The Impact of Crisis on Strategic Corporate Activities: Determinants of M&A and Defensive Use of Buybacks

Haifa Rejili

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_____ Chair
Dr. Sandra Betton

_____ Examiner
Dr. Thomas Walker

_____ Examiner
Dr. Parianen Veeren

_____ Supervisor
Dr. Sandra Betton

Approved by _____ Graduate Program Director
Dr. Nilanjan Basu, Graduate Program Director

April 2024 _____ Dean of Faculty
Dr. Anne-Marie Croteau, Dean of Faculty

ABSTRACT

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There is an extensive literature on the determinants of the likelihood of mergers and acquisitions (M&A), however, there is limited research on how a crisis impacts the likelihood of M&A. We examine a sample of 20,076 events to investigate the direction of influence of two distinct crises (the financial crisis and Covid-19) on the likelihood of M&A. In addition, we assess the impact of M&A likelihood on the probability of buyback announcements as buybacks can be used as a defensive strategy against M&A attempts. We find smaller firms with higher liquidity and leverage are more likely to be targeted post-crisis. Additionally, we note that while bidders were more inclined towards more profitable firms following the financial crisis, less profitable firms were more appealing acquisition candidates after the Covid-19 crisis. Tobin's Q was not statistically significant during post-crisis periods. We find that the probability of announcing a buyback is positively related to the likelihood of being a target in the pre-crisis periods, however, this relationship disappears post-crisis. It appears that firms reassess their use of share repurchases to deter acquirers in the event of a crisis. Our robustness tests highlight the importance of studying the impact of each crisis independently and show that our findings are not driven by random variation.

Keywords Mergers and acquisitions · Financial Crises · US and Canada

JEL classification code G34 · G01 · N12

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Dear me, keep dreaming and achieving. This is only the beginning.

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1 INTRODUCTION

The modern world is characterized by a sense of uncertainty and unpredictable distress, given the terrorist attacks, wars, global economic turmoil, and health crises occurring in recent years. Such events often expose the weaknesses in companies' systems as it becomes harder for businesses to navigate and survive through challenging times.

The majority of the studies discussing global crises examine their motives and repercussions (Cornand & Gimet, 2012; Kamin & DeMarco, 2012; Petmezas & Santamaria, 2014), without paying much attention to companies' responses to these periods of uncertainty. Beltratti and Paladino (2013) and Kooli and Lock Son (2021) are among the few researchers who discussed the importance of corporate activities, including mergers and acquisitions (M&As), in showing resilience in times of hardship, presenting such organizational restructuring as opportunities for firms to rebuild and reframe amid periods of uncertainty, which makes M&A a sail for a new growth journey for some firms and a safe shelter for others.

Despite the difficulty in predicting future targets, as highlighted by Jensen and Ruback (1983), numerous studies focus on determining the factors influencing targeting behavior and predicting the probability of becoming a target using a variety of techniques, such as event studies and regression analysis. One common limitation in studies of takeover likelihood conducted by Adelaja et al. (1999), Bena and Li (2014), as well as Beccalli and Frantz (2013), among other researchers, is that they overlook the changing landscape of uncertainty and crises over time, failing to account for events like the dot-com bubble of 2000 or the financial crisis of 2008.

Additionally, the literature on corporate activities has expanded to include discussions about buybacks, originally introduced as an ownership consolidation tactic but now seen as a defensive strategy against hostile takeovers. In their studies, Denis (1990), Bagwell (1991), and Yallapragada (2014) highlight that firms feeling vulnerable to acquisition may engage in share repurchases to protect themselves from takeover attempts by rivals. However, to the best of our knowledge, the existing literature has not explored the potential shift in buybacks as a defensive strategy between the pre- and post-crisis periods.

Our paper contributes to the debate on the prediction of the probability of being a target through the examination of the impact of crises on both the takeover likelihood and the motives of engaging in buybacks. We analyze data from 2002 to 2021, obtained from a combination of data providers such as Refinitiv and Compustat and we particularly focus on two major crises,

namely, the financial crisis as an economic event and Covid-19 as an exogenous event. Our final sample consists of 20,076 events.

Following the methodology of Bena and Li (2014) and Fairhurst and Greene (2022), we constructed a sample of targets and matched pseudo-targets based on industry code and sales. Subsequently, we distinguish between M&A deals and buybacks, employing both the split sample and dummy variable approaches in studying each of our deal subsamples. We formulate our hypotheses based on five key firm characteristics: liquidity, leverage, Tobin's Q, profitability, and size (Adelaja et al., 1999), predicting that, following a crisis, smaller and undervalued firms with higher liquidity, leverage, and profitability are more likely to be acquired. Regarding buybacks, we expect that managers will become more risk-averse, prioritizing adding value to the company and gaining more market share, rather than being driven by the desire to avoid being targeted. Consequently, we anticipate that the use of buybacks as a defensive strategy will persist during stable periods but not during post-crisis periods.

We use both the conditional logit and the linear probability models to examine the determinants of takeover likelihood. Our findings indicate that during the pre-financial crisis period, firms with lower liquidity, higher profitability, lower leverage, and lower valuation are more likely to be acquired, aligning with our hypotheses and consistent with the discoveries of Adelaja et al. (1999). We observe similar trends in the pre-Covid period, except for Tobin's Q, which shows statistically insignificant results. Surprisingly, our results indicate that larger companies are more likely to be targeted during pre-crisis periods, defined as "normal" periods.

Following a crisis, we note that companies with higher liquidity and leverage are more likely to be acquisition candidates. In fact, firms may be considered more attractive and resilient to economic downturns as their higher cash reserves and debt levels may show their ability to acquire assets at lower prices and loans at favorable rates. We also find that smaller firms are targeted post-crises, potentially due to their possession of niche knowledge that may be valuable to bidders seeking expansion in a particular field in the future.

Despite the similar trends observed in companies' behavior following the financial crisis and the pandemic, we noted differences in the influence of firms' profitability and market valuation on their probability of being a target. We find that, while companies with higher profitability continued to attract bidders following the Great Recession, less profitable firms became attractive targets post-Covid-19. We attribute this finding to acquirers seeing an

opportunity to improve their targets' management inefficiency and create positive synergies (Moore, 1997). Additionally, we note that the market-to-book ratio of firms loses significance post-crisis because managers may be willing to pay more for overvalued companies if they believe the acquisition will benefit their own business during uncertain times, but they may refuse to purchase undervalued firms because of the higher risk involved. We are unable to draw any conclusions about market valuation as an M&A determinant because other managers might view overvalued companies as riskier and be more inclined to target undervalued firms instead.

Our evidence regarding the motives behind buybacks supports our hypothesis that companies change their use of buybacks as a defensive strategy following a crisis. We interpret that post-crisis, companies engage in share repurchases to facilitate further expansion, achieve a competitive advantage, and foster the well-being of the company, whereas in « normal » periods, they tend to resort to buybacks as a measure to prevent hostile takeovers.

Both the split sample approach and the dummy variable approach yield overall consistent results when using the conditional logit model. This consistency does not hold for linear probability models due to the presence of heteroscedasticity, which violates a fundamental assumption of linear regression.

The remainder of this paper is organized as follows: Section 2 provides a comprehensive overview of the theoretical foundations and discusses the literature review, Section 3 details our approach to hypothesis development, as well as model selection, and Section 4 describes our data collection steps and our data exploration method. Section 5 presents the results, accompanied by a thorough analysis of our findings. Section 6 includes robustness tests to validate the reliability and consistency of our results, and Section 7 summarizes the key findings

2 LITERATURE REVIEW

2.1 Strategic Corporate Activities

2.1.1 Mergers and Acquisitions

Merger and acquisition (M&A) activities have grown significantly over the past twenty years. Their frequency and deal value are reaching unprecedented levels. While M&A motives, methods of payment, and dynamics differ, the primary objective of most M&A deals is creating value (Junni & Teerikangas, 2019). M&A serves as a means for companies to bolster their production, strengthen their ability to compete, and diversify their portfolio during periods of crisis, imposing market discipline and maximizing both private profits and public welfare (Piesse et al., 2022). Kumar and Pal (2021, p. 247) highlight the importance of M&A activities and describe them as « effective transition drivers » and as «a force to gain synergies ». In its broadest definition, synergy is the combined power that can be achieved by the collaboration of organizations or groups of individuals as opposed to working separately. Synergy in the context of M&A, is the significance of the combined benefits and value that result from two companies coming together compared to two individual companies, i.e., 1+1=3 (Jensen & Ruback, 1983). The idea hinges on the importance of M&A deals in achieving better results than they could separately through cost reduction, improved operational efficiencies, expanded market reach, or enhanced capabilities (Seth, 1990).

Rao and Kumar (2013) relate mergers and acquisitions to corporate and ownership restructuring. The terms « merger » and « acquisition » are frequently used interchangeably in the literature, despite their distinct meanings and economic implications (Ravichandran, 2009; Singh, 1971). While an acquisition refers to the purchase of a portion or the entirety of another entity, a merger occurs when two or more firms join forces to become a single organization (Alao, 2010; Hampton, 1989) and only one survives as a legal entity (Horne & Wachowicz, 2004). According to Ravichandran (2009), it is relatively smoother to integrate firms in acquisitions compared to mergers because when one firm acquires another, the control is clearer and the implementation process is simplified.

It is worth noting that M&A activity has seen numerous successful mergers. The Exxon and Mobil deal stands as a prime illustration of a successful merger, with the first and second-largest oil producers in the United States announcing in 1998 their plans to merge. Kumar and Kumar (2019) report that the deal value resulted in a premium of 290%, leading this megamerger to control roughly 90% of oil production in the United States. Although mergers are often challenging given the financial risks, cultural differences, and regulatory hurdles, the

Exxon-Mobil deal realized the $2.8 billion forecasted synergies (Kumar & Kumar, 2019; Weston, 2002).

In the realm of acquisitions, large and financially strong firms may identify an attractive deal and seek the acquisition of a target as part of their cost efficiency, expansion, or diversification strategies. Conglomerates and large companies might even be involved in M&A activity as a response to market instability. For example, Swiss bank UBS acquired Credit Suisse, Switzerland's second-largest bank on the edge of collapse, in March 2023 for about $3.3 billion in stocks in order to avert a banking sector meltdown. The deal has been supported by Swiss regulators and completed without shareholder approval. A new consolidated banking group was created afterwards.

There is a debate among researchers on distinguishing between a merger and an acquisition. While Hampton (1989) contends that differentiation lies in the dominance of one of the involved parties and explains the importance of negotiation power in defining these terms, Stallworthy and Kharbanda (1988) argue that naming distinctions is ineffective, highlighting the significance of practical execution. Stallworthy and Kharbanda (1988) suggest using the term « takeover » in deals in which the target is not as powerful as the bidder. They propose to interchange the term « acquisition » with « merger » as long as the negotiating process is 'friendly'. This notion is supported by Rees (1990) who further indicates that both terms « merger » and « acquisition » arise from the same legal framework. Hence, in our paper, we align with Rees's (1990) perspective, and we employ M&A as a general term to refer to both mergers and acquisitions.

