------|-------------------------|------------------------|
| Model | \$3 Share-Price Filter | | | Excluding Regulated Industries | | |
| | Model 1 | Model 2 | Probit Regression | Model 1 | Model 2 | Probit Regression |
| Z-score | 0.00029 (1.06) | 0.00029 (1.07) | 0.00032 (1.30) | 0.00007 (0.23) | 0.00009 (0.32) | -0.01165** (-1.98) |
| Unexpected | | -0.0011 (-0.43) | | | 0.000997 (0.25) | |
| Zscore × Unexpected | | -0.00003 (-0.07) | | | 0.000206 (0.41) | |
| Market Volatility | | | 11.95604 (1.21) | | | -22.47364 (-1.33) |
| Zscore × Market Volatility | | | 2.78485** (2.34) | | | 1.46869 (0.91) |
| Firm Size | -0.00178** (-1.99) | -0.00181** (-2.01) | -0.08180*** (-4.23) | -0.00398*** (-3.10) | -0.003924*** (-3.04) | -0.09034*** (-3.34) |
| Stock Price Runup | -0.03418*** (-3.07) | -0.03423*** (-3.07) | -0.16997 (-0.98) | -0.02721 (-1.59) | -0.02725 (-1.59) | 0.23728 (0.82) |
| No. of obs. | 2 327 | 2 327 | 2 327 | 1 078 | 1 078 | 1 078 |
| R ² | 0.03 | 0.03 | | 0.04 | 0.04 | |
| Adjusted R ² | 0.02 | 0.02 | | 0.02 | 0.02 | |
| Pseudo R ² | | | 0.08 | | | 0.11 |
| Mean dep. var | 0.01272 | 0.01272 | 0.53245 | 0.01666 | 0.01666 | 0.54267 |

B. Alternative Measures of Abnormal Returns

Following Brown and Warner (1985) and the implementation in Babenko et al. (2012), we re-estimate announcement-window performance using cumulative abnormal returns (CARs) constructed from firm-specific market-model parameters. For each firm, we estimate α and β over the pre-event window of -252 to -44 trading days using the Market Model (see Appendix B) and obtain firm-level return–market sensitivities. These estimated parameters are then used to generate expected returns during the event window $[-1, +1]$, allowing us to compute market-model CARs as an alternative to our baseline BHAR measure. In addition to the 3-day CAR, we further estimate a 5-day CAR and a 5-day BHAR to examine the sensitivity of our findings to wider event-window definitions. Across all specifications, results remain highly stable and do not alter the interpretation of our main findings. Table 9 reports the robustness results using alternative abnormal-return metrics.

Table 9: Robustness Checks: Alternative Measures of Abnormal Returns

| The table reports robustness tests evaluating whether our baseline results are sensitive to the choice of abnormal-return metric. The dependent variable is redefined using three alternative announcement-window measures: the 3-day cumulative abnormal return (CAR), the 5-day buy-and-hold abnormal return (BHAR), and the 5-day CAR. These measures are constructed using firm-specific market-model parameters estimated over the pre-event window ($-252, -44$). All standard errors are clustered at the firm level. Statistical significance at the 1%, 5%, and 10% levels is denoted by ***, **, and *, respectively. Only the key coefficients are reported due to space constraints. | | | | | | |
|--|--|--|--|--|--|--|
|--|--|--|--|--|--|--|

Table 9 (Continued): Robustness Checks: Alternative Measures of Abnormal Returns

| Model | 3-day CAR | | 5-day BHAR | | 5-day CAR | |
|----------------------------|------------------------|------------------------|---------------------|---------------------|---------------------|---------------------|
| | Model 1 | Model 2 | Model 1 | Model 2 | Model 1 | Model 2 |
| Z-score | 0.00024 (0.99) | 0.00024 (0.98) | 0.00035 (1.55) | 0.00035 (1.53) | 0.00055 (1.63) | 0.00055 (1.64) |
| Unexpected | | 0.00063 (0.25) | | -0.00103 (-0.41) | | 0.00381 (1.10) |
| Zscore \times Unexpected | | -0.00025 (-0.60) | | -0.00057 (-1.57) | | 0.00013 (0.23) |
| Firm Size | -0.00243*** (-2.76) | -0.00242*** (-2.73) | -0.00063 (-0.83) | -0.00068 (-0.89) | -0.00149 (-1.41) | -0.00136 (-1.29) |
| Stock Price Runup | -0.02522** (-2.28) | -0.02510** (-2.27) | -0.00494 (-0.46) | -0.00481 (-0.45) | -0.00504 (-0.34) | -0.00487 (-0.33) |
| Repurchase Program Size | 0.00421** (2.02) | 0.00417** (2.00) | -0.00210 (-1.14) | -0.00218 (-1.19) | 0.00324 (1.20) | 0.00323 (1.20) |
| No. of obs. | 2 426 | 2 426 | 2 426 | 2 426 | 2 426 | 2 426 |
| R ² | 0.04 | 0.04 | 0.01 | 0.01 | 0.02 | 0.02 |
| Adjusted R ² | 0.02 | 0.02 | 0.00 | 0.00 | 0.01 | 0.01 |
| Mean dep. var | 0.01419 | 0.01419 | 0.00340 | 0.00340 | 0.01255 | 0.01255 |

The results largely confirm the patterns documented in our baseline 3-day BHAR regressions. Looking at all three abnormal-return measures, the coefficients on Z-score, unexpectedness, and their interaction remain small and statistically insignificant, indicating that the absence of distress-related effects is not an effect of the abnormal-return metric or the length of the event window. In line with earlier results, firm size continues to be economically meaningful only in the shortest window: for the 3-day CAR, size is negative and highly significant in both Model 1 and Model 2, but once we extend the window to 5-day BHAR and 5-day CAR the size effect disappears. Similarly, stock price run-up and repurchase program size are only significant under the 3-day CAR specification and lose explanatory power when the window is widened.

The deterioration in explanatory power when moving from 3-day CAR to 5-day BHAR and 5-day CAR is also reflected in the R² statistics, which fall from around 4% to roughly 1%. This pattern suggests that the variables in our framework primarily capture very short-horizon announcement reactions, while price movements beyond the immediate window are largely driven by other news and market noise. Put differently, any “reward” (or penalty) the market assigns to share repurchase announcements appears to be concentrated in the first few trading days, with no systematic relation between our firm-level characteristics and longer-horizon return drift.

C. Alternative Estimation Window

As an additional robustness check, we examine whether our results are sensitive to the choice of estimation window used to obtain firm-specific market-model parameters. In the baseline analysis, α and β are estimated over the $(-252, -44)$ pre-event window. To test the stability of these parameters, we re-estimate them using a shorter window of $(-200, -40)$ trading days, construct new 3-day and 5-day CARs based on the alternative α and β estimates, and use these revised abnormal-return measures as dependent variables in re-estimations of OLS Model 1 and Model 2. This robustness exercise isolates whether our findings are driven by the specific choice of estimation window. Table 10 reports the results of this robustness check.

Table 10: Robustness Checks: Alternative Estimation Windows for Market-Model CARs

| Model | 3-day CAR | | 5-day CAR | |
|---------|-------------------|--------------------|--------------------|--------------------|
| | Model 1 | Model 2 | Model 1 | Model 2 |
| Z-score | 0.00029 (1.20) | 0.000291 (1.19) | 0.00063* (1.90) | 0.00063* (1.90) |

The table reports robustness tests evaluating whether our baseline results are sensitive to the choice of estimation window used to compute abnormal returns. The dependent variable is redefined using two alternative announcement-window measures: the 3-day cumulative abnormal return (CAR) and the 5-day CAR. Both measures are constructed using firm-specific market-model parameters estimated over a shorter pre-event window $(-200, -40)$, instead of the baseline $(-252, -44)$ window. All standard errors are clustered at the firm level. Statistical significance at the 1%, 5%, and 10% levels is denoted by ***, *, and **, respectively. Only the key coefficients are reported due to space constraints.

Table 10 (Continued): Robustness Checks: Alternative Estimation Windows for Market-Model CARs

| | | | | |
|-------------------------|------------------------|-------------------------|----------------------|----------------------|
| Unexpected | | 0.000620 (0.24) | | 0.00384 (1.11) |
| Zscore × Unexpected | | -0.000241 (-0.59) | | 0.00018 (0.32) |
| Firm Size | -0.00261*** (-2.97) | -0.002596*** (-2.94) | -0.00176* (-1.69) | -0.00163 (-1.56) |
| Tobin's Q | -0.00001 (-0.03) | -0.000013 (-0.04) | -0.00020 (-0.56) | -0.00020 (-0.54) |
| Stock Price Runup | -0.03763*** (-3.41) | -0.037517*** (-3.40) | -0.02538* (-1.73) | -0.02522* (-1.72) |
| Repurchase Program Size | 0.00323 (1.56) | 0.003191 (1.54) | 0.00193 (0.72) | 0.00193 (0.73) |
| No. of obs. | 2 426 | 2 426 | 2 426 | 2 426 |
| R ² | 0.04 | 0.04 | 0.02 | 0.02 |
| Adjusted R ² | 0.03 | 0.03 | 0.01 | 0.01 |
| Mean dep. var | 0.01424 | 0.01424 | 0.01252 | 0.01252 |

Across all specifications, the results confirm that our core findings are not sensitive to the choice of estimation window used to construct market-model abnormal returns. The coefficients on distress, unexpectedness, and their interaction remain statistically insignificant in the 3-day CAR regressions. Notably, the Z-score becomes positive and statistically significant in the 5-day CAR specification, suggesting a modest tendency for financially healthier firms to experience slightly higher abnormal returns when the event window is extended. However, this effect emerges only in the longer CAR window and does not persist across the 3-day window or the BHAR-based robustness checks, indicating that it is unlikely to alter the broader interpretation of our findings. Stock-price run-up and firm size mostly continue to display the expected signs and patterns, reinforcing their role as the primary predictors of announcement-window performance. Overall, the stability of results across alternative estimation windows supports the conclusion that our empirical inferences are not driven by the specific construction of abnormal returns.