Within the extensive literature on M&A, discussions abound regarding the diverse dynamics of both friendly and hostile takeovers (Loyola & Portilla, 2016) and the choice of the method of payment (Huang et al., 2016). While friendly takeovers are characterized by mutual agreement and a high level of collaboration between the acquirer and the target, hostile takeovers are often associated with an adversarial scenario in which the bidder seeks to obtain a controlling interest in the target firm's shares without the approval or cooperation of the target's management team. In either case, a tender offer can contribute to the success of a takeover as it allows for the expedition of the acquisition process and empowers shareholders to decide whether to accept or reject the tender based on the offer price and their projection of the future of the company, no matter what the organization's leadership believes. According to Bradley et al. (1983, p. 183), "… tender offers are an attempt by the bidding firm to exploit some specialized resource by gaining control of the target and implementing a higher-valued operating strategy….".

Kwon and Song (2011) studied tender offers in emerging markets, more specifically in Korea, in the context of the Asian Financial Crisis during the late 1990s. They studied the impact of this period of economic downturn on the merger process and investigated the effect of public tender offer announcements. According to Kwon and Song (2011), the majority of M&A deals rely on public tender offers, particularly for companies receiving partial or full funding from the government.

2.1.2 Buybacks

Buyback is another widely discussed strategy in the literature. It is added to the M&A literature in the context of corporate actions used to allocate available funds to maximize shareholder value and serve to signal either growth or confidence in the company's value. While they are distinct actions with different purposes and implications, studies often attempt to investigate the link between them and portray buybacks as a defensive method against hostile takeover attempts (Bagwell, 1991; Dittmar, 2000; Mohanty & Panda, 2011; Yallapragada, 2014).

Throughout the last two decades, share buybacks, or share repurchases, have gained popularity as a strategy for companies to invest their excess cash in their own companies by strategically targeting and repurchasing their shares. Following the introduction of the Safe Harbor Regulation (Rule 10b-18) in 1982 which provides guidelines for companies conducting buybacks and protects them from liability for market manipulation, share buybacks gained momentum in the United States in the 1990s, leading industrial American companies, for the first time, to allocate more funds to share repurchase than dividends (Grullon & Michaely, 2004).

A firm's distribution policy, whether opting for dividends or share buybacks, is a crucial component of the corporate financial decision-making process because it directly influences shareholder value, optimizes the company's capital structure, and enables companies to navigate economic uncertainties effectively (Comment & Jarrell, 1991; Hyderabad, 2009; Wiemer & Diel, 2008). Fried (2004) reported that the annual value of share buybacks surged from $1.4 billion to $220 billion between 1980 and 2000. The rise in share buyback activity is further evidenced by Grullon and Michaely's study (2004), showing that expenditures on share repurchases experienced a mean growth of 26.1% per year within the same period (1980 to 2000), outpacing the average annual growth of dividends, which equals 6.8%.

This substantial emphasis on share buybacks prompted research efforts to comprehend the motivations driving companies to repurchase their shares (Hyderabad, 2009; Wiemer & Diel, 2008). Wiemer and Diel (2008) examine the rationale behind companies choosing buybacks by weighing their pros and cons against dividend payments. While dividend announcements often communicate favorable long-term prospects for the company, dividend payments have a negative impact on share prices when adjusting the divided policy downwards, accompanied by administrative time and expenses in distribution to all shareholders (Wiemer & Diel, 2008). On the other hand, shareholders gain flexibility in their selling decisions, considering individual tax situations, cost basis, and company valuation, which allows them to address market undervaluation via engaging in buybacks and restructuring the company's capital through diminished cash holdings and increased financial leverage. Hyderabad (2009) further discussed several explanations for companies repurchasing their shares by highlighting their significance in reflecting managerial confidence in the company, setting a specific desired price for their stocks (Lazonick, 2009), and distributing cashflow instead of investing it in less profitable or negative net present value (NPV) projects, potentially addressing the agency conflict over excess cashflow (Grullon & Michaely, 2004; Jensen, 1986).

Furthermore, Hyderabad (2009) sheds light on the possibility for shareholders to reach an optimal financing ratio through buybacks, particularly when they are funded using debt capital. Guedes and Opler (1996) suggest that the use of debt in buybacks positions firms closer to their optimum debt-equity ratio. Leverage has dual effects on the liability side of the balance sheet—reducing equity and increasing debt. This is associated with a lower free float in the market as well as a higher risk due to increased debt, acting as a deterrent against hostile takeover attempts by competitors (Bagwell, 1991; Denis, 1990; Mohanty & Panda, 2011; Yallapragada, 2014).

Denis (1990) analyzes defensive payouts declared in reaction to hostile corporate control activity within a sample of U.S. firms and finds that engaging in share repurchases can help deter takeovers attempts, leading to a high likelihood of the target firm retaining its independence. Bagwell (1991) explains that when faced with an upward-sloping supply curve for shares, the acquirer's takeover cost may be higher if the target firm opts for cash distribution through share repurchases compared to choosing to pay a cash dividend or doing nothing, concluding that firms may use buybacks as a defense mechanism against unwanted takeover attempts. Alternatively, Yallapragada (2014) and Mohanty and Panda (2011) examined buybacks as a remedy for takeover threats from a liquidity standpoint. Since companies with

substantial cash reserves are likely to be attractive targets, engaging in stock repurchases using cash as a method of payment might eliminate their potential for being targeted.

Yallapragada (2014) notes that, following the dot-com bubble burst, numerous companies experienced a boom in stock repurchases due to their substantial cash reserves during profitable business cycles, increasing S&P 500 investors' overall cash return (calculated as the sum of share buybacks and dividends) by 20% in less than a decade, rising from 33% in 2001 to an anticipated ratio of 53% relative to cash utilization in 2007 (Wiemer & Diel, 2008). More recently, Lazonick et al. (2020) point out that S&P 500 firms collectively engaged in buybacks totaling $806 billion, driven by the Tax Cuts and Jobs Act of 2017. This amount surpasses the prior record set in 2007 by approximately $200 billion. Consequently, these extensive buybacks were viewed as a tangible threat to the economy because, through undertaking such large investments, companies forego the liquidity that could otherwise assist them in managing sales and profit declines during an economic downturn (Lazonick et al., 2020).

2.2 Probability of Being a Target

Prior literature about M&A has widely assessed the firm characteristics of companies subject to mergers and acquisitions and laid the groundwork for identifying the determinants of M&A activities (Simkowitz & Monroe, 1971; Stevens, 1973). While some of these studies developed hypotheses that estimate the likelihood of the occurrence of M&A deals (Palepu, 1986; Taussig & Hayes, 1968) using conditional logit models (Adelaja et al., 1999; Bena & Li, 2014), others employed the « event studies» methodology, examining the effect of announcing M&A on stock price behavior pre- or post-M&A deals (Dodd, 1980; Langetieg, 1978; Mandelker, 1974).

Mitchell and Lehn (1990) utilized event study methodology combined with three distinct sets of logit equations to investigate how value-reducing acquisitions affect takeover likelihood. The authors highlight the « discrimination » between « bad» bidders and « good » bidders based on the probability of being acquired and use cumulative abnormal return (CAR) to measure the stock price effects related to the announcements of M&A deals (Mitchell & Lehn, 1990).

A plethora of studies focusing on the factors influencing M&A activity employ logistic regressions (Bena & Li, 2014; Hannan & Rhoades, 1987).

Hannan and Rhoades (1987) discussed the relationship between a company's management efficiency and its likelihood of being taken over, laying the foundation for more researchers to explore the probability of acquisition in different contexts.

Bena and Li (2014) constructed a takeover probability model, employing three control samples to investigate the significance of innovation attributes as key drivers of transaction incidence. To do so, they built a matched sample of pseudo targets by identifying five firms that share the finest SIC code and are closest in terms of sales. Their empirical model incorporates conditional logit regression, as previously introduced by McFadden (1972), and controls for industry and time by considering firm-level control variables and deal-specific characteristics. Their study reveals that targets tend to exhibit high R&D costs alongside slow output growth, building on Phillips and Zhdanov's (2013) work that suggests that since larger firms are likely to strategically reduce their internal R&D efforts, small firms anticipate acquisition by larger firms and prioritize R&D intensity (Bena & Li, 2014).

Fairhurst and Greene (2022) expanded on Bena and Li's (2014) previous pseudo target matching procedure and shed light on theoretical predictions concerning the importance of corporate social responsibility (CSR) in the takeover market (Hart & Zingales, 2017). Fairhurst and Greene (2022) employed a sample of publicly traded firms between 1996 and 2016 to show that companies with the lowest or highest CSR rating are more likely candidates for takeover than companies with intermediate CSR scores and conclude that, in general, CSR tends to be advantageous for shareholders. Fairhurst and Greene (2022) indicate, however, that an excessive focus on CSR activities correlates with an amplified probability of a firm becoming a target. While evaluating the robustness of their results, Fairhurst and Greene (2022) gauge the quality of their matching procedure by comparing its accuracy with the propensity scores method. Their findings demonstrate a considerable level of robustness. They even highlight the limitations of their methodology, emphasizing the inherent tradeoff between achieving a precise match based on industry specificity (such as matching at the four-digit level versus broader three-digit or two-digit levels) and the proximity of sales data. In essence, Fairhurst and Greene (2022) primarily investigate the association between corporate social responsibility (CSR) and firm value, with considerations for governance and alternative M&A motivations, and deduce that while CSR generally benefits shareholders, an overly intense or insufficient commitment to CSR may have adverse consequences. Despite the importance of their findings, their results remain exploratory as their empirical setup lacks the capacity for a causal interpretation.

Adelaja et al. (1999) discuss M&A activities in the food industry using two logit models to estimate the likelihood of being a target and the probability of being acquired. Their work allows us to identify the factors that influence the likelihood of M&A deals and explore their predictability. Adelaja et al. (1999, p. 1) found that liquidity, leverage, profitability, and stock market characteristics defined as "the percentage of common stocks traded in the stock market", as well as Tobin's Q, tend to impact the chances of being targeted, while deal attitude, the existence of litigation, the degree of officer control, and the number of prior takeover attempts influence the probability of a targeted firm being taken over.

Although a considerable body of literature exists on target prediction, most studies focus on a single industry due to the perceived ease of takeover likelihood prediction (Adelaja et al., 1999; Beccalli & Frantz, 2013; Hannan & Rhoades, 1987; Moore, 1997).

Similar to Hannan and Rhoades's (1987) approach, Moore (1997) uses a multinominal logit estimation approach to determine the target firm characteristics that impact the probability of acquisition in the banking industry. The purpose and the main findings of the two studies differ. Hannan and Rhoades (1987) identify a positive relationship between a firm's probability of being a target and its capital-to-asset ratio, as well as whether the firm operates in an urban area, but find no evidence supporting the hypothesis that poorly managed firms have higher chances of being acquired. Conversely, Moore (1997) primarily studies financial performance measures in relation to takeover likelihood and finds that companies with weak performance are more likely candidates for acquisition.

More recently, Beccalli and Frantz (2013) built on the previous studies conducted by Hannan and Rhoades (1987) as well as Moore (1997) within the banking industry and employed a multinomial logistic regression, such that the dependent variable is coded as zero for not being involved in M&A, one for becoming a bidder, and two for becoming a target. Alternatively, Beccalli and Frantz (2013) used the Cox proportional hazards model, which yielded identical determinants associated with engaging in M&A activity, confirming the robustness of the multinomial logit approach. Beccalli and Frantz (2013) used a sample of 777 deals to establish clear and distinct characteristics for firms in the banking industry and define what makes a firm a target and what it takes for a targeted company to be acquired. They found that banks positioned as potential targets tend to have lower levels of free cash flows, liquidity, and leverage. In contrast, the authors show that acquirers tend to be larger financial institutions with a track record of substantial growth and great cost efficiency.

2.2.1 M&A Determinants

The evidence about the relationship between a company's size and its likelihood of becoming a target is mixed. While some researchers suggest that larger banks are more likely to be targeted (Correa, 2009; Hernando et al., 2009), others contend that this trend applies to smaller banks instead (Focarelli et al., 2002; Goldberg, 1983; Palepu, 1986). Goldberg (1983) introduces the idea of takeover-related transaction costs increasing with the size of the targeted company, which implies an inverse relationship between the size of the firm and its probability of being a target. Hannan and Rhoades (1987), however, find no evidence supporting the size hypothesis.

Adelaja et al. (1999) suggest that profitability and free cash-flow share a close relationship. Since profitability is a main concern for shareholders, it plays a pivotal role in determining a firm's likelihood of becoming a target (Goldberg, 1983). On the one hand, scholars argue that highly profitable companies might attract bidding firms due to their robust cash flows (Adelaja et al., 1999). On the other hand, less profitable firms could also be appealing because of their potential for enhanced profits through improved management strategies (Beccalli & Frantz, 2013). Beccalli and Frantz (2013) suggest that companies that overinvest tend to allocate funds to projects with negative net present value (NPV), making them more likely to be acquired by other firms, which can potentially make superior investment choices.

Regarding the market valuation of the company, Adelaja et al. (1999) show that firms with lower market-to-book ratios (i.e. lower management efficiency) are more likely to be takeover candidates. This supports Franks and Mayer's (1996) findings that targets acquired in hostile takeovers have poorer pre-bid performance. Tobin's Q is calculated as the quotient of a company's market value to its replacement costs (Tobin, 1969), and can be proxied by the market-to-book ratio (Sudarsanam, 1995). A value of Tobin's Q less than one indicates that the market value is lower than the cost of replacing the assets and potentially shows inefficiency or poor performance. This could be attractive to some acquirers, resulting in an increase in the likelihood of a firm being targeted when Tobin's Q is lower than one, approaching zero (Chappell Jr & Cheng, 1984). In contrast, economists propose that a ratio above one might signal monopoly profits from unique resources (Lindenberg & Ross, 1981), potentially impose a takeover as the sole way for a bidding firm to enter such an industry, and increasing chances of being targeted when Tobin's Q is higher than one. Other researchers found no association between Tobin's Q and the takeover outcome (Limmack, 1991; Sudarsanam, 1995).

Since firms run their operations using a combination of equity capital and debt, and debt is known to be less expensive than equity to fund projects, companies often prefer to borrow rather than raise more equity. This led Adelaja et al. (1999) to hypothesize an inverse relationship between a company's leverage ratios and its takeover likelihood, building on Lintner's (1971) indicate that bidders that rely on debt to grow and expand tend to avoid highly leveraged firms. Adelaja et al. (1999) find consistent results and conclude that the hazard of acquisition is inversely related to higher leverage. In the same context, Goddard et al. (2009) studied a sample of credit unions between 2001 and 2006 and discovered that institutions exhibiting low capitalization or possessing smaller loan portfolios were more likely to be targeted. Consistent results were obtained by Beccalli and Frantz (2013) who showed that bidders favor lower capitalization because it allows them to amplify gains and offer a reduced price for the target company. Although the majority of prior research highlights a negative correlation between leverage and takeover likelihood, conflicting views among researchers propose contrasting perspectives, indicating that financial institutions possessing larger loan portfolios tend to aggressively grant credit in pursuit of a greater market share, making them potentially more appealing targets (Akhigbe et al., 2004; Hannan & Rhoades, 1987).

Previous literature suggests that high liquidity may be desirable to bidders because it implies that the target firm's management might not be optimizing shareholder wealth, leaving more room for them to potentially make more effective use of surplus cash. Alternatively, Pasiouras et al. (2011) found that companies with lower liquidity are more likely to become targets (Adelaja et al., 1999; Beccalli & Frantz, 2013).

Additionally, Adelaja et al. (1999) explored the link between a company's growth and its resources, emphasizing the significance of growth in influencing the likelihood of becoming a target (Goldberg, 1983; Lewellen, 1971). They also discussed dividends and stock market activity, revealing that an acquiring firm tends to favor companies with low dividend payouts and those experiencing high trading activity in the stock market (e.g., active trading of common shares).

2.2.2 Corporate Activities under Certain Conditions

Mergers and acquisitions (M&A) and buybacks as economic activities are subject to regulations and exhibit certain trends, under normal economic conditions. The literature indicates that corporate behavior deviates in times of crisis from the norms observed in more stable economic periods (Bauer et al., 2022; Evgeniou et al., 2018).

Bauer et al. (2022), among other researchers including Duett et al. (2010), Campello et al. (2010), and Hasan (2022), explored the role of a crisis in the development and growth of M&A, shedding light on how financial challenges can act as catalysts for increased M&A transactions.

Regarding buybacks, Blundell-Wignall and Roulet (2013), Evgeniou et al. (2018) and Asness et al. (2017) find that buyback activity tends to increase before stock market upswings and decreases afterward. This trend was evident during the financial crisis of 2008 when buyback announcements hit a 15-year low, mirroring the structural decline in equity issues since 2000 (Blundell-Wignall & Roulet, 2013).

2.3 Literature about Crises

The term « crisis » in its broadest definition, according to the Cambridge Dictionary, refers to an « extremely difficult or dangerous point in a situation ». In the finance literature, times of crisis are often associated with uncertainty and deep financial disruptions, leading to a significant decline in global economic activity, hence impacting international direct investments and corporate strategic behavior (Kang & Johansson, 2000).

History is replete with crises that heavily impacted international and economic systems, including but not limited to the Asian financial crisis (1997-1998), dot-com bubble burst (2000-2001), the Great Recession (2007-2008), and Covid-19 (2019-2020).

Scholars have widely discussed historical views, causes, and implications of the global financial crisis (Bordo & Landon-Lane, 2010; Claessens et al., 2010; Garcia-Appendini & Montoriol-Garriga, 2013; Liu et al., 2012; Ogawa & Tanaka, 2013), which has been described since then as the most severe economic crisis since the Great Depression of 1929 (Shachmurove, 2011). The financial crisis, also known as the Great Recession, originated in the United States in 2007, as a result of the government's failure to regulate the financial industry while banks were issuing mass mortgages to subprime borrowers (Boorman, 2009; Goodhart, 2008), leading to unprecedented numbers of loans in default and a sharp collapse of the housing sector, the stock market, as well as major businesses (Acharya & Richardson, 2009; Kamin & DeMarco, 2012). Subsequently, the global financial crisis started to contaminate the global economy, causing a shock to the financial system worldwide due to the significant pressure on developing countries because of the reduced demand for their exports and trade credit, as well as the severe credit crunch and contraction of liquidity persisting worldwide.

While numerous researchers focused on the negative consequences of the financial crisis, other scholars perceived crises as potential avenues for financially healthy and robust companies to achieve gains.

Reddy et al. (2014) indicate that financial crises often show a downturn in M&A undertakings during the crisis, which subsequently reverses as the crisis ends. In other terms, as suggested by Hughes et al. (1999) and Acharya et al., (2011), managers who make the right investment decisions might use M&A as an effective tool to allocate money, reshape the business landscape following times of crisis, and benefit from an economic downturn by acquiring companies and assets at discounted prices during liquidation. Silva and Gallucci Netto (2022) compared abnormal returns following M&A announcements in Brazil during the recession period versus the expansion period, and concluded that periods of crisis are associated with an average positive abnormal return ranging between 1.8% and 3.3%.

Besides, researchers attempt to describe and understand the shift in the number of share repurchases before and after a crisis (Asness et al., 2017; Curran, 2021; Horan, 2012). According to Curran (2021), prior to the 2008 financial crisis, companies used share buybacks to mitigate stock price volatility and take advantage of opportunistic purchases during brief declines. However, this trend has slowed down since then, signaling a change in the frequency and purpose of share buybacks, which could possibly be explained by evolving market dynamics and managers' more prudent post-crisis approach.

While the majority of recent studies on the impact of crises study the financial crisis, newer research works address a more recent phenomenon: Covid-19. The World Health Organization announced in March 2020 a pandemic that first appeared at the end of 2019 in China. The global spread of SARS-CoV-2, an unprecedented contagious disease, caused thousands of deaths worldwide, one of the largest stock market declines since 2008, and a halt in global business operations due to enforced lockdowns and travel limitations (Palden, 2020). The pandemic, also known as Covid-19, fundamentally triggered recessions in numerous economies and heavily impacted international trade (Notteboom et al., 2021). The impact of Covid-19 surpassed the challenges posted to financial systems by previous crises, disrupting daily routines and causing the cessation of numerous businesses. No sector or nation was an exception.

Bauer et al. (2022) highlight the importance of the M&A industry in recovering from the decline in sales and earnings during previous crises, such as the dot com bubble burst and

the Great Recession, while driving growth in businesses during post-crisis periods. Additionally, they explore the impact of Covid-19 on businesses' strategies for selecting their targets and managing synergies. For example, Covid-19 urged a shift in work routines, with remote work as the prevailing standard, which requires a high level of adaptation to secure the future viability of companies. Bauer et al. (2022) conclude that companies might respond differently to the same type of threat based on managers' risk attitudes and the size of the company.

Other researchers studied the Covid-19 period, suggesting that companies adopted a more cautious approach during periods of pandemic-related uncertainty, resulting in a decrease in the volume of M&A transactions (Tian & Wang, 2024; Zhang et al., 2023). Following the gradual relaxation of lockdown measures and positive vaccine announcements, M&A activity drastically increased, reaching a total value of disclosed deals equal to USD 2.2 trillion between January 2020 and October 2020 (Kooli & Lock Son, 2021).

A similar trend has also been witnessed in buybacks amid Covid-19. Azali and Setiawan (2023) examined 59 companies on the Indonesia Stock Exchange and showed that during the Covid-19 pandemic, companies were not inclined to distribute excess funds, substitute dividends, increase share value, or elevate leverage through stock buybacks. Azali and Setiawan (2023) further demonstrate that the limited number of buybacks during the crisis was meant to convey a positive signal to the market rather than be driven by undervaluation. Besides, Wood and Sacks (2023) analyzed the patterns of share buybacks among publicly traded American firms between 1982 and 2021, and particularly focused on the Covid-19 crisis and the change in macroeconomic factors and regulations. They noted that the Inflation Reduction Act of 2022 included a one percent tax on share repurchases, which was approved by the U.S. Senate, demonstrating the government's increased interest in regulating buybacks to address inflation and potentially influence corporate strategic behavior (Wood & Sacks, 2023).