D. Ohlson O-score

To further validate our financial-distress results, we replace the Altman Z-score with the Ohlson O-score, a complementary and widely used bankruptcy-prediction model that extends beyond the balance-sheet emphasis of Altman's framework (Ohlson, 1980). Whereas the Z-score is constructed using a linear discriminant approach and relies primarily on five accounting ratios, the O-score is estimated through a logistic regression using eight variables that capture profitability, leverage, liquidity, size, and recent performance dynamics. In this way, we incorporate additional information (such as changes in earnings) that may detect early deterioration in financial condition even when traditional Z-score components have not yet deteriorated. Including it serves important purposes of both, testing whether our findings are simply a result of the specific distress measure chosen; if distress truly influences announcement reactions, the effect should emerge under both models despite their methodological and compositional differences. Also, because the O-score is more sensitive to firm-specific trends and non-linear risk patterns, it allows us to examine whether a broader notion of financial vulnerability alters the interpretation of repurchase-announcement effects. Hence, we treat the O-score as a distress proxy when recomputing all baseline regressions, enabling a rigorous assessment of whether our null results are consistent across alternative, theoretically grounded measures of financial distress. However, it requires substantially more accounting inputs than the Z-score, which reduces the usable sample size in our setting. Because our empirical design relies on retaining as many repurchase events as possible (especially when estimating interaction terms and fixed effects) the loss of observations would meaningfully reduce statistical power. For this reason, we employ the O-score strictly as a robustness check rather than as the primary distress measure.

The main conclusions remain unchanged in both baseline models: distress and unexpectedness continue to exhibit no explanatory power for announcement-window abnormal returns, and neither does the interaction between distress and unexpectedness. In

the probit model, the interaction between distress and market volatility also loses statistical significance, although the sign of the coefficient remains negative, consistent with the notion that healthier firms are somewhat more likely to issue unexpected repurchase announcements. An attenuation, that is likely attributable to the substantial reduction in sample size: the O-score can only be computed for firms with complete accounting data, leaving 1,888 observations, considerably fewer than in the Z-score sample (2,426). With reduced variation and statistical power, the probit estimates become less precise.

Overall, the O-score results reinforce the main conclusion that neither distress nor unexpectedness materially affects short-horizon announcement returns, while also highlighting that data availability constraints may limit the detectability of certain interaction effects in the probit specification. Table 11 presents the full set of results using the O-score.

Table 11: Robustness Checks Using the O-score as an Alternative Distress Measure

| Model | Model 1 | Model 2 | Probit Regression |
|-----------------------------------|------------------------|------------------------|------------------------|
| O-score | -0.00085 (-1.15) | -0.00096 (-1.29) | -0.00040 (-0.03) |
| Unexpected | | -0.00070 (-0.20) | |
| Oscore \times Unexpected | | 0.00160 (1.11) | |
| Market Volatility | | | -7.75391 (-0.64) |
| Oscore \times Market Volatility | | | -3.80064 (-1.41) |
| Firm Size | -0.00304*** (-2.93) | -0.00308*** (-2.93) | -0.09398*** (-4.67) |
| Stock Price Runup | -0.03776*** (-2.81) | -0.03731*** (-2.77) | -0.13275 (-0.73) |
| No. of obs. | 1888 | 1888 | 1888 |
| R ² | 0.04 | 0.04 | |
| Adjusted R ² | 0.02 | 0.02 | |
| Pseudo R ² | | | 0.11 |
| Mean dep. var | 0.01605 | 0.01605 | 0.57733 |

E. Winsorization

All continuous variables are winsorized at the 1st and 99th percentiles to limit the influence of extreme observations and ensure that estimated relationships are not driven by a small number of outliers. This approach follows established practice in empirical corporate-finance research, including studies on share repurchases such as Grullon and Michaely (2004), Stephens and Weisbach (1998), and Babenko et al. (2012). Winsorization is particularly important in our setting for two reasons. First, financial ratios, especially distress metrics, market-to-book values, and run-up measures, tend to exhibit heavy-tailed distributions and may be distorted by accounting anomalies, one-off firm events, or extreme stock-price movements (Kothari, Leone & Wasley, 2005). Second, our analysis relies on cross-sectional variation in firm characteristics; reducing noise from extreme values ensures that coefficients reflect systematic patterns rather than idiosyncratic firm-specific shocks. Moreover, because our ideal dataset (as presented earlier) would feature firms that are perfectly comparable across all characteristics, with no outliers or missing information distorting inference, the winsorization step also moves our empirical design one step closer to that benchmark.

F. Unexpectedness: Two-Year Inactivity Threshold

To examine whether our results depend on the chosen inactivity horizon, we conduct a robustness test using an alternative definition of unexpectedness based on a two-year rather than a three-year repurchase gap as in our baseline analysis. We re-estimate both the OLS

Model 2 and the Probit specification through this twenty-four-month lookback window. Using such an alternative threshold aligns with the insight in Ikenberry, Lakonishok and Vermaelen (1995), who show that firms with different historical repurchase patterns exhibit systematically different market reactions, suggesting that investors condition their expectations, at least in part, on recent repurchase behavior. Table 12 reports the robustness results using a two-year inactivity threshold to define unexpected repurchase announcements.

Table 12: Robustness Checks Using a 2-Year Definition of Unexpectedness

| Model | Unexpectedness Defined Over a 2-Year Lookback Window | |
|-----------------------------------|--|------------------------|
| | Model 2 | Probit Regression |
| Z-score | 0.00023 (0.93) | 0.00330 (0.61) |
| Unexpected | 0.00125 (0.48) | |
| Zscore \times Unexpected | -0.00062 (-1.54) | |
| Market Volatility | | 11.14673 (1.07) |
| Zscore \times Market Volatility | | 2.17119* (1.95) |
| Firm Size | -0.00238*** (-2.70) | -0.08054*** (-4.44) |
| Stock Price Runup | -0.03363*** (-3.03) | -0.18682 (-1.05) |
| No. of obs. | 2 426 | 2 426 |
| R ² | 0.04 | |
| Adjusted R ² | 0.02 | |
| Pseudo R ² | | 0.07 |
| Mean dep. var | 0.01391 | 0.62325 |

The results in Table 12 demonstrate that redefining unexpectedness using a two-year rather than a three-year lookback window does not materially affect our findings. In OLS Model 2, Z-score, unexpectedness, and their interaction remain statistically insignificant, fully in line with the baseline specification. The sign and magnitude of the coefficients remain highly similar as well, indicating that the market does not react differently to repurchase announcements merely because the unexpectedness threshold is shortened. Firm size continues to be the only consistently significant predictor in the OLS specification, mirroring earlier results. In the Probit regression, the two-year definition likewise produces patterns identical to the baseline. Unexpectedness remains statistically significant in predicting the likelihood of a repurchase being classified as unexpected, and the interaction between distress and market volatility also retains significance. These similarities confirm that firms classified as “unexpected” under the shorter window are essentially the same group that drives the results under the three-year definition. As a whole, our key inferences are not sensitive to the precise inactivity horizon used to define unexpected repurchases, reinforcing that the main conclusions are structurally stable rather than dependent on an arbitrary cutoff.

G. WLS

We assess whether our announcement-return results are sensitive to heteroskedasticity in abnormal-return estimation by following Babenko et al. (2012) and re-estimating the models using Weighted Least Squares (WLS). Each announcement is weighted by the inverse of the standard deviation of its market-model residuals, giving greater influence to observations with more precisely estimated abnormal returns. To implement this, we estimate firm-specific market models over days -252 to -44 , compute each announcement’s residual-standard-deviation, and use its inverse as the WLS weight. The WLS results closely mirror the baseline OLS findings: neither financial distress nor its interaction with unexpectedness becomes

significant, and coefficient signs and magnitudes change little. This confirms that our null results are not driven by heteroskedasticity or noise in the abnormal-return estimates.

Table 13: Weighted Least Squares Robustness Check for Announcement-Return Regressions

| Model | Weighted Least Square | |
|-------------------------|------------------------|------------------------|
| | Model 1 | Model 2 |
| Z-score | 0.00032 (1.57) | 0.00031 (1.54) |
| Unexpected | | -0.00028 (-0.14) |
| Zscore × Unexpected | | -0.00011 (-0.35) |
| Firm Size | -0.00169** (-2.51) | -0.00169** (-2.54) |
| Tobin's Q | 0.00001 (0.04) | 0.00001 (0.03) |
| Stock Price Runup | -0.02623*** (-2.94) | -0.02622*** (-2.94) |
| Repurchase Program Size | 0.00672*** (2.82) | 0.00671*** (2.82) |
| No. of obs. | 2 397 | 2 397 |
| R ² | 0.03 | 0.03 |
| Adjusted R ² | 0.02 | 0.02 |
| Mean dep. var | 0.01356 | 0.01356 |

VII. Discussion & Limitations

A. Hypotheses

Hypothesis 1: *Unprofitable firms announcing share repurchases experience stronger cumulative abnormal returns (CARs) than profitable firms:*

To begin with, as initially presented: classic signaling theory suggests that repurchases should be especially informative for financially weak firms, since the action is costlier and therefore a more credible signal of undervaluation or recovery prospects. But our findings do not support this prediction: distress plays little role in explaining announcement returns, while firm size and prior price dynamics dominate. Seminal evidence by Ikenberry, Lakonishok and Vermaelen was produced in a period when repurchases were relatively infrequent and thus carried clearer informational value; in today's environment of routine and programmatic repurchases, the signaling power of distress appears significantly diluted. Our findings therefore resonate with the view that repurchases no longer function as a costly, high-information signal for distressed firms in the way early models assumed. Instead, the market reaction appears shaped primarily by structural characteristics, where the fact that this size effect overwhelms the influence of distress suggests that what the market values is not necessarily the riskiness of the firm, but rather how much uncertainty exists about its *fundamentals*.

Fundamentals

Definition

When referring to a firm's "fundamentals," we mean the underlying qualities that reflect its long-term economic strength, such as scale, competitive positioning, growth prospects, operational efficiency, and valuation metrics (e.g., Tobin's Q). In this context, fundamentals equal whether a firm is perceived as structurally strong or strategically well-positioned, rather than whether it is temporarily financially constrained or distressed as our Z-score does.

Similar interpretation follows for the negative association between stock-price run-up and abnormal returns, where we see our results linked to findings of Babenko et al. (2012): showing that the informativeness of a repurchase is reduced when the stock has recently experienced strong momentum. Investors may simply view repurchases in such cases as less surprising or less indicative of undervaluation, proving expectations to anchor short-term reactions to repurchase announcements rather than balance-sheet conditions. Building on this, the Tobin's Q results, especially within the quintile analysis, further underscore that market reactions appear more closely tied to perceptions of firm quality than to financial strain or undervaluation. While Tobin's Q is not consistently significant in the full sample, it becomes positive and strongly significant within the most distressed quintile, precisely where firm size loses its explanatory power. This shift suggests that when evaluating firms under deeper financial pressure, investors may place greater weight on the underlying strength and future prospects of the business rather than on scale alone. This view echoes prior research showing that the market's reaction to repurchases depends not only on financial constraints but also on indicators of firm quality that affect the perceived credibility of the repurchase signal.

A similar pattern emerges in the negative coefficient on the stock-option-related repurchase motive. Although based on only a few observations, the result indicates that investors discount repurchases driven by administrative or compensation-related needs, as these actions provide little information about the firm's core economic prospects. Together, these findings reinforce a broader theme: investors appear more responsive to repurchase announcements when they come from firms perceived as fundamentally strong, not merely from those experiencing financial strain.

Furthermore, the muted role of distress also becomes clearer when viewed through a broader macroeconomic time- and industry perspective. The positive year effects in 2021 to 2023 suggest that repurchases during the post-pandemic period, marked by elevated volatility, shifting liquidity conditions, and heightened investor uncertainty, were interpreted more favorably, regardless of firm distress. Industry patterns point in a similar direction: mining firms, operating in highly cyclical environments, exhibit stronger reactions, while financial firms, constrained by regulatory oversight, show weaker ones. Together, these dynamics indicate that broader economic conditions and sector characteristics played a more decisive role than distress itself in shaping announcement-period returns.

Despite the reasonableness of above discussion, the most revealing nuance emerges from incorporating aspects from our Z-score quintile analysis. While the baseline regressions show no association between distress and abnormal returns, the lowest-Z-score quintile does exhibit a negative and significant distress effect in early specifications. Hence, a pattern that briefly aligns with our hypothesis: among the most financially constrained firms, repurchases appear to convey information that the market finds relevant. But this effect disappears once industry fixed effects are included, implying that the distress-return relationship may be driven by compositional differences across sectors rather than by firm-level financial weakness per se. Interestingly, within this quintile, firm size also loses significance, and only the 2021 year dummy remains significant, suggesting that during the height of post-COVID uncertainty, investors may temporarily have placed greater weight on balance-sheet conditions when interpreting repurchase announcements. Although not a robust effect, this provides a narrow window in which our hypothesis seems partially valid.

Viewed together, the findings call for a more nuanced interpretation of Hypothesis 1. Distress does not systematically amplify announcement effects, and any marginal influence it may have under specific conditions, such as severe weakness combined with heightened market uncertainty, is outweighed by broader forces such as firm size, prior price dynamics, and industry environment. Our results offer a modern reinterpretation of traditional signaling

theory: repurchases may still act as signals of firm strength, but the market is highly selective about when, and from whom, it accepts them.

Hypothesis 2: Abnormal returns are higher when the repurchase is a surprise (i.e., not recurring in recent years)

The indication of our findings, that the market does not systematically reward firms for deviating from their historical repurchase patterns, contrasts with the findings of De Ridder (2015) and Peyer & Vermaelen (2009), who document that irregular repurchase activity can heighten news value. One explanation is in parallel with our initial discussion on Hypothesis 1; that share repurchases have become so routine based and programmatic in the U.S., thus a lack of recent repurchases no longer constitutes a meaningful surprise; consistent with evidence that the signaling value of repurchase announcements has weakened over time as firms increasingly announce buybacks they do not fully execute (Bonaimé et al., 2014). Our insignificant and negative interaction term between unexpectedness and financial distress shows that distressed firms do not regain signaling power by timing their repurchases in atypical ways.

Importantly, the dominating predictors of announcement returns remain firm size and stock-price run-up, just as in Model 1, indicating that markets continue to anchor their reactions in broad firm fundamentals rather than in firms' repurchase histories. Even during years of elevated uncertainty such as 2021 to 2023, when overall announcement reactions were stronger, unexpectedness adds no explanatory power, and the interaction with distress remains consistently negative and insignificant. A pattern suggesting that, in the contemporary repurchase environment, where programs are frequent and highly standardized, the market does not treat an unexpected repurchase as a meaningful deviation from normal payout behavior. While it is notable that unexpectedness becomes positive within the most distressed quintile, the effect is statistically irrelevant and easily overshadowed by structural determinants. Overall, the evidence offers little support for Hypothesis 2: unexpected repurchases no longer appear to carry distinct signaling value in shaping short-term market reactions.

Hypothesis 3: Unexpected repurchase announcements are more likely to occur when financially distressed firms face high market volatility

Prior research has shown that managerial incentives and signaling motives are central to understanding payout and share repurchase decisions (Ikenberry et al., 1995; Almeida, Fos & Kronlund, 2016). Our results, however, deviate from this traditional expectation and instead align with more recent evidence documenting a decline in the credibility and informativeness of repurchase signals. Healthier firms, not distressed ones, are more likely to initiate unexpected repurchases when volatility rises. This outcome runs counter to the expectation in Hypothesis 3 and instead aligns with the broader mechanism highlighted by Massa, Schumacher and Wang (2025), who show that firms' repurchase decisions are shaped by the surrounding market environment (particularly conditions affecting price impact) rather than by financial strain alone. In a similar way, our Probit results suggest that unexpected repurchase announcements are more strongly driven by market-level factors and their interaction with distress than by distress in isolation. We noticed that our outcome could be linked to a broader macro-financial interpretation that fits the period studied. During the Federal Reserve's post-COVID tightening cycle, external financing costs increased sharply, and liquidity buffers became central to corporate survival (Federal Reserve, 2023). Under such conditions, distressed firms may rationally refrain from opportunistic repurchases, whereas stronger firms, who are better capitalized and less dependent on external funding, retain the flexibility to use unexpected repurchases as stabilization tools or confidence signals. This interpretation complements the insights of Bonaimé et al. (2014), who show that firms

with greater balance-sheet capacity, particularly those that are underlevered or perceived as undervalued, are more likely to initiate repurchases. Additionally, the robustness checks offer further nuance. When we remove regulated industries (sectors where payout decisions are constrained by regulation and capital requirements) the Z-score becomes negative and significant, consistent with our original hypothesis and with evidence that distressed firms sometimes use repurchases strategically to offset valuation concerns (Vermaelen, 1981). Regulation appears to suppress this behavior in the full sample by limiting the discretion of banks, insurers, and utilities. Looking more closely, large U.S. banking organizations and systemically important financial institutions (SIFIs) must obtain regulatory approval before executing share repurchases under the Comprehensive Capital Analysis and Review (CCAR) framework and the Dodd-Frank Act stress-testing regime. These constraints became especially binding after the 2008 financial crisis, when U.S. supervisors adopted a more precautionary, macro-prudential stance toward capital distribution (Sullivan & Cromwell LLP, 2019). Such institutional shift helps explain why distressed firms in regulated industries cannot freely initiate unexpected repurchases, even when market volatility rises. In contrast, once these regulated industries are removed, the interaction between distress and volatility loses significance, implying that firms outside the prudential perimeter respond primarily to internal liquidity and balance-sheet capacity rather than to macro uncertainty, consistent with De Ridder's (2015) who finds that repurchase decisions are governed largely by firms' internal financial flexibility.