There is a significant interest in the literature in the effects of crises on both stock prices and accounting performance. Since share buybacks involve a company repurchasing its own shares, as the number of outstanding shares decreases, ownership becomes more concentrated among the remaining shareholders (Wiemer & Diel, 2008). Therefore, the observed impact on stock market performance during the financial crisis aligns with the idea that ownership concentration can have implications for a company's overall performance. Amewu (2014) employed event study methodology to assess the impact of M&A announcements on the stock returns of public companies during the financial crisis as well as non-crisis periods, and

found no significant alterations in the stock returns of a bidder firm in either period. Furthermore, Kitching et al. (2009) discussed business performance under recession conditions and concluded that certain firms outperform others, reflecting on the importance of firm-specific characteristics in determining the resilience of a company before and during periods of economic distress. Sufian and Habibullah (2010) studied a time frame between 1990 and 2005, with a particular focus on the impact of the 1997 Indonesian banking crisis. Their study revealed that Indonesian banks demonstrated elevated profitability before the crisis in contrast to the post-crisis and crisis periods, demonstrating a significant impact of a crisis on M&A behavior. Following Saleh (2023), we distinguish between two primary effects of the impact of crises, namely direct effects at the micro level and indirect effects at the macro level.

In examining the micro level dynamics during crises, researchers commonly discuss different aspects such as the decline in sales and profits (Tejima, 2000), strategies for shoring up liquidity (Emmerich & Norwitz, 2021), and the interaction between internal liquidity, external funds, and corporate decisions (Campello et al., 2011). Kahle and Stulz (2013) demonstrate that the post-financial crisis period is characterized by a supply shock in equity markets, which results from a flight to quality in bond markets and leads to an increased cost for highly leveraged firms to secure additional equity. They also underscore the decreased demand for consumption associated with a decreased demand for products and increased cash holdings due to investment postponements during heightened uncertainty periods.

Regarding the macro level, the existing literature examines the link between crises, stock price volatility, and interest rates, as they represent important factors in shaping the overall economy. Celebi and Hönig (2019) analyzed a sample of firms ranging between 1991 and 2018 to determine whether the market tends to be more “macro-driven” during or after the financial crisis, revealing that leading macroeconomic factors exerted a more significant impact on the German stock market during the crisis period compared to the periods preceding and following the crisis. They conclude that asset managers and investors should place heightened emphasis on trends in classical macroeconomic variables, government bond yields, and especially leading economic indicators during crisis periods, as opposed to non-crisis periods. Some of the mainly discussed characteristics of a crisis include liquidity challenges, heightened leverage, diminished performance, distressed asset valuation, and government interventions (Celebi & Hönig, 2019).

Certain corporate activities, including M&A deals and buybacks, may be fully or partially driven by macroeconomic conditions (Dunning, 2009; Harford, 2005; Jovanovic &

Rousseau, 2002). This relationship aligns with the economic prosperity theory proposed by Reid (1968), demonstrating a direct link between a country's economic activity and the occurrence of M&A transactions. A similar trend between net buybacks and economic growth has been noted by Bernstein and Arnott (2003). Their finding has been further evidenced by Wang et al. (2020), who illustrated the expansion of repurchase programs in the context of unconventional monetary policy. Hamouda (2021) examined the relationship between buybacks and economic conditions according to free cash flow and the signaling theory, and showed that companies tend to engage in investments during bullish market periods and opt for stock buybacks in bear markets when economic conditions are less favorable.

The existing literature, including studies by Iqbal and Kume (2014), Graham and Harvey (2001), Leary and Roberts (2005), discusses shifts in equity and debt levels during and post-crisis periods. Besides the shift in macroeconomic factors, Reinhart and Rogoff (2009) suggest that elevated leverage on balance sheets and asset price booms often precede crises, making it important for firms to actively adjust their capital structures as well as their utilization of short-term and long-term debt to successfully navigate the crisis impacts. In their study spanning 2006–2011, Iqbal and Kume (2014) analyze leverage ratio dynamics before, during, and after the financial crisis. Their findings show that the crisis led to a decline in demand for external capital, affecting leverage ratios, and prompting firms to adapt their financing strategies during economic downturns and uncertainty.

It is clear that with the occurrence of every major event, there is always a pre- and post-event, both on the micro and macro levels. However, the incidence of such events is often overlooked by many researchers. More specifically, the majority of the studies predicting the takeover likelihood do not examine the impact of the crisis on this probability, despite their samples spanning at least one crisis period. For instance, Adelaja et al. (1999), Bena and Li (2014), Beccalli and Frantz (2013), and Fairhurst and Greene (2022) used sample periods of 1985-1995, 1984–2006, 1991-2006, and 1996–2016, respectively. For instance, Adelaja et al. (1999) studied M&A deals in the food and tobacco industry between 1985 and 1995, without addressing the impact of the 1987 stock market crash, known as "Black Monday." This omission raises questions about the potential effects of the crash on their findings and the validity of their results. Similarly, Beccalli and Frantz (2013) explicitly showed that macroeconomic variables can significantly impact M&A activity between times of financial distress and stable periods. They used a sample of M&A deals occurring between 1991 and 2006, and they named their time frame a “normal” period.

The objective of our study is to address the gap in the existing M&A literature by investigating how a crisis affects the determinants of takeover candidates and predicting the probability of being a target during crisis versus non-crisis periods. Furthermore, we extend this research by analyzing how the motives of companies engaging in buybacks change before and after a crisis, seeking to provide empirical support for earlier exploratory studies discussing the use of buybacks as a defensive strategy against hostile takeover attempts.

3 METHODOLOGY

3.1 Hypothesis Development

Numerous researchers discussing M&A or buyback activities often limit the timeframe of their work to what they consider "normal" periods, overlooking or excluding times of crisis, and do not particularly delve into their potential impact on strategic corporate behavior (Adelaja et al., 1999; Beccalli & Frantz, 2013). Drawing inspiration from Adelaja et al. (1999), we develop five main hypotheses about liquidity, profitability, size, Tobin's Q, and leverage, to provide a comprehensive analysis of the influence of a crisis on the determinants of M&A behavior.

3.1.1 Mergers and Acquisitions

Our expectations regarding the probability of being a target during the pre-crisis period are rooted in the prior findings of Adelaja et al. (1999), considering that their discoveries are applicable to a pre-crisis or « normal » period. However, we establish our own anticipated direction of influence of a crisis on the probability of being a target, as summarized in Table 1 (Table 1).

The post-crisis liquidity hypothesis suggests that highly liquid firms are more likely to be targeted. Given that crises are often tied to reduced liquidity and sudden shifts in macroeconomic factors like inflation (Fosberg, 2012), firms may be inclined to invest in firms that show a high level of resilience during economic downturns and demonstrate their ability to navigate through challenges. Matiş and Matiş (2015) highlight the importance of maintaining a reserve of liquidity during crisis periods because liquidity risk tends to increase during times of economic downturn. Therefore, we hypothesize that bidders are willing to acquire companies with significant liquidity, as it may help them increase the overall liquidity of the bidder and invest in future projects as the opportunity arises. We follow Adelaja et al. (1999) and Fairhurst and Greene (2022) in measuring liquidity using cash and cash equivalents scaled by total assets, the current ratio, and the quick ratio.

The leverage hypothesis anticipates that firms with high leverage will become appealing targets for M&A post-crisis. One key consideration is that highly leveraged firms tend to possess robust financial positions and an established track record of effectively accessing capital, which may allow them to secure financing at a favorable rate in an economic landscape associated with increased interest rates post-crisis (Celebi & Hönig, 2019). Asgharian (2003) particularly studied the relationship between a company's level of leverage and its

responsiveness or sensitivity to economic downturns, and revealed that highly leveraged companies manage to sustain a relatively higher growth in profitability compared to their rivals in distressed industries, despite facing comparatively lower sales growth and stock returns. Asgharian (2003) attributes the decline in sales for high-cap firms to managers' choices to scale back on product lines with lower sales volume, demonstrating a strong positive relationship between performance and leverage. This has been supported by Tsuruta (2015) and Margaritis and Psillaki (2010), leading us to predict that when uncertainty increases, bidders will be more interested in highly leveraged firms as debt will be used to invest in profitable projects and will reflect a stronger performance. We measured leverage using the long-term debt ratio and the leverage ratio (Adelaja et al., 1999; Fairhurst & Greene, 2022).

The hypothesis on profitability proposes a positive correlation between the profitability of a company and its likelihood of being a takeover candidate during the post-crisis period. Acquirers may prioritize the acquisition of profitable companies as a means of mitigating risks. Firms that maintain high profitability in a period of uncertainty are likely to possess strong operational efficiency strategies, which become valuable assets to the acquiring company. According to Dencic-MIihajlov (2014), insufficient profitability may result in insolvency issues and firm deterioration, leading less profitable firms to become less likely to be acquired after a crisis, especially when considering the amplified negative impact of insolvability during economic downturns and global financial hardship. Moreover, Dimitropoulos (2020) studied the impact of the sovereign debt crisis in Greece on companies' overall profitability and found that firms with high profitability post-crisis often have substantial investments in research and development (R&D). Therefore, acquiring profitable companies may be a strategy for bidders to acquire much-needed R&D knowledge and achieve positive synergy and significant advancements in the future. Commonly used indicators for profitability are return on assets and gross margin (Fairhurst & Greene, 2022; Leahy, 2012).

Tobin's Q hypothesis suggests that bidders are more inclined towards firms with lower Tobin's Q, as bidders may benefit from the acquisition of undervalued firms. In times of crisis and uncertainty, managers are likely to become more risk-averse and to favor investing in companies with a low Tobin's Q, considering this as a prospect to acquire assets at a discount and enhance operational efficiency (Acharya et al., 2011; Hughes et al., 1999). In line with Sudarsanam (1995), we use the market-to-book ratio (MBK) as a proxy for Tobin's Q.

The hypothesis on the size of the target firm implies that, following a crisis, there is a heightened attraction towards smaller and mid-sized firms as potential targets for M&A activities. Smaller firms often offer specific competencies, niche expertise, and skilled professionals that complement the acquiring firm's strategic goals. Additionally, they tend to be more cost-effective than larger firms, operating with lower overhead costs and more flexible human resource (HR) practices (Alves et al., 2020). As a result, the acquisition of these firms could provide access to new markets, technologies, or customer segments that contribute to overall growth and market expansion. This could also allow bidders to enhance their cost efficiency and improve their financial performance, especially as the economic environment becomes challenging during the post-crisis period. We proxy size using the natural logarithm of total assets (Beccalli & Frantz, 2013) and sales dollar value (Fairhurst & Greene, 2022).

3.1.2 Buybacks

Buybacks are a common strategy used by companies to demonstrate their financial stability and future prospects, lower the number of outstanding shares in order to support stock price, modify capital structure, and counteract dilution from stock-based compensation. But it goes beyond that.

The existing literature on share buybacks proposes various strategies, including reducing cash reserves (Mohanty & Panda, 2011; Yallapragada, 2014), increasing the cost of acquisition (Bagwell, 1991), and raising leverage through debt-financed buybacks (Hyderabad, 2009), all of which aim to make firms less appealing to potential acquirers and hence avoid hostile takeover attempts.

The use of share repurchases as a defensive strategy has been extensively discussed by Denis (1990), Bagwell (1991), and Dittmar (2000), employing samples ranging from 1980 to 1987, 1981 to 1988, and 1977 to 1996, respectively. The timeframes used in their studies do not incorporate any crises.

We deduce that the findings obtained by previous researchers correspond to a « normal » period. Therefore, we hypothesize that, during pre-crisis periods, firms engage in share repurchases to protect themselves against takeover attempts.

We anticipate that the occurrence of a crisis will significantly impact buyback behavior and lead companies to reassess their defensive strategies. In the post-crisis scenario, we expect managers to become more risk-averse and prioritize the competitive position of the company

rather than their psychological characteristics, such as narcissism, which may drive them to do everything they need to avoid being acquired (Aktas et al., 2016). Hence, we predict that, following a crisis, firms with a high probability of being targeted will no longer engage in buybacks as a defense tactic against being taken over. Instead, they may use buybacks as an offensive strategy to enhance their competitive position, pursue growth opportunities, and add long-term value.

The terms "offensive" and "defensive" were previously used by Yannopoulos (2011) and Cazacu et al. (2021) in the context of the definition of business strategies

3.2 Model Framework

3.2.1 Matching Procedure

We follow the approach of Bena and Li (2014) and Fairhurst and Greene (2022) to investigate the likelihood of a firm being a target for acquisition. We use the term “target” in the context of target and pseudo-target pairs to refer to companies involved in M&A as target firms and for firms buying back their own shares. For each target, we designate five pseudo-targets obtained by matching them based on sales and the narrowest SIC code to an actual target. In cases where targets have fewer than five matches at the four-digit SIC code level, we extend the matching process to the three-digit industry level, then to the two-digit industry level. Pseudo-targets are companies that did not engage in M&A/buyback activity three years prior to the bid announcement.

3.2.2 Linear Probability Models

Linear regression stands as one of the most widely adopted statistical models in the field of social sciences and economics research (Feridun, 2004). Linear probability models (LPMs) are linear regressions in which the outcome variable is binary, taking values of either one or zero. Greene (2011) suggests that the use of LPMs is advantageous because they provide reliable results and straightforward interpretations (Holm et al., 2015). Mathematically, the linear probability model can be articulated as follows:

$$P(Y=1) = \beta_0 + \beta_1 * X_1 + \beta_2 X_2 + \beta_3 X_3 + \ldots + \beta_k X_k + \varepsilon,$$

such that

- $P(Y=1)$ is the probability that the dependent variable Y equals 1.
- $\beta_0, \beta_1, \beta_2, \beta_3, ., \beta_k$ are the coefficients to be estimated.
- $X_1, X_2, X_3, ., X_k$ are the explanatory variables.
- ε is the error term.

The LPM assumes a linear relationship between the explanatory variables and the probability of the dependent variable equating to 1. In their study, Chatla and Shmueli (2016, p. 1) assess the effectiveness of LPM versus logit and probit models across "three common applications of binary outcome models: inference and estimation, prediction and classification, and addressing selection bias". Despite the overall consistent results between linear probability models and logit and probit models, Chatla and Shmueli (2016) found LPM to be less viable when predicting probability, as the estimated probabilities might fall outside the unit interval, posing challenges in interpretation and raising concerns about heteroscedasticity. Caudill (1988) argues that there are situations where LPM might be preferable to logit and probit models, specifically, when the model incorporates a dummy variable indicating membership in a certain group and every member of the group shares the same value for the dependent variable. In such cases, the coefficient of the group dummy variable can be estimated only using linear probability models.

3.2.3 Conditional Logit Regression

The majority of the studies that model binary dependent variables utilize logistic regression, also known as logit (Boateng & Abaye, 2019; Martin, 1977; Mithas & Krishnan, 2009). The term "logistic regression" derives from its use of a logistic function to convert the output into a probability value.

While logistic regression is a more general technique used to predict binary outcomes, conditional logit finds its application in matched case-control studies or scenarios where groups of subjects share similar characteristics (McFadden, 1972, 1984). This methodology has been widely used in the M&A literature, especially in the prediction of the probability of being a target (Adelaja et al., 1999; Bena & Li, 2014; Hannan & Rhoades, 1987).

The conditional logit regression assumes a model of the form:

$$p_j = \frac{e^{\beta' x_j}}{\sum_j e^{\beta' x_j}}$$

This probability formula represents the likelihood of choosing alternative j relative to the other alternatives.

If we suppose that we have j alternatives, and for each individual i at time t, the utility U_{ijt} associated with alternative j is given by the mathematical expression:

$$U_{ijt} = \beta' X_{ijt} + \varepsilon_{ijt,}$$

such that

- β' is a vector of coefficients.
- X_{ijt} is a vector of observed characteristics of the individual and the alternative.
- ε_{ijt} is the error term.

3.2.4 Model Selection

3.2.4.1 Mergers and Acquisitions

In our study, we follow Fairhurst and Greene (2022), and employ the following regression model to predict the probability of being a target:

$$\text{Actual Target}_{xy} = \beta_0 + \beta_1 * C + \beta_2 M + D_y + \varepsilon, \qquad (T)$$

where the dependent variable is the "Actual Target," taking a value of one if the firm x is the actual target in the M&A deal y, and zero if it is a pseudo-target. The independent variables, denoted by the vector C, encompass various firm characteristics such as liquidity, leverage, size, Tobin's Q, and profitability ratios, as shown in Table 1. We include the vector M to account for macroeconomic variables and ensure that our findings will not be driven by any change in the level of inflation, the volatility index, interest rates, or market return volatility. The deal fixed effects (Dy) vector encompasses bidder public status, method of payment, identification of a horizontal deal, whether the deal is a tender offer, and the deal attitude. Standard errors are clustered at the deal level.

3.2.4.2 Buybacks

We begin our analysis using the M&A subsample and attempt to determine appropriate models that predict the takeover likelihood. Subsequently, we calculate the takeover likelihood in our model (T), and we incorporate the calculated probability of being a target (CPBT) as an explanatory variable in a subsequent model (B) that estimates the probability of a buyback conditional on the likelihood of being targeted. Our goal is to establish empirical evidence about the use of buybacks as a defensive strategy against takeovers. This concept has been previously discussed by Bagwell (1991), Yallapragada (2014), and Dittmar (2000) in preliminary studies. Our regression model is as follows:

$$\text{Actual Buyback}_{xy} = \beta_0 + \beta' P_{xy} + \beta_1 * C + \beta_2 M + \varepsilon, \qquad (B)$$

where the dependent variable takes a value of one if the firm x is the actual company engaging in buyback y and 0 if it is the pseudo-target in buyback y. Vector P_{xy} represents the calculated

probability of a company x being targeted, obtained using (T). Vectors C and M include firm characteristics (e.g., ROA, leverage ratio, sales) and macroeconomic factors (e.g., inflation, interest rates), respectively. An error term ε is also included in the model.

3.2.5 Research Approach

In our approach, inspired by Fairhurst and Greene (2022), we employ both linear probability models and conditional logit regression. This dual methodology enables us not only to understand the relationship between the variables and the takeover likelihood, but also to predict the probability of being identified as a target. To do so, we follow two different techniques.

First, we use the split sample approach, which involves dividing a dataset into two or more subsets and separately analyzing each subset. Anderson and Magruder (2017), as well as Fafchamps and Labonne (2017), indicate that this method is highly effective, especially in exploratory analyses. Furthermore, Vazquez and Federico (2015) applied this approach in their research on the evolution of bank funding structures. They divided their sample based on two criteria: the scope (international or domestic) and the type of banks (commercial banks, savings banks, and cooperatives), and treated each of them separately.

For the purpose of our study, we divide our initial acquired data into two subsamples based on the type of deal (M&A or buyback). Subsequently, we subdivide each of these subsamples based on the year in which the deal occurs, distinguishing between two major crises (the global financial crisis and Covid-19). Finally, we further split each subset into pre-crisis and post-crisis periods. Section 4.1.2 details the limits (start and end) of each subperiod.

Second, we employ the dummy variable approach, as previously utilized by Gujarati (1970) and Diéguez-Aranda et al. (2006). We create a dummy variable « ACRISIS », which takes the value one if the deal occurred after a crisis and zero otherwise. This approach enables us to incorporate time-specific effects into the regression model, and further evaluate the impact of a crisis on the relationship between the dependent variable and explanatory variables. Wang et al. (2008, p. 2660) describe this method as "fixed individual effects" and demonstrate its robust results obtained when “treating parameters as fixed but varying across individual subjects”. In a context similar to ours, Gujarati (1970) employs the dummy variable approach to distinguish between periods preceding and following a particular event, which is the introduction of futures markets.

4 DATA COLLECTION & EXPLORATION

4.1 Data Collection and Sample Split

4.1.1 Data Collection

We obtain our data from numerous sources. The M&A sample is from the Thomson/Refinitiv Mergers and Acquisitions file. We selected 974,898 deals announced between January 1, 2000 and August 31, 2023. We require that either the target or the acquirer be from Canada or the United States. This filter reduced our sample size to 568,719 deals. We identify all deals where the form of deal is a merger, an acquisition of majority interest, an acquisition of assets (Bena & Li, 2014; Fairhurst & Greene, 2022), or buybacks. Throughout our study, we utilized Excel and SPSS as statistical tools for data preparation and exploration, as well as model execution.

Financial data comes from Compustat/CRSP, which is a leading data provider for financial market professionals and academics capturing market information about publicly traded companies. The initial sample consists of 305,132 observations about 30,260 companies between 1999 and 2021. We require that each target have available data from the Compustat dataset, aligning them through the CUSIP as of the fiscal year-end before the bid announcement. After matching both datasets, we end up with 14,462 deals.

We obtain data from Compustat/CRSP, selecting information about existing companies between 1996 and 2021. After using our pseudo-target matching procedure, as previously detailed in Section 3.2.1, we end up with a sample of 32,118 companies, such that 6443 of them are targeted firms and the rest, 25,775 companies, are pseudo-target firms. This design allows us to predict the probability of being a target while accounting for industry, time, firm, and deal characteristics. Figure A (Figure A) in Appendix B depicts a flowchart detailing the data collection process.

We perform further data cleaning tasks, such as removing duplicates, using mean imputation for missing data when adequate, and validating data. We obtain a total of 20,076 companies, of which 3346 are actual target firms. Subsequently, we create dummy variables to understand deal specific characteristics such as whether the deal is a tender offer or not, the method of payment, the deal's attitude, and so forth.