Ultimately, our findings suggest that the relationship between distress, volatility, and unexpected repurchases is conditional rather than universal. Unexpected repurchases in volatile markets tend to be initiated by healthy firms, consistent with modern evidence on execution credibility, while distressed firms behave opportunistically only in sectors where regulation does not restrict payout policy. Our layered result refines traditional signaling arguments by showing that institutional constraints and macro-financing conditions can materially shape when firms choose to send (or refrain from sending) a repurchase signal.

B. Implications

Perhaps the most striking implication of our findings is the growing mismatch between managerial intent behind repurchases and the way investors actually respond to them. From the market's perspective, financial distress carries virtually no weight: investors no longer interpret distress-driven repurchases as credible signals and instead respond primarily to firm size, valuation, and recent price dynamics. The Probit results, however, show that managers do incorporate financial condition and volatility into their repurchase decisions. Together, these findings point to a clear disconnect where managers initiate unexpected repurchases in response to internal pressures and risk conditions, while investors largely ignore distress and price announcements according to broader market signals.

Momentum effects may reinforce this pattern: consistent with behavioral models of return extrapolation, investors tend to project recent declines forward (Jegadeesh & Titman, 1993), meaning that distressed firms' repurchase announcements do little to shift expectations anchored in a negative trajectory.

A further explanation could lie in the changing structure of today's equity markets. Traditional signaling theory evolved in an era dominated by institutions that closely analyzed stocks, but that landscape has shifted substantially. Modern markets feature a far more heterogeneous investor base than the environments in which classic signaling theory was developed. Retail investors using zero-commission trading apps, passive index funds now holding over 40% of U.S. equity assets, and algorithmic traders reacting primarily to order-flow patterns (Chinco & Sammon, 2024) all contribute to a market structure driven increasingly by short-term price dynamics rather than balance-sheet signals. This perhaps help explain why variables such as price run-up and firm size dominate our results: these

investor groups respond more to observable market behavior than to financially driven managerial intentions. A further structural force is the communication overload of contemporary capital markets. Firms today issue a constant flow of information, earnings updates, ESG reports, investor-day materials, and real-time digital disclosures, which dramatically lowers the signal-to-noise ratio. In this crowded information environment, share repurchases no longer stand out as salient events, helping explain why investors discount the informational content of unexpected or distress-driven repurchases.

In general, our patterns point toward a dual-equilibrium environment: managers may deploy repurchases strategically when facing financial pressure, but investors reward only those announcements aligned with indicators of strength and fundamental stability. Hence, this helps explain why distress shapes *who* repurchases but not *how* the market responds, a distinction that we see as most apparent when macro uncertainty, regulatory constraints, and evolving market microstructure interact. Managers may still rely on repurchases as strategic tools, while markets, shaped increasingly by behavioral dynamics, no longer respond to distress-driven signals in the way theory once predicted.

C. Limitations

A central limitation of our study concerns how abnormal returns are measured. Unlike Babenko et al. (2012), who employ a matching-firm strategy (comparing each repurchasing firm to a highly similar non-repurchasing firm, with nearly identical fundamentals, risk characteristics, and performance prior to the event) our analysis relies on market- and industry-adjusted returns. While this approach is standard in event-study research and suitable for large-scale datasets, it is inherently less precise in isolating the portion of the return attributable solely to the repurchase announcement. However, we realized that replicating the same strategy as Babenko et al. was proved to not be feasible in our case. To illustrate, the data requirements are substantial: constructing a credible match demands extensive firm-level information across multiple dimensions (size, industry, performance, leverage, valuation, and historical trading patterns) combined with strict timing alignment. Also, the long sample window (2016 to 2024) and the high frequency of repurchase announcements result in a dataset where many firms eligible for matching eventually engage in repurchases themselves, making it difficult to identify a clean pool of non-repurchasing control firms without introducing selection bias. On top of that we realized, the computational and methodological burden of dynamically updating matches for every event, sometimes multiple times per firm, lies beyond the scope of our project. Given these constraints, we chose to adopt the more tractable abnormal-return benchmark acknowledging that this method introduces more noise into the estimates, and despite our effort to mitigate confounding effects (e.g., winsorization, multiple controls, fixed effects), the measured abnormal return may still partly reflect intraday news, sector-specific shocks, or macroeconomic developments that coincide with the event window.

A further methodological constraint in replicating the method used by Babenko et al. (2012), arises from our inability to incorporate governance frictions through an Entrenchment Index, as developed by Bebchuk, Cohen and Ferrell (2009) and applied in subsequent repurchase research. When investigating the construction of this index we realized it required granular firm-level governance data (poison pill provisions, staggered boards, limits to shareholder amendments, and additional anti-takeover mechanisms) alongside multi-year regulatory filings. Implementing this methodology would have required merging several large datasets, hand-collecting missing governance attributes, and running additional layers of regressions to isolate governance-driven heterogeneity in signaling credibility. Within the time and resource constraints of this thesis, assembling an index of comparable scope and quality was not possible. The absence of such a measure implies that we cannot distinguish whether

distressed firms fail to generate market reactions because investors discount distress per se, or because entrenched managers repurchase for reasons unrelated to shareholder value.

Including a dummy variable for insider activity, as described in our data-section, reduces the risk that insider behavior acts as an unobserved confounder in the return regressions. Importantly, one must notice and as mentioned in our ideal data set: insider activity would ideally be measured as a continuous variable capturing the exact volume, timing, and direction of insider trades, enabling a deeper assessment of whether insider behavior reinforces or weakens the market's interpretation of repurchase announcements. We explored several approaches to obtaining such detail, including attempts to extract transaction-level insider data directly from Refinitiv and through supplementary SEC Form 4 filings. However, neither source provided structured, firm-level aggregates suitable for large-scale analysis. To generate the desired variable, we would have needed to manually retrieve and consolidate all insider transactions occurring in the six months preceding each announcement, amounting to more than 3,000 firm-specific searches and thousands of individual filings. This process exceeded the practical time and resource constraints of the thesis. Therefore, we employ a simplified dummy variable indicating whether any insider activity was reported prior to the announcement, although it gives consistency, it still sacrifices informational richness.

Another limitation arises from the multicollinearity between cash flow and components of the Altman Z-score, most notably EBIT. Because the Z-score mechanically embeds profitability, leverage, liquidity, and solvency dimensions (Altman, 1968), including cash flow alongside it introduces substantial overlap that risks inflating standard errors and distorting coefficient estimates. Given that the Z-score forms the theoretical backbone of our distress-related hypotheses and remains one of the most widely applied distress metrics in empirical corporate-finance research (Begley, Ming and Watts, 1996), we prioritized its inclusion over a standalone cash-flow measure. This choice preserves conceptual coherence but inevitably limits our ability to isolate the independent influence of cash-flow capacity from broader financial distress. We explored whether alternative distress proxies could mitigate this issue, for example, the Ohlson O-score, used extensively in subsequent bankruptcy-prediction literature (Ohlson, 1980), offers the benefit of relying on different firm characteristics and therefore reduces mechanical overlap with cash-flow measures. However, the O-score requires inputs such as the current ratio, which were missing for a substantial share of our sample. Using it as the primary distress metric would have reduced the number of usable observations by nearly half in our case, undermining statistical power and the representativeness of the dataset. Consequently, while we employ the O-score as an important robustness check, and its results broadly corroborate those obtained using the Z-score, it could not serve as a complete substitute in the baseline analysis.

The Probit model is estimated on the same full sample as the OLS specifications. The challenge arises only when attempting to sort the data into Z-score quintiles. Because unexpected repurchases are relatively rare events, dividing the sample into quintiles leaves each group with roughly 485 observations but very few actual "unexpected" announcements. This sparse distribution makes the Probit model unstable at the quintile level, as maximum-likelihood estimation cannot generate reliable coefficients when the dependent variable exhibits too few positive outcomes within each subsample. Within these smaller groups, many dummy categories contain too few or even zero observations, particularly for unexpected repurchases and certain industries, leading to dropped variables and unstable estimates. Including such results would risk overstating patterns driven by data artefacts rather than underlying economic behavior. Restricting the quintile-sorted regressions to the OLS models ensures that all reported results meet the reliability and robustness standards aimed obtaining in this paper. Nonetheless, the absence of a Probit quintile decomposition limits our ability to

evaluate how the distress-volatility relationship varies across the financial-health distribution, a dimension that remains an opportunity for future research with richer data or larger samples.

A further limitation is that our analysis focuses only on short-horizon announcement effects and does not incorporate the long-run dimension of repurchases. Prior work (e.g., Babenko et al., 2012) shows that actual buyback execution (not just authorization) plays a central role in signaling credibility and in explaining returns over longer horizons. This is directly relevant for our setting: the Probit results indicate that financially weaker firms are more likely to initiate unexpected repurchases in volatile periods, while the return regressions show that investors do not reward distress-driven announcements. Without execution data, we cannot determine whether this disconnect persists once firms follow through with actual repurchases or whether long-run performance differs across financially strong and weak firms.

Although many of the limitations discussed above stem from data constraints or methodological scope, one limitation is more structural and tied to the macroeconomic and policy environment of the period we study. Under the CARES Act, firms that received pandemic-related federal assistance were prohibited from conducting share repurchases for 12 months after loan repayment (or until September 2022). This restriction disproportionately affected financially weak firms, the very group central to our hypotheses, resulting in a policy-driven selection effect. Because these firms were legally barred from repurchasing, they do not appear in our sample, and the distressed firms that do appear are likely systematically healthier than the broader population. Combined with heightened public scrutiny of payouts during the pandemic, this filtering implies that part of the observed disconnect between distress and repurchase behavior may reflect regulatory constraints rather than purely managerial or market-driven forces, as have just been analyzed.

VII. Conclusion

A. General

Share repurchases have long been viewed as one of the market's clearest corporate signals: an intentional action through which firms reveal information about value, confidence, or strategic direction. But as repurchases have evolved from rare events into a routine feature of U.S. corporate policy, a natural question arises: *do investors still listen in the way theory expects?* This thesis sets out to examine that question through the lens of financial distress, announcement unexpectedness, and market volatility.

Across our empirical analyses, the evidence points toward a modern repurchase environment that departs sharply from classical signaling predictions. Financial distress, once theorized to enhance the credibility of share repurchase announcements, plays little role in explaining short-term market reactions. Instead, investors continue to emphasize fundamentals such as firm size, valuation, and recent price dynamics. This suggests that in today's repurchase landscape, where programs are frequent and often programmatic, distress-driven announcements no longer stand out as meaningful indicators of undervaluation or recovery. Similarly, the expectation that "surprise" repurchases generate stronger abnormal returns finds little support. Deviating from past repurchase behavior no longer appears to carry distinct informational weight, even in years marked by heightened macroeconomic uncertainty. In this sense, markets seem to interpret repurchase announcements less as deviations from historical patterns and more as reflections of a firm's broader fundamentals and prevailing market conditions.

Where the market remains unresponsive, managerial behavior tells a different story. The Probit results show that firms' propensity to initiate unexpected repurchases during volatile periods depends strongly on their financial health and regulatory environment. Healthier firms become more opportunistic as volatility rises, while distressed firms (especially

in regulated sectors) face constraints that limit their ability to act on repurchase opportunities. This divergence underscores a core insight of this thesis: managers and investors operate under different logics. The factors that prompt a firm to repurchase are not the same factors that drive how markets interpret the announcement. Analyzing our findings combined, presents a more nuanced view of contemporary repurchase signaling. Managers may still initiate repurchases with CONFIDENCE in their ability to use them strategically, but investors appear increasingly selective about which signals they consider CREDIBLE.

Financial distress, long viewed as a potential component of repurchase signaling, appears to hold limited explanatory power in contemporary U.S. markets. Instead, firm fundamentals, sectoral constraints, and macro-financial conditions shape both repurchase decisions and market reactions in ways that older models no longer fully capture.

Rather than pointing to a single mechanism, our findings suggest that modern repurchases operate within a more complex signaling landscape, one that offers perspective on the broader rise in repurchases that motivates this study. Credibility now depends less on the costliness of the action and more on its broader context, with the meaning of a repurchase jointly shaped by the firm that issues the signal and the market that decides whether, and how, to interpret it.

B. Future Research

One suggestion of further investigation concerns the divergence we uncover between managerial motives (identified in the Probit model) and market pricing (shown in the OLS regressions). Future studies could formalize this as a strategic interaction between firms and investors, where each side acts under different constraints. One approach would be to build a structural or semi-structural model in which: (1) Managers choose whether and when to announce repurchases based on liquidity, execution risk, regulatory limits, and their private expectations of future cash flows. (2) Investors update beliefs about firm quality conditional not only on the announcement itself but also on observable states like volatility, interest-rate conditions, or balance-sheet strength. (3) Execution uncertainty, the probability that the firm actually completes the repurchase, could be incorporated as a latent variable shaping the credibility of the signal. Estimating such a model, using simultaneous equations or Bayesian updating frameworks (Milgrom & Roberts, 1982): in which investors are assumed to update their beliefs about a firm's value when new information arrives, allow researchers to map how repurchase announcements transmit information differently across firms and market conditions. It would extend the use of a narrow announcement window by allowing the adjustment to unfold gradually through a Bayesian model: A potential method that could help reconcile why managerial incentives respond to distress and volatility, while investor reactions do not - revealing patterns invisible in short-window event studies, and apply that to the modern dynamic market. This "updated belief framework" could mathematically be illustrated as:

$$\textit{Posterior Belief} \propto \textit{Prior Belief} \times \textit{Likelihood of the Signal}$$

Finally, expanding the empirical setting across countries, regulatory regimes, and uncertainty episodes would offer richer comparative insights. Markets where repurchases are heavily restricted, newly liberalized, or subject to varying capital-distribution rules provide natural contrasts to the U.S. context. Studying how announcement reactions differ under these environments could reveal whether the patterns we observe (such as the diminished signaling power of distress) are global phenomena or features of the U.S. institutional landscape.

References

- Almeida, H., Fos, V. and Kronlund, M. (2016) “The real effects of share repurchases,” *Journal of Financial Economics*, 119(1), pp. 168–185. Available at: <https://doi.org/10.1016/j.jfineco.2015.08.008>.
- Babenko, I., Tserlukevich, Y. and Vedrashko, A. (2012) “The Credibility of Open Market Share Repurchase Signaling,” *Journal of Financial and Quantitative Analysis*, 47(5), pp. 1059–1088. Available at: <https://doi.org/10.1017/S0022109012000312>.
- Bebchuk, L., Cohen, A. and Ferrell, A. (2009) “What Matters in Corporate Governance?,” *Review of Financial Studies*, 22(2), pp. 783–827. Available at: <https://doi.org/10.1093/rfs/hhn099>.
- Begley, J., Ming, J. and Watts, S. (1996) “Bankruptcy classification errors in the 1980s: An empirical analysis of Altman’s and Ohlson’s models,” *Review of Accounting Studies*, 1(4), pp. 267–284. Available at: <https://doi.org/10.1007/BF00570833>.
- Berk, J.B. (1995) “A Critique of Size-Related Anomalies,” *Review of Financial Studies*, 8(2), pp. 275–286. Available at: <https://doi.org/10.1093/rfs/8.2.275>.
- Board of Governors of the Federal Reserve System (2023) “2023 Annual Report — Monetary Policy,” *Federal Reserve*. Available at: <https://www.federalreserve.gov/publications/2023-ar-monetary-policy.htm>.
- Bolton, P., Wang, N. and Yang, J. (2015) *Liquidity and Risk Management: Coordinating Investment and Compensation Policies*. NBER Working Paper No. 20979. National Bureau of Economic Research (NBER).
- Bonaimé, A.A., Öztekin, Ö. and Warr, R.S. (2014) “Capital structure, equity mispricing, and stock repurchases,” *Journal of Corporate Finance*, 26, pp. 182–200.
- Brav, A. et al. (2005) “Payout policy in the 21st century\$,” *Journal of Financial Economics*, 77, pp. 483–527.
- Brown, S.J. and Warner, J.B. (1985) “Using daily stock returns,” *Journal of Financial Economics*, 14(1), pp. 3–31. Available at: [https://doi.org/10.1016/0304-405X\(85\)90042-X](https://doi.org/10.1016/0304-405X(85)90042-X).
- Chinco, A. and Sammon, M. (2024) “The Passive Ownership Share Is Double What You Think It Is,” *Working paper*, p. 63.
- Cox, J. (2020) “Stock Market Volatility Tops Financial Crisis with VIX at Record,” *Bloomberg*. Available at: <https://www.bloomberg.com/news/articles/2020-03-16/stock-market-volatility-tops-financial-crisis-with-vix-at-record>.
- De Ridder, A. (2015) “Additional evidence on the frequency of share repurchases and managerial timing,” *The Quarterly Review of Economics and Finance*, 56, pp. 154–164. Available at: <https://doi.org/10.1016/j.qref.2014.09.011>.
- Dittmar, A.K. (2000) “Why Do Firms Repurchase Stock?,” *The Journal of Business*, 73(3), pp. 331–355. Available at: <https://doi.org/10.1086/209646>.
- Fama, E.F. and French, K.R. (1992) “The Cross-Section of Expected Stock Returns,” *The Journal of Finance*, 47(2), pp. 427–465.
- Grullon, Michaely, G., Roni (2004) “The Information Content of Share Repurchase Programs,” *The Journal of Finance*, 59(2), pp. 651–680.

Hillert, A., Maug, E. and Obernberger, S. (2016) “Stock repurchases and liquidity,” *Journal of Financial Economics*, 119(1), pp. 186–209. Available at: <https://doi.org/10.1016/j.jfineco.2015.08.009>.