While exploring the data, we find that 58% of the deals are buybacks (the other 42% include mergers, acquisitions of majority interest, and acquisitions of assets). We divide the dataset into two subsamples: the M&A subsample and the buyback subsample, consisting of

1412 deals, and 1934 deals, respectively. The majority of the M&A deals are friendly (99%), with 15% of them being tender offers, 47% of them being entirely cash-based, and 37% of them occurring within the same industry.

Our final dataset spans a period of two decades, encompassing the years from 2002 to 2021 and capturing two significant crises, each characterized by distinct features—one being the endogenous Great Recession and the other the exogenous Covid-19 pandemic.

4.1.2 Sample Split: Pre-Crisis and Post-Crisis Periods

Our methodology in selecting each subperiod limit aligns with the work of Hsu et al. (2013), in which they studied an equivalent number of years before and after the crisis to ensure the reliability of their findings (3 years before and 3 years after the financial crisis). In our study, we start in 2002, avoiding any overlap with the dot-com crisis, and extend the pre-financial crisis period until 2007, as previously done by Mollick and Assefa (2013). We designate the 6-year span from 2008 to 2013 as the post-crisis period, and then transition into the pre-Covid-19 era, covering the years from 2014 to 2019[1]. Due to data limitations, our analysis considers only the years 2020 and 2021 as the post-Covid-19 period.

4.2 Macroeconomic Variables Selection

Among the macroeconomic variables, we carefully choose those that effectively capture the markets' responses to financial, economic, and political events. From the Center for Research in Security Prices (CRSP), we collect monthly stock returns encompassing all common stocks listed on the NYSE, Amex, and Nasdaq exchanges. We start by considering the annual stock return averaging portfolio prices at the holding period's commencement and conclusion., commonly referred to as the buy-and-hold return for the benchmark portfolio (Conrad & Kaul, 1993; Roll, 1983). The buy-and-hold return was previously used as an empirical proxy for the return on the stock market portfolio by Bessembinder (2018) and Rasmussen (2006). However, this measure has been later criticized by Karunanayake et al. (2010), showing a limited impact on mean stock return in the United States during both the 1997 Asian financial crisis and the Great Recession. The authors noted a positive influence on stock return volatility during these crises, demonstrating the significance of variations in stock returns when evaluating the impact of economic downturns (Karunanayake et al., 2010). Therefore, we compute the volatility (standard deviation) of stock returns.

[1] We acknowledge that the post-crisis periods, as defined in this study, encompass the peak of the crisis itself.

Controlling for inflation when building models around the crisis period is also crucial because inflation drives one's behavior from investments to consumption, as it impacts the cost of living and resource allocation. High inflation reduces demand for market instruments and influences stock trading. In response, monetary policies tighten and affect interest rates. When studying the Ghanaian market, Kuwornu (2012) highlights the importance of incorporating a measure of inflation in empirical models that involve corporate profits, dividends, and stock returns, as this allows for a more accurate economic representation pre- and post-crisis.

Chen et al. (1986) and Fifield et al. (2002) discuss interest rates and inflation varying together during times of crisis and explain that environments characterized by high interest rates result in elevated borrowing costs, leading to a contraction in economic activity. Therefore, we account for the variation in inflation and interest rates throughout our sample period, and we obtain the consumer price index and the 3-month Treasury bill rate from the Federal Reserve Bank of St. Louis, known as FRED (Kuwornu, 2012; Kuwornu & Owusu-Nantwi, 2011).

We also rely on the Chicago Board Options Exchange (CBOE) to obtain the daily VIX, which we use to calculate the annual (arithmetic average) volatility index (Bessembinder, 1992; Bevilacqua et al., 2020). The CBOE VIX Index serves as a real-time, short-term volatility index in the stock market, a concept introduced by Whaley in 1993. It has also been recognized as a "fear gauge" due to its daily fluctuations that reflect dynamic shifts in market perceptions, providing valuable insights into the evolving risk landscape (Onan et al., 2014, p. 461) and a tool for risk management in the capital market (Prasad et al., 2022). Kownatzki (2016) explored the VIX's historical evolution and revealed two notable extremes: one aligning with the Black Monday in 1987 and another during the Great Recession, showing that the volatility index (VIX) can be used as a barometer of market uncertainty and risk perception across important financial events. According to Bailey et al. (2014), the behavior of the VIX varies across different phases—before, during, and after the financial crisis.

We attempt to enhance the data by applying a smoothing process and transforming all macroeconomic data into natural logarithms. This approach is beneficial for minimizing heteroscedasticity by compressing the scale on which variables are measured. The utilization of natural logarithms has been widely used in the literature in this context (Kuwornu, 2012), as opposed to levels and percentage changes, because it serves to alleviate correlations among variables. We end up with four macroeconomic variables, namely the market return volatility, the volatility index, inflation, and interest rates, proxied by the natural logarithm of the standard deviation of market return, the VIX, the consumer price index, and the 3-month Treasury bill

rate, respectively. We match our main sample with these variables based on the year preceding the deal in our dataset.

4.3 Data Exploration

4.3.1 Overall Dataset

Our matching procedure consists of calculating the differences between the sales of the target firm and those of other companies within the same industry (using the finest SIC code). Then, we select five companies with the closest sales compared to the target firm. In order to assess the goodness of our matching procedure, we compute the ratio of the difference in sales for each pair of companies (target and its pseudo-target) and divide it by the target firm's sales. We suggest that a lower ratio demonstrates a better match between the target firm and its pseudo-target.

Table 2 (Table 2) presents the summary statistics of the differences in sales between target and pseudo-target pairs relative to the sales of the target firm. Using our matching procedure, we obtained 16,730 pseudo-targets, with an average difference in sales between the target firm and its pseudo-target representing 30% of the target firm's own sales. The median is 17.9%, indicating that when sorting the ratios in ascending order, half of the pseudo-target firms have relatively close sales to the target firm's sales, relative to the size of the target firm. The difference between the mean (30%) and the median (17.9%) suggests the existence of a positive skewness, indicating that a few target firms have very high ratios compared to their pseudo-targets. We report a maximum ratio of 12.2 and draw attention to the presence of one or more significant outliers that pull the mean upward and away from the central tendency represented by the median. The 25th, 50th, and 75th percentiles indicate, respectively, ratios of 0.041, 0.179, and 0.510. The standard deviation is 0.356, indicating a relatively low spread in the data.

Table 3 (Table 3) reports summary statistics of the targets and the pseudo-targets while distinguishing between the M&A subsample and the buyback subsample[2]. Variables are defined in Appendix A (Appendix A).

Panel A of Table 3 presents descriptive statistics of firms involved, whether in M&A or buybacks. The average sales of a firm targeted in a merger, an acquisition of majority interest, or an acquisition of assets are $2176 million, while the average sales of a firm engaging in a

[2] While matching the targets with pseudo-targets based on sales, no upper limit was applied for the matching. We acknowledge the significant difference between average sales in Panel A and Panel B of Table 3. Refer to Table 2 for an assessment of the goodness of the matching procedure.

buyback are $3451 million. We note that companies engaging in buybacks tend to have higher sales compared to those engaging in M&A, which could be explained by the willingness of firms to use buybacks to fortify their market position and deter potential acquirers. The average targeted firm exhibits a return on assets (ROA) that equals 22%, which is consistent with Adelaja et al.'s (1999) research suggesting that companies become acquisition targets due to their higher profitability. Surprisingly, we observe that the average ROA for a company engaging in buybacks equals 3%, which is significantly lower than the 22% ROA observed in the M&A subsample. Moreover, the comparison of liquidity ratios between the M&A and buyback subsamples reveals that, on average, firms involved in mergers and acquisitions exhibit a higher cash to asset ratio, current ratio, and quick ratio (0.22, 1.39, and 1.32, respectively) compared to those engaged in buybacks (0.19, 1.24, and 1.21, respectively). The elevated ratios in the M&A sample suggest robust short-term financial health and liquidity, potentially providing flexibility for funding strategic initiatives. The slightly lower ratios in the buyback sample still indicate sound liquidity, emphasizing that firms undertaking buybacks also maintain sufficient liquid assets to cover immediate liabilities. This can also suggest that companies repurchase their shares to lower their cash reserve and hence avoid being taken over (Yallapragada, 2014). As for leverage and long-term debt ratios, firms targeted in M&A have higher levels of long-term debt in their capital structure ($0.23 > 0.17$), showing that firms identified as potential acquisition targets tend to have a greater reliance on debt in their future expansion, potentially making them more attractive to acquirers looking to leverage their financial structure for the acquisition. In Panel B of Table 3, we note that for both liquidity and leverage ratios, the average values are very close between the M&A pseudo-target subsample and the buyback pseudo target sample. In contrast, profitability measures as well as Tobin's Q values are, on average, significantly higher in the M&A pseudo-target subsample compared to the buyback pseudo target. We find that pseudo targets within the buyback subsample tend to be larger than pseudo targets within the M&A subsample, as proxied by sales and total assets, with average values of 2140 and 2.75 in comparison to 796 and 2.37, respectively.

Panel C of Table 3 shows that our main sample is composed of 8,472 M&A deals and 11,604 buybacks. On average, target firms within our M&A subsample have a Tobin's Q equal to 2.57 and a ROA equal to 29%. However, in the buyback subsample, we notice that, an average firm has a Tobin's Q of 1.90 and an ROA of 11%. Thus, we deduce that the average target firm in the M&A subsample tends to be more overvalued and profitable compared to an average firm engaging in buybacks.

We note differences in the characteristics of firms involved in M&A and those engaged in buybacks. Furthermore, we attempt to visually capture the changing frequency of M&A and buyback activity throughout our sample period (2002-2021), as illustrated in Figure 1 (Figure 1). As time progresses along the X-axis, the Y-axis illustrates the annual number of deals, revealing a distinct pattern in the trajectory of buybacks over the specified period. There is a notable upward trend in buybacks overall from 2004 to 2007, followed by a drastic decline starting in 2008 which could be attributed to the financial crisis, as documented by Horan (2012). Similarly, a comparable trend emerges in M&A, showing a relative decrease in the number of deals in 2007. Starting in 2008, Figure 1 shows a fluctuating pattern marked by alternating periods of increase and decrease in the number of buybacks and M&A deals up until 2018. Coinciding with the onset of the Covid-19 pandemic, there has been a decline in corporate activity, which persists through 2021. This decline aligns with the previous findings of Kooli and Lock Son (2021).

Overall, during the 21st century, we note a prevailing preference for buybacks over M&A activity, suggesting a particular interest among companies in repurchasing their own shares to concentrate ownership and return value to shareholders. The occurrence of Covid-19 has reversed this trend, highlighting the profound impact of this distinct and unprecedented event on the global economy and the finance industry. Starting in 2019, we began to witness a greater inclination towards M&A deals.

4.3.2 Macroeconomic Variables

Throughout history, crises have commonly been associated with financial market instability, instances of banking failures (such as the collapse of Lehman Brothers), economic downturns marked by reduced consumer confidence, and declining growth, among various other factors.