I. Altman, E. (1968) “Financial Ratios, Discriminant Analysis and the Prediction of Corporate Bankruptcy,” *The Journal of Finance*, 23(4), pp. 589–609.

Ikenberry, D., Lakonishok, J. and Vermaelen, T. (1995) “Market underreaction to open market share repurchases,” *Journal of Financial Economics*, 39(2–3), pp. 181–208.

Jagannathan, M. and Stephens, C. (2003) “Motives for Multiple Open-Market Repurchase Programs,” *Financial Management*, 32(2), pp. 71–91.

Jagannathan, M. and Weisbach, M.S. (2000) “Financial Flexibility and the choice between dividends and stock repurchases,” *Journal of Financial Economics*, 57(3), pp. 355–384.

Jegadeesh, N. and Titman, S. (1993) “Returns to Buying Winners and Selling Losers: Implications for Stock Market Efficiency,” *The Journal of Finance*, 48(1), pp. 65–91.

Kim, S. (2013) “What is behind the magic of O-Score? An alternative interpretation of Dichev’s (1998) bankruptcy risk anomaly,” *Review of Accounting Studies*, 18(2), pp. 291–323. Available at: <https://doi.org/10.1007/s11142-012-9206-7>.

Kothari, S.P., Leone, A.J. and Wasley, C.E. (2005) “Performance matched discretionary accrual measures,” *Journal of Accounting and Economics*, 39(1), pp. 163–197. Available at: <https://doi.org/10.1016/j.jacceco.2004.11.002>.

Lambrecht, B.M. and Myers, S.C. (2012) “A Lintner Model of Payout and Managerial Rents,” *The Journal of Finance*, 67(5), pp. 1761–1810.

“LSEG Workspace” (2025).

Massa, M., Schumacher, D. and Wang, Y. (2025) “Repurchases for Price Impact: Evidence from Fragile Stocks,” *Journal of Financial and Quantitative Analysis*, 60(5), pp. 2334–2366. Available at: <https://doi.org/10.1017/S002210902400036X>.

Milgrom, P. and Roberts, J. (1982) “Predation, reputation, and entry deterrence,” *Journal of Economic Theory*, 27(2), pp. 280–312. Available at: [https://doi.org/10.1016/0022-0531\(82\)90031-X](https://doi.org/10.1016/0022-0531(82)90031-X).

Ohlson, J.A. (1980) “Financial Ratios and the Probabilistic Prediction of Bankruptcy,” *Journal of Accounting Research*, 18(1), p. 109. Available at: <https://doi.org/10.2307/2490395>.

Rules and Regulations for the Securities and Exchange Commission: Rule 10b-18—Purchases of Certain Equity Securities by the Issuer and Others (2017). U.S. Securities and Exchange Commission (SEC). Available at: <https://www.sec.gov/>.

“SDC Platinum” (2025).

Skinner, D.J. (2008) “The evolving relation between earnings, dividends, and stock repurchases,” *Journal of Financial Economics*, 87(3), pp. 582–609.

“S&P Capital IQ Pro” (2025).

S&P Dow Jones Indices (2018) *A Fresh Look at Buybacks*. S&P Global. Available at: <https://www.spglobal.com/spdji/en/documents/research/research-a-fresh-look-at-buybacks.pdf>.

S&P Dow Jones Indices (2020) *S&P 500 Buybacks Decline 55.4% to \$88.7 Billion in Q2 2020*. S&P Global. Available at: <https://www.spglobal.com/spdji/en/documents/index-news-and-announcements/20200915-sp-500-buybacks-q2-2020.pdf>.

Stephens, C.P. and Weisbach, M.S. (1998) “Actual Share Reacquisitions in Open-Market Repurchase Programs,” *The Journal of Finance*, 53(1), pp. 313–333. Available at: <https://doi.org/10.1111/0022-1082.115194>.

Sullivan & Cromwell LLP (2019) *Bank Capital Requirements: Federal Reserve Issues Final Rule on Prudential Standards for Large Banking Organizations*. Client Memorandum / Regulatory Update. New York: Sullivan & Cromwell LLP.

Vermaelen, T. (1981) “COMMON STOCK REPURCHASES AND MARKET SIGNALLING An Empirical Study,” *Journal of Financial Economics*, 9(2), pp. 139–183.

Vermaelen, T. (2009) “The Nature and Persistence of Buyback Anomalies,” *The Review of Financial Studies*, 22(4), pp. 1693–1745.

Appendix

Appendix A: AI Transparency Statement

We made limited use of ChatGPT 4o for minor language edits and occasional assistance with coding syntax. With respect to both the detailed and technical nature of our paper, the tool was employed only in a narrowly restricted manner, with only small excerpts of text or code provided when necessary.

Appendix B: Definitions and Equations

3-day BHAR Formula:

$$BHAR_i = \prod_{t=-1}^{+1} (1 + R_{i,t}) - \prod_{t=-1}^{+1} (1 + R_{M,t})$$

Altman Z-score:

$$Z = 1.2 \left(\frac{\text{Working Capital}}{\text{Total Assets}} \right) + 1.4 \left(\frac{\text{Retained Earnings}}{\text{Total Assets}} \right) + 3.3 \left(\frac{\text{EBIT}}{\text{Total Assets}} \right) + 0.6 \left(\frac{\text{Market Value of Equity}}{\text{Total Liabilities}} \right) + 1.0 \left(\frac{\text{Sales}}{\text{Total Assets}} \right)$$

Tobin's Q:

$$\text{Tobin's } Q = \frac{\text{Market Value of Equity}}{\text{Book Value of Equity}}$$

Market Model:

$$R_{it} = \alpha_i + \beta_i \times R_{Mt} + \varepsilon_{it}$$

α_i and β_i estimated over -252 to -44

Full Specification of Model 1:

$$\begin{aligned} BHAR_i = \alpha + \beta_1 Zscore_i + \beta_2 Size_i + \beta_3 Q_i + \beta_4 Runup_i + \beta_5 ProgSize_i + \beta_6 Cashflow_i + \beta_7 Insider_i \\ + \beta_8 Reason: General Corporate + \beta_9 Reason: Employee Benefit \\ + \beta_{10} Reason: Enhance Shareholder Value + \beta_{11} Reason: Offset Dilution \\ + \beta_{12} Reason: Stock Option + \beta_{13} Reason: Undervalued + \beta_{14} Year: 2016 \\ + \beta_{15} Year: 2017 + \beta_{16} Year: 2018 + \beta_{17} Year: 2019 + \beta_{18} Year: 2020 + \beta_{19} Year: 2021 \\ + \beta_{20} Year: 2022 + \beta_{21} Year: 2023 + \beta_{22} Year: 2024 \\ + \beta_{23} Industry: Agriculture, forestry\&fishing + \beta_{24} Industry: Mining \\ + \beta_{25} Industry: Construction + \beta_{26} Industry: Manufacturing \\ + \beta_{27} Industry: Transportation\&Communication + \beta_{28} Industry: Wholesale Trade \\ + \beta_{29} Industry: Retail Trade + \beta_{30} Industry: Finance\&Insurance \\ + \beta_{31} Industry: Services + \beta_{32} Industry: Public administration + \varepsilon_i \end{aligned}$$

Full Specification of Model 2:

$$\begin{aligned} BHAR_i = \alpha + \beta_1 Zscore_i + \beta_2 Unexpected_i + \beta_3 (Zscore_i \times Unexpected_i) + \beta_4 Size_i + \beta_5 Q_i + \beta_6 Runup_i \\ + \beta_7 ProgSize_i + \beta_8 Cashflow_i + \beta_9 Insider_i + \beta_{10} Reason: General Corporate \\ + \beta_{11} Reason: Employee Benefit + \beta_{12} Reason: Enhance Shareholder Value \\ + \beta_{13} Reason: Offset Dilution + \beta_{14} Reason: Stock Option + \beta_{15} Reason: Undervalued \\ + \beta_{16} Year: 2016 + \beta_{17} Year: 2017 + \beta_{18} Year: 2018 + \beta_{19} Year: 2019 + \beta_{20} Year: 2020 \\ + \beta_{21} Year: 2021 + \beta_{22} Year: 2022 + \beta_{23} Year: 2023 + \beta_{24} Year: 2024 \\ + \beta_{25} Industry: Agriculture, forestry\&fishing + \beta_{26} Industry: Mining \\ + \beta_{27} Industry: Construction + \beta_{28} Industry: Manufacturing \\ + \beta_{29} Industry: Transportation\&Communication + \beta_{30} Industry: Wholesale Trade \\ + \beta_{31} Industry: Retail Trade + \beta_{32} Industry: Finance\&Insurance \\ + \beta_{33} Industry: Services + \beta_{34} Industry: Public administration + \varepsilon_i \end{aligned}$$

Full Specification of Probit Regression:

$$\begin{aligned}
P(\text{Unexpected}_i = 1) &= \Phi(\beta_1 \text{Zscore}_i + \beta_2 \text{Market Volatility}_i + \beta_3 (\text{Zscore}_i \times \text{Market Volatility}_i) + \beta_4 \text{Size}_i \\
&+ \beta_5 Q_i + \beta_6 \text{Runup}_i + \beta_7 \text{ProgSize}_i + \beta_8 \text{Cashflow}_i + \beta_9 \text{Insider}_i \\
&+ \beta_{10} \text{Reason: General Corporate} + \beta_{11} \text{Reason: Employee Benefit} \\
&+ \beta_{12} \text{Reason: Enhance Shareholder Value} + \beta_{13} \text{Reason: Offset Dilution} \\
&+ \beta_{14} \text{Reason: Stock Option} + \beta_{15} \text{Reason: Undervalued} + \beta_{16} \text{Year: 2016} \\
&+ \beta_{17} \text{Year: 2017} + \beta_{18} \text{Year: 2018} + \beta_{19} \text{Year: 2019} + \beta_{20} \text{Year: 2020} + \beta_{21} \text{Year: 2021} \\
&+ \beta_{22} \text{Year: 2022} + \beta_{23} \text{Year: 2023} + \beta_{24} \text{Year: 2024} \\
&+ \beta_{25} \text{Industry: Agriculture, forestry\&fishing} + \beta_{26} \text{Industry: Mining} \\
&+ \beta_{27} \text{Industry: Construction} + \beta_{28} \text{Industry: Manufacturing} \\
&+ \beta_{29} \text{Industry: Transportation\&Communication} + \beta_{30} \text{Industry: Wholesale Trade} \\
&+ \beta_{31} \text{Industry: Retail Trade} + \beta_{32} \text{Industry: Finance\&Insurance} \\
&+ \beta_{33} \text{Industry: Services} + \beta_{34} \text{Industry: Public administration})
\end{aligned}$$

Cumulative Abnormal Return:

$$\text{CAR}_i(-1, +1) = \sum_{t=-1}^{+1} [R_{i,t} - (\alpha_i + \beta_i R_{M,t})]$$

Ohlson O-score:

$$\begin{aligned}
T &= -1.32 - 0.407 \log\left(\frac{\text{Total Assets}_t}{\text{GNP Price Index Level}}\right) + 6.03 \left(\frac{\text{Total Liabilities}_t}{\text{Total Assets}_t}\right) - 1.43 \left(\frac{\text{Working Capital}_t}{\text{Total Assets}_t}\right) \\
&+ 0.0757 \left(\frac{\text{Current Liabilities}_t}{\text{Current Assets}_t}\right) - 1.72X - 2.37 \left(\frac{\text{Net Income}_t}{\text{Total Assets}_t}\right) \\
&- 1.83 \left(\frac{\text{Funds From Operations}_t}{\text{Total Liabilities}_t}\right) + 0.285Y \\
&- 0.521 \left(\frac{\text{Net Income}_t - \text{Net Income}_{t-1}}{|\text{Net Income}_t| + |\text{Net Income}_{t-1}|}\right)
\end{aligned}$$

Funds From Operations = Net income_t + Depreciation, Depletion & Amortization

X = 1 if Total Liabilities > Total Assets, 0 otherwise

Y = 1 if a net loss for the last two years, 0 otherwise

Appendix C: NASDAQ/NYSE Trading Holiday List

US Holiday List

Table 14: U.S. Holidays

The table reports all U.S. federal holidays between 2015 and 2024 on which the NASDAQ stock market was closed. These dates are used to adjust repurchase-announcement event dates in our dataset. Specifically, when SDC Platinum reports an announcement on a non-trading day, either a weekend or one of the holidays listed in the table, the event date is reassigned to the next available trading day.

| 2015 | 2016 | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 | 2023 | 2024 | 2025 |
|------|-------|-------|-------|-------|-------|-------|-------|-------|-------|------|
| 24/1 | 1/1 | 1/1 | 1/1 | 1/1 | 1/1 | 1/1 | 17/1 | 2/1 | 1/1 | 1/1 |
| 2 | 18/1 | 16/1 | 15/1 | 21/1 | 17/1 | 18/1 | 15/4 | 16/1 | 15/1 | |
| | 15/2 | 20/2 | 19/2 | 18/2 | 20/1 | 15/2 | 30/5 | 20/2 | 19/2 | |
| | 25/3 | 14/4 | 30/3 | 19/4 | 10/4 | 2/4 | 20/6 | 7/4 | 29/3 | |
| | 30/5 | 29/5 | 28/5 | 27/5 | 25/5 | 31/5 | 4/7 | 29/5 | 4/7 | |
| | 4/7 | 4/7 | 4/7 | 4/7 | 3/7 | 5/7 | 5/9 | 19/6 | 27/5 | |
| | 5/9 | 4/9 | 3/9 | 2/9 | 7/9 | 6/9 | 24/11 | 4/9 | 19/6 | |
| | 24/11 | 23/11 | 22/11 | 28/11 | 26/11 | 25/11 | 26/12 | 23/11 | 2/9 | |
| | 26/12 | 25/12 | 25/12 | 25/12 | 25/12 | 24/12 | | 25/12 | 28/11 | |
| | | | | | | 31/12 | | | 25/12 | |

Appendix D: Full Quintile-Sorted Results

Quintile-Sorted Announcement Return Regressions (Model 1)

Table 15: Announcement Returns by Distress Quintile (Model 1)

| Model | Quintile 1 | Quintile 2 | Quintile 3 | Quintile 4 | Quintile 5 |
|--|---------------------|-----------------------|------------------------|-----------------------|------------------------|
| Intercept | 0.01930 (0.61) | -0.01864 (-0.81) | 0.07092** (2.49) | -0.00765 (-0.30) | 0.01784 (0.92) |
| Z-score | -0.00219 (-1.18) | 0.00559 (0.97) | 0.00262 (0.34) | 0.00721 (1.51) | -0.00050 (-1.39) |
| Firm Size | -0.00031 (-0.17) | -0.00058 (-0.34) | -0.00713*** (-3.26) | -0.00337** (-1.99) | 0.00014 (0.07) |
| Tobin's Q | 0.00258* (1.92) | -0.00057 (-1.44) | -0.00058 (-1.04) | -0.00020 (-0.39) | 0.00003 (0.03) |
| Stock Price Runup | 0.00573 (0.23) | -0.01572 (-0.80) | -0.07483*** (-2.92) | -0.01125 (-0.49) | -0.07011*** (-2.69) |
| Repurchase Program Size | 0.00234 (0.72) | 0.01504** (2.22) | 0.00074 (0.18) | -0.00498 (-1.27) | 0.01495*** (5.08) |
| Cash Flow | -0.02131 (-0.49) | 0.00635 (0.12) | 0.06232* (1.70) | -0.00331 (-0.09) | -0.02403 (-0.63) |
| Insider Trading | 0.00348 (0.34) | -0.00018 (-0.03) | -0.00315 (-0.43) | 0.00242 (0.35) | 0.00440 (0.49) |
| Reason:Employee Benefit | -0.00000 (-0.36) | -0.03011 (-1.37) | -0.00000* (-1.73) | -0.00000* (-1.91) | 0.03194*** (3.64) |
| Reason:Enhance Shareholder Value | -0.01040 (-1.05) | -0.00937 (-1.19) | -0.01077 (-1.09) | -0.00497 (-0.17) | -0.00176 (-0.21) |
| Reason:Offset Dilution | 0.02193 (0.93) | -0.04033 (-1.56) | -0.02044 (-0.94) | 0.02013* (1.89) | 0.00516 (0.36) |
| Reason:Stock Option | -0.00000 (-0.23) | -0.01555** (-2.02) | -0.04420*** (-3.23) | -0.00000 (-1.48) | 0.00000 (0.64) |
| Reason:Undervalued | -0.09005 (-0.96) | 0.02735** (2.17) | -0.05725*** (-4.45) | -0.09605* (-1.79) | 0.02236 (0.39) |
| Year:2017 | 0.02084 (1.31) | 0.00862 (0.49) | -0.02868*** (-2.34) | 0.01772* (1.72) | -0.01214 (-1.35) |
| Year:2018 | 0.01377 (0.97) | 0.01872* (1.81) | -0.00860 (-0.65) | 0.01807* (1.69) | -0.00440 (-0.37) |
| Year:2019 | -0.00048 (-0.04) | 0.01539 (1.50) | -0.01458 (-0.98) | 0.01717 (0.93) | 0.00177 (0.17) |
| Year:2020 | 0.00773 (0.66) | 0.00327 (0.24) | -0.03885 (-1.59) | 0.02795** (2.23) | -0.01064 (-0.98) |
| Year:2021 | 0.02502** (2.09) | 0.01277 (1.36) | -0.00554 (-0.40) | 0.03514** (2.38) | 0.01049 (0.93) |
| Year:2022 | 0.01705 (1.47) | 0.02391** (2.26) | -0.00373 (-0.29) | 0.01531 (1.57) | 0.00733 (0.69) |
| Year:2023 | 0.01738 (1.43) | 0.02400* (1.95) | -0.02042 (-1.53) | 0.03061** (2.41) | 0.00787 (0.58) |
| Year:2024 | 0.00806 (0.63) | 0.00930 (0.88) | -0.02112 (-1.54) | 0.01819 (1.51) | 0.00945 (0.78) |
| Industry:Agriculture, forestry and fishing | -0.00000 (-0.12) | 0.01522 (0.56) | -0.05700*** (-4.73) | -0.00000 (-0.81) | -0.00000 (-1.08) |
| Industry:Mining | 0.01434 (0.54) | 0.07172 (1.21) | 0.01371 (0.53) | 0.13286** (2.37) | 0.02923 (0.38) |
| Industry:Construction | -0.00000 (-0.90) | 0.00000 (0.09) | -0.01412 (-0.55) | -0.00942 (-0.48) | -0.00963 (-1.30) |
| Industry:Transportation&Communication | -0.03924 (-0.92) | 0.01309 (0.61) | 0.00807 (0.69) | 0.00779 (0.84) | 0.01107 (1.32) |
| Industry:Wholesale Trade | 0.00000 (0) | 0.00491 (0.19) | 0.00980 (1.02) | -0.00055 (-0.03) | 0.01859 (0.83) |
| Industry:Retail Trade | 0.00000 (0) | 0.02274 (1.06) | -0.01708 (-1.09) | 0.00035 (0.03) | 0.00471 (0.46) |
| Industry:Finance&Insurance | -0.03084 (-1.31) | 0.01490 (0.86) | -0.00110 (-0.08) | -0.00723 (-0.51) | -0.00962 (-0.94) |
| Industry:Services | -0.03939 (-1.16) | 0.03168* (1.86) | 0.00617 (0.64) | -0.00137 (-0.17) | 0.00015 (0.02) |
| Industry:Public administration | -0.02566 (-1.08) | 0.01570 (0.89) | -0.00479 (-0.49) | -0.00315 (-0.35) | 0.00472 (0.50) |
| No. of obs. | 486 | 485 | 485 | 485 | 485 |
| R ² | 0.03 | 0.10 | 0.10 | 0.07 | 0.07 |
| Adjusted R ² | 0.02 | 0.05 | 0.04 | 0.02 | 0.01 |
| Mean dep. var | 0.01194 | 0.01086 | 0.01354 | 0.01363 | 0.01957 |