In our paper, we discuss two distinct crises, namely the Great Recession and Covid-19. We are aware that each of them may have been characterized by certain market conditions. Table 4 (Table 4) presents the average value obtained for each of our macroeconomic variables during a particular period. We note that both the volatility index and the market return volatility values increase post-crisis compared to pre-crisis levels, with the volatility index rising from 17.98 to 23.81 following the financial crisis, and from 14.96 to 24.45 following Covid-19. Simultaneously, market return volatility significantly increased from 96.96 to 169.81 after the financial crisis and jumped to more than double from 219.47 to 559.49 amid Covid-19.

Regarding interest rates, we observe a decline in interest rates following the financial crisis, which could be attributed to the implementation of monetary policy measures that stimulate economic activity after the credit crunch of 2007-2008. The average inflation rate decreased following the financial crisis. However, we observe different trends during the pandemic, as interest rates, on average, slightly decreased from 1.02% to 0.08% and the inflation rate nearly doubled, rising from 1.56% to approximately 3% (2.97%). This rise in inflation can be attributed to cost-push inflation resulting from business closures and incurred losses, as well as supply chain disruptions during the lockdown.

Table 4 illustrates more pronounced shifts in macroeconomic measures pre- and post-Covid-19 compared to the pre- and post-financial crisis. We provide two possible explanations. First, the unpredictability and widespread impact of the pandemic resulted in significantly higher uncertainty compared to the financial crisis, given the nature of the pandemic and its associated casualties. Second, the post-Covid-19 period only covers two years, whereas the other sub-periods cover six years each. Therefore, the figures following Covid-19 show shorter-term and more immediate effects of the crisis, which may explain the amplification of the observed impacts.

Furthermore, we attempt to gain a deeper understanding of the variations in these macroeconomic indicators, and we visualize the annual change in market return volatility and the volatility index between 1999 and 2022. We highlight the pre-crisis periods, as defined in Section 4.1.2, in blue and post-crisis periods in pink. Figure 2 (Figure 2) depicts the trends in the volatility of market return, showing two peaks in value occurring in 2008 and 2021, with the latter reaching its highest historical value (800) before declining to less than 500 within just one year. High market volatility is often observed during recessionary periods, as highlighted by Kownatzki (2016). Based on Figure 2, we note the extreme values obtained during the financial crisis (2007-2008) and following the Covid-19 pandemic (2021), which could be explained by the sensitivity of market returns to changes in investor sentiment, adjustments in monetary policy, geopolitical events, and even company earnings reports.

Similarly, the volatility index, as illustrated in Figure 3 (Figure 3), exhibits fluctuating patterns over time, with two peak values in 2008 and 2020. In 2002, two years following the dot-com bubble, we noticed a decline in the volatility index, reaching a value of VIX=12 in both 2005 and 2006. Subsequently, the market expectation of future volatility began to increase, with a peak value observed in 2008 at 32. Since then, we have observed a reversal in the trend, which persists until 2019. In 2020, the index reached its highest level again, peaking at 30,

before starting to fluctuate over the subsequent two years. Based on these observations, we conclude that the peaks in the volatility index coincide with the major two crises covered in this study, indicating that crises impact the stock market, investors' behavior, and the overall well-being of an economy. Figure 2 and Figure 3 clearly illustrate the increased uncertainty and turbulence in the financial markets caused by the Great Recession and Covid-19.

Figure 4 (Figure 4) reveals a close correlation between inflation and interest rates. It is clear that, following a crisis, both interest rates and inflation experience immediate decreases, as observed post-the dot-com bubble burst, the financial crisis, and Covid-19. In all three scenarios, we witness a significant decrease in interest rates, with inflation following suit.

From 2008 onwards, the Federal Reserve has subsequently maintained its federal funds rate between 0% and 0.25% for seven years, potentially as part of initiatives aimed at enhancing economic activity following the crisis. Interest rates were kept relatively low for nearly a decade until 2018, when both inflation and interest rates surpassed 2%. In 2020, inflation initially followed a decrease in interest rates but then jumped, prompting the Federal Reserve to raise interest rates accordingly. By the end of 2021, inflation stood at 8%, the highest level in more than 20 years.

In our analysis, we control for macroeconomic conditions to isolate crisis specific effects.

4.3.3 Mergers & Acquisitions Subsample

Table 5 (Table 5) presents the summary statistics of the M&A subsample.

Starting with the financial crisis, both liquidity and leverage ratios show non-significant differences between pre-crisis and post-crisis levels. This indicates that firms adopt a conservative approach towards cash utilization and debt engagement during crises, preferring to maintain stability rather than alter their financial positions. Consequently, firms tend to go back to similar pre-crisis levels, with a few adjustments made during the crisis period, aligning with the previous findings of Iqbal and Kume (2014).

Regarding profitability metrics, we observe an approximate 10% rise in both return on assets (ROA) and gross margin between pre-crisis and post-crisis periods. This rise may stem from the economic recovery marked by heightened consumer spending, increased business investments, and the implementation of cost-cutting strategies. In contrast, Tobin's Q exhibits a decline post-crisis, potentially indicating diminished investor confidence during uncertain conditions that leads to corrections in market overvaluation. Furthermore, Table 5 shows that

the average sales value has nearly doubled post-crisis, escalating from $652 million to $1050 million, accompanied by an increase in the average natural log of total assets.

Regarding the impact of the Covid-19 pandemic, we note that liquidity, leverage, and profitability exhibit comparable values both before and after the pandemic, showing a slight decrease in average values post-crisis. However, the average Tobin's Q, dollar value of sales, and logarithmic assets experienced an increase following the onset of Covid-19, suggesting that firms, on average, became more overvalued post-the pandemic, and generated, on average, higher sales revenues. Certain companies may have witnessed a significant increase in their market-to-book ratios and size following Covid-19 due to the shift in consumer behavior during the lockdown, with increased online shopping, the emergence of remote work, as well as the focus on health and wellness products.

4.3.4 Buyback Subsample

We refer to Table 6 (Table 6) in describing the buyback subsample. We note that the average cash-to-asset ratio remained consistent before and after both crises. In contrast, we observe diverging trends in the behavior of the current ratio and the quick ratio across the financial crisis and Covid-19. While both ratios increased, on average, with the occurrence of the financial crisis (from 0.94 to 1.16 and from 0.91 to 1.11), they showed a decline post Covid-19 (going from 1.04 to 0.84 and from 1.02 to 0.82), indicating potential variations in firms' responses to the unique challenges posed by each crisis. Following the credit crunch in 2008, companies may be willing to mitigate risk and strengthen their liquidity positions to better navigate uncertain economic conditions. However, given the exogeneity of the impact of Covid-19, firms may have quickly pivoted towards recovery strategies as soon as the situation stabilized with the discovery and distribution of vaccines, and may have engaged in optimizing inventory management, reducing excess working capital, and reallocating resources towards growth opportunities, which led their liquidity ratios to decrease, on average, compared to pre-crisis levels.

Regarding leverage ratios, we witness relatively stable figures for both the leverage ratio and the long-term debt ratio across our study period, suggesting that companies that engage in buybacks may prioritize maintaining stable debt levels both in the short and long-run to better support their future share repurchase programs.

Conversely, Table 6 illustrates that the average return on asset (ROA) shifted from positive to negative values following the occurrence of a crisis, implying the important impact

of favorable economic conditions on the profitability of a firm and potentially showing that firms may be inclined towards buybacks post-crisis to add value to their company and increase their profitability rather than defend against potential acquisitions. The gross margin, computed as the ratio of the difference between sales volume and the cost of goods sold to the sales volume, had a negative mean value of (-0.081) before the financial crisis, indicating that the cost of goods sold was relatively higher than sales revenue before the financial crisis. We suggest that companies review their business models or their product mix in response to lessons learned from the crisis. Furthermore, we witness a consistency in the improvement of the average gross margin of companies repurchasing their shares following the occurrence of a crisis (whether economic or exogenous), leading us to conclude that firms tend to retain a higher average percentage of each dollar of revenue post-crisis.

Companies within our buyback subsample appear to be overvalued, as the average firm has a market-to-book ratio higher than one. The average Tobin's Q levels across different periods (before or after a particular crisis) are comparable. We notice a significant decrease in the average Tobin's Q with the onset of Covid-19 (from 1.85 to 1.68), which could be explained by the drastic stock price decline post-Covid-19.

Furthermore, our analysis reveals a notable consistency in the size metrics of companies between 2002 and 2021, namely the average sales volume and the mean natural logarithm of total assets. This implies that, on average, companies that engage in buybacks are often stable and resilient to challenging market conditions, allowing them to continue generating revenue effectively and maintaining their desired level of total assets.

Although we present the statistics obtained for the macroeconomic variables in Table 6, we will not particularly discuss them because the variables are in natural logarithms and their interpretation will be complicated.

5 FINDINGS & INTERPRETATIONS

5.1 Mergers and Acquisitions

5.1.1 Split Sample Approach

Table 7 (Table 7) and Table 8 (Table 8) display results from both linear probability models (Columns 1 through 3) and conditional logit models (Columns 4 through 6), studying the impact of the financial crisis and that of Covid-19, respectively.

5.1.1.1 The financial crisis

We conduct an analysis of the M&A deals spanning the period from 2002 to 2013, and we create subperiods to distinguish between pre-financial crisis and post-financial crisis deals. Based on the results in Table 7, linear probability models show a significant inverse relationship between the probability of being a target and liquidity ratios in pre-crisis scenarios. While the current ratio is consistently positive and non-significant, either the cash-to-asset ratio or the quick ratio, or both, show significant negative coefficients at the 5% level. We thoroughly examine the definitions of our liquidity ratios and find that the quick ratio and the current ratio share considerable similarities, but differ primarily in the composition of current assets utilized in their computations. While the quick ratio is calculated as the difference between current assets and inventories divided by current liabilities, the current ratio is computed as the ratio of current assets to current liabilities. Therefore, lower values for these ratios indicate that a company possesses a lower proportion of current assets relative to its current liabilities, potentially signaling inefficient utilization of cash resources. A lower cash-to-asset ratio reflects a lower ability for a firm to generate cash compared to its asset size. The consistent negative coefficients of the cash-to-asset ratio obtained through the application of both the linear probability model and the conditional logit suggest that companies with lower liquidity are more likely to be targeted during pre-crisis periods, aligning with our liquidity hypothesis during pre-crisis periods.

In post-financial crisis scenarios, the current ratio and the quick ratio coefficients become insignificant, and the cash-to-asset ratio becomes positive. Since a higher cash-to-asset ratio indicates that a larger portion of the company's assets are held in cash, we confidently deduce that bidders tend to be inclined towards firms with stronger liquidity positions post-crisis.

Regarding the leverage hypothesis during the pre-crisis period, none of the leverage ratio coefficients show statistical significance; hence, they remain inconclusive. However, we

note that the long-term debt ratio demonstrates significant negative values across columns (1-6), showing that firms with lower liquidity are more likely to be takeover candidates during "normal" periods.