Quintile-Sorted Announcement Return Regressions (Model 2)

Table 16: Announcement Returns, Financial Distress, Unexpectedness, and Their Interaction Across Financial-Distress Quintiles

The dependent variable in columns (1)–(5) is the 3-day BHAR around the repurchase announcement. The table reports OLS regressions estimated separately within each Altman Z-score quintile to examine whether the relation between financial distress, announcement unexpectedness, and their interaction varies across the financial-distress distribution. Coefficients represent the change in BHAR associated with a one-unit increase in the explanatory variable. Unexpectedness is an indicator equal to 1 if the firm has made no repurchase announcements in the prior three years. All controls from Model 2 are included (but omitted for brevity), and continuous variables are centered within each quintile. Standard errors are clustered at the firm level, and t-statistics appear in parentheses. Statistical significance at the 1%, 5%, and 10% levels is denoted by ***, *, and * respectively.

| Model | Quintile 1 | Quintile 2 | Quintile 3 | Quintile 4 | Quintile 5 |
|--|---------------------|-----------------------|------------------------|-----------------------|------------------------|
| Intercept | 0.02008 (0.65) | -0.01878 (-0.83) | 0.08076*** (3.43) | 0.02107 (1.16) | 0.01321 (0.65) |
| Z-score | -0.00189 (-1.14) | 0.00478 (0.84) | 0.00219 (0.29) | 0.00704 (1.46) | -0.00052 (-1.44) |
| Unexpected | 0.00085 (0.17) | 0.00724 (1.32) | -0.01089 (-1.57) | -0.00034 (-0.06) | -0.00502 (-0.80) |
| Zscore × Unexpected | -0.00358 (-1.22) | 0.00232 (0.26) | 0.01667 (1.15) | -0.01256 (-1.35) | 0.00001 (0.02) |
| Firm Size | -0.00014 (-0.07) | -0.00028 (-0.16) | -0.00745*** (-3.43) | -0.00332** (-1.98) | 0.00001 (0.00) |
| Tobin's Q | 0.00259* (1.88) | -0.00059 (-1.52) | -0.00063 (-1.14) | -0.00019 (-0.37) | 0.00001 (0.01) |
| Stock Price Runup | 0.00478 (0.19) | -0.01482 (-0.76) | -0.07705*** (-3.05) | -0.00939 (-0.41) | -0.07018*** (-2.68) |
| Repurchase Program Size | 0.00236 (0.72) | 0.01490** (2.21) | 0.00076 (0.19) | -0.00483 (-1.19) | 0.01513*** (4.81) |
| Cash Flow | -0.01301 (-0.31) | 0.00550 (0.10) | 0.05937 (1.64) | -0.00465 (-0.12) | -0.026223 (-0.69) |
| Insider Trading | 0.00395 (0.38) | 0.00094 (0.13) | -0.00514 (-0.70) | 0.00266 (0.38) | 0.00376 (0.41) |
| Reason:Employee Benefit | -0.00000 (-0.34) | -0.03328 (-1.49) | -0.00000* (-1.74) | 0.00000*** (2.64) | 0.031589*** (3.34) |
| Reason:Enhance Shareholder Value | -0.00987 (-0.98) | -0.00949 (-1.21) | -0.01053 (-1.05) | -0.00540 (-0.71) | -0.001788 (-0.22) |
| Reason:Offset Dilution | 0.02299 (0.93) | -0.04297* (-1.68) | -0.01350 (-0.63) | 0.02690** (2.17) | 0.007474 (0.51) |
| Reason:Stock Option | 0.00000 (0.91) | -0.01871** (-2.25) | -0.04501*** (-2.84) | 0.00000 (0.10) | 0.00000 (0.19) |
| Reason:Undervalued | -0.09277 (-0.97) | 0.02689** (2.08) | -0.05530*** (-4.40) | -0.09702* (-1.77) | 0.022316 (0.38) |
| Year:2017 | 0.01869 (1.19) | 0.00886 (0.51) | -0.03094** (-2.53) | 0.01610 (1.54) | -0.012102 (-1.35) |
| Year:2018 | 0.00981 (0.66) | 0.01681* (1.66) | -0.00879 (-0.67) | 0.01775* (1.65) | -0.005064 (-0.43) |
| Year:2019 | -0.00147 (-0.12) | 0.01337 (1.30) | -0.01394 (-0.93) | 0.01606 (0.87) | 0.002401 (0.23) |
| Year:2020 | 0.00592 (0.52) | 0.00222 (0.17) | -0.03877 (-1.56) | 0.02713** (2.15) | -0.009830 (-0.91) |
| Year:2021 | 0.02344** (2.03) | 0.01152 (1.25) | -0.00289 (-0.20) | 0.03495** (2.33) | 0.011552 (1.01) |
| Year:2022 | 0.01496 (1.30) | 0.02331** (2.13) | -0.00080 (-0.06) | 0.01492 (1.50) | 0.008013 (0.75) |
| Year:2023 | 0.01502 (1.25) | 0.02344* (1.93) | -0.01990 (-1.47) | 0.03039** (2.43) | 0.008312 (0.61) |
| Year:2024 | 0.00607 (0.48) | 0.00899 (0.86) | -0.02104 (-1.54) | 0.01789 (1.47) | 0.009833 (0.81) |
| Industry:Agriculture, forestry and fishing | 0.00000 (1.14) | 0.01259 (0.46) | -0.06957*** (-5.07) | -0.00000** (-1.99) | -0.00000 (-0.52) |
| Industry:Mining | 0.02109 (0.73) | 0.07072 (1.20) | 0.01890 (0.74) | 0.13541** (2.42) | 0.02791 (0.35) |
| Industry:Construction | 0.00000 (0.90) | -0.00000 (-0.20) | -0.01409 (-0.54) | -0.00984 (-0.52) | -0.01176 (-1.40) |
| Industry:Transportation&Communication | -0.03718 (-0.86) | 0.01240 (0.58) | 0.00772 (0.65) | 0.00692 (0.76) | 0.01090 (1.32) |
| Industry:Wholesale Trade | 0.00000 (0) | 0.00148 (0.06) | 0.01080 (1.14) | 0.00054 (0.03) | 0.01742 (0.76) |
| Industry:Retail Trade | 0.00000 (0) | 0.02384 (1.19) | -0.01804 (-1.16) | -0.00016 (-0.02) | 0.00381 (0.37) |
| Industry:Finance&Insurance | -0.02853 (-1.19) | 0.01551 (0.89) | -0.00290 (-0.21) | -0.00870 (-0.59) | -0.00960 (-0.96) |
| Industry:Services | -0.03809 (-1.11) | 0.03098* (1.82) | 0.00459 (0.48) | -0.00136 (-0.17) | -0.00022 (-0.03) |
| Industry:Public administration | -0.02309 (-0.96) | 0.01538 (0.87) | -0.00588 (-0.59) | -0.00412 (-0.47) | 0.00495 (0.53) |
| No. of obs. | 486 | 485 | 485 | 485 | 485 |
| R ² | 0.11 | 0.10 | 0.11 | 0.08 | 0.07 |
| Adjusted R ² | 0.06 | 0.05 | 0.05 | 0.02 | 0.01 |
| Mean dep. var | 0.01194 | 0.01086 | 0.01354 | 0.01363 | 0.01957 |