Following the financial crisis, our results indicate that the leverage ratio displays a positive trend and attains statistical significance at the 5% level across all models (1-6). Long-term debt ratios maintain their negative coefficients in columns 1-3 in which we use the linear probability model, and become positive and significant through the application of the conditional logit in columns 4-6. Based on these results, we interpret that bidders tend to be more interested in acquiring firms that rely on borrowed funds for their operational and investment needs post-crisis. Besides, companies with higher leverage ratios may be perceived as closer to bankruptcy during times of uncertainty. Hence, acquiring such distressed firms at reduced valuations enables bidders to exploit market inefficiencies and potentially realize superior returns on their investments. Overall, we find that these results lend support to our liquidity hypothesis and conclude that while bidders' preferences may lean towards lower-leverage firms before a crisis, there is a shift towards favoring highly leveraged firms' post-crisis.

Profitability metrics including the return on assets (ROA) and gross margin (GM) have positive signs across both LPM and conditional logit, with significant findings observed across our models. These results highlight the attractiveness of more profitable firms to potential bidders during pre-crisis periods. The consistency of these findings with our expectations and previous literature strengthens the idea that bidders favor firms with higher profitability (Adelaja et al., 1999). Our analysis using linear probability models on the post-crisis dataset yields consistent results (positive coefficients), suggesting that more profitable firms are increasingly targeted post-crisis. Since the conditional logit model does not provide a clear indication of the relationship between profitability and the likelihood of takeover after the crisis, we rely on the significant coefficients obtained to conclude that bidders tend to be inclined towards profitable firms, following the financial crisis.

Tobin's Q, as proxied by the market-to-book ratio, yields statistically insignificant positive outcomes in the linear probability model (columns 1 to 3). However, the sign reverses to negative when employing the conditional logit model. Interestingly, we observe significant findings for Tobin's Q in columns 5 and 6, in which we account for the impact of macroeconomic variables. We conclude that, before the financial crisis, undervalued firms tended to have a higher probability of being targeted. In contrast, in the post-crisis scenario,

Tobin's Q does not show a significant correlation with the likelihood of a takeover. We investigate these findings, and we determine a few potential contributing factors. First, the heightened market volatility and uncertainty characteristic of post-crisis periods may diminish the relevance of Tobin's Q as a reliable measure of firm valuation, thus weakening its predictive power in acquisition scenarios. Second, firms may reassess their strategies in response to the market landscape, prioritizing other factors, such as the strategic fit of the two entities or the specialized expertise of the target firm, over the pure market valuation of the company. We find that our results diverge from our Tobin's Q hypothesis, indicating that the market valuation of the company is not a determinant of its takeover likelihood post-financial crisis.

The size hypothesis in our study predicts that there is no relationship between the size of the company and its probability of being targeted during the pre-crisis period. However, our results obtained in Table 7 challenge this notion. In the pre-crisis scenario, particularly evident in the conditional logit regression results (since both sales and natural log of total assets exhibit positive significant results), larger firms are more likely to be acquired between 2002 and 2007. However, this trend is reversed in the post-financial crisis scenario, as indicated by the consistently negative and significant log of assets across columns 1-6. We explain that bidders may be more interested in larger firms, pre-crisis, because of their perceived stability, market dominance, and potentially higher value in terms of assets and revenue. However, with the occurrence of an economic downturn, bidders' priorities may change, becoming more risk-averse and cautious about investing in larger enterprises. Therefore, smaller companies may gain appeal due to their growth potential, cost-efficiency, and flexibility when compared to their larger counterparts.

Despite the noticeable shift in the determinants of takeover behavior between before and after the financial crisis, Table 7 indicates non-significant values for all macroeconomic factors. The lack of significance in the results can be attributed to the endogeneity of macroeconomic variables to acquisition decisions, as we suggest that firm-characteristics reflect the changes in macroeconomic variables. We also attribute the non-significance of the coefficients for the volatility index, inflation, interest rate, and market return volatility to the heterogeneity of responses, as different firms may react differently to macroeconomic shocks based on their own specific characteristics such as the industry, size, and geographic location.

5.1.1.2 Covid-19

According to the results shown in Table 8, only the cash-to-asset ratio among the liquidity ratios demonstrates a significant coefficient, with a consistently negative sign across all models (1-6) during the pre-Covid-19 period, suggesting that less liquid firms are more likely to be targeted during "normal" periods, aligning with our previous findings about the liquidity hypothesis amid the financial crisis. However, it is important to highlight that, during the post-crisis period, the linear probability model reveals across columns 1-3 a significant positive relationship between the cash-to-asset ratio and the probability of being a target. The conditional logit model shows that the coefficients observed during the post-Covid-19 period lack statistical significance. Therefore, based on LPM's findings, we conclude that the higher the liquidity of a firm, the higher its likelihood of being targeted following Covid-19.

Moreover, Table 8 reveals consistently negative and significant long-term debt ratio and leverage ratio coefficients pre-crisis, which become positive and significant following the onset of Covid-19. These results align with our previous findings regarding the impact of the financial crisis, allowing us to conclude that Covid-19 significantly impacts the M&A determinants, such that bidders become more likely to acquire high-leveraged firms post-crisis.

We note that none of the return on asset coefficients show statistical significance; hence, our attention shifts primarily to the analysis of gross margin as a proxy for profitability. Our findings indicate that although more profitable firms were perceived as more attractive before Covid-19, firms with lower gross margins appear to be more appealing to bidders during the post-crisis period (negative significant coefficients). These results are consistent with the previous findings of Beccalli and Frantz (2013), who found that bidders may find less profitable firms appealing due to the potential of enhancing their profits through efficient management strategies including robust supply chains, diversified revenue streams, and effective risk management practices. Following Covid-19, companies with low management efficiency incurred huge losses due to the heightened uncertainty of the pandemic and the complete shutdown of trade and services. Therefore, acquirers may seize the opportunity of acquiring distressed firms at a discount with the goal of achieving positive synergy (Galpin & Mayer, 2020).

Additionally, we find that Tobin's Q exhibits insignificant values across all columns 1-6 both before and after Covid-19, leading us to conclude that the market-to-book ratio is not a significant determinant of M&A behavior. Although these findings are inconsistent with our

hypotheses, they align with previous research conducted by Sudarsanam (1995) and Limmack (1991).

Our findings regarding the size hypothesis suggest that while larger firms were more likely to be targeted between 2014 and 2019, bidders became more inclined towards smaller firms following Covid-19. This highlights the significant impact of the pandemic on takeover likelihood and M&A determinants.

In regard to the macroeconomic variables, none of them exhibit significance. Our potential explanation for the statistical insignificance of macroeconomic variables outlined in Section 5.1.1.1 applies here as well.

Moreover, we examined the possibility of multicollinearity and found that all our independent variables have variance inflation factor (VIF) values below 10, implying that although our predictors have some correlation (as indicated by VIF $\neq 1$), it is within acceptable limits and does not necessarily require us to remove any variables from the model. See correlation matrix (Table B).

5.1.2 Dummy Variable Approach

We use the dummy variable approach, as detailed in Section 3.2.5. We compare the results of the linear probability model against those of the conditional logit. For convenience, we choose to focus on Columns 2 and 5, as outlined and explained in Table 7 and Table 8. The two models we consider involve firm-specific characteristics and macroeconomic factors. We further add to each of them a dummy variable to account for the crisis period (pre or post).

Based on our initial observation of Table 9 (Table 9), we notice significant differences in the coefficients obtained using the linear probability model compared to the conditional logit. Moreover, when we use the dummy variable approach, we employ a sample that covers both pre-crisis and post-crisis periods. Therefore, we suspect that the inclusion of these distinct subperiods may indicate a strong possibility of varying error variance, leading to the potential presence of a heteroscedasticity issue. We delve into the literature and hypothesis testing to further investigate the accuracy of the results.

Shieh (1981) as well as Fisher and Kamin (1985) suggest that the error term in linear models often displays heteroscedasticity, which implies that its variance is not constant. The presence of non-constant variance violates an essential assumption in linear regression, leading

ordinary least squares (OLS) estimators to not be the Best Linear Unbiased Estimators (BLUE) and potentially driving reduced efficiency and consistency in the results (Uyanto, 2022).

Uyanto (2022) conducted a Monte Carlo simulation to compare the robustness of seven heteroscedasticity tests and concluded that the Harvey–Godfrey test was more powerful than others such as the Breusch–Pagan test and the White test. The Harvey–Godfrey test was developed by Harvey (1976) and Godfrey (1978). It assumes that the error variance is an exponential function of the explanatory variables in the regression equation, regressing the squared residuals from a regression on the lagged values of the independent variables and the dependent variable. To detect heteroscedasticity issues, we use the formula $HG = nR^2$, where n is the number of observations in the regression and R^2 is the coefficient of determination from regressing the residuals on their lagged values.

As homoscedasticity is a critical assumption in linear regression, we set our null hypothesis as H_0: No heteroscedasticity, and the alternative hypothesis as H_1: At least one of the residual variances is different. The sample size n and the coefficient of determination R^2 obtained from the regression will follow the ChiSquare (χ^2) distribution with degrees of freedom the same as the number of independent variables. To conduct our tests, we utilize EViews, a statistical software package designed for time series-oriented econometric analyses.

For both the financial crisis and Covid-19 subsets, we find evidence of significant heteroscedasticity, with $HG_{\text{financial crisis}}$=412.52 and $HG_{\text{covid-19}}$=1092.45. Therefore, we refrain from drawing conclusions based on linear probability models due to the violation of the homoscedasticity assumption, which is essential for the validity of the results.

Since logistic regression does not have the homoscedasticity assumption, as outlined by Healy (2006), we continue to interpret Table 9 using the conditional logit results. We find that the odds of a takeover occurring in the post-crisis period are 1.018 times higher than the odds of a takeover occurring in the pre-crisis period, holding all other variables constant. Our results indicate that there is a slightly higher probability of M&A activity during the post-financial crisis compared to the pre-crisis period. However, this trend does not hold true following Covid-19 because a smaller number of M&A deals occurred post-Covid-19 than pre-Covid-19 (odds=0.487). These outcomes are consistent with the previous findings of Hughes et al., (1999), suggesting that the post-crisis period may be an opportunity for resilient and financially strong companies to expand further at lower prices. In the particular context of the pandemic,

Tian and Wang (2024) indicated a decline in M&A activity volumes post-crisis, which they attributed to increased risk aversion among managers due to heightened uncertainty.

The conditional logit regression using both the financial crisis and Covid-19 subsets shows that liquidity interaction terms exhibit significant odds that are equal to 1.717 and 1.683, respectively. This suggests that higher liquidity is associated with a higher probability of takeover post-crisis compared to pre-crisis, which aligns with our post-crisis liquidity hypothesis as well as our previous findings using the split sample approach.

We find that the leverage interaction term displays a significant odds ratio only for the financial crisis, such that, holding other variables constant, the odds of firms with the same leverage are 1.226 times higher after the Great Recession than before the Great Recession. Therefore, we conclude that companies with higher leverage positions are more attractive targets for acquisition following the financial crisis. This finding is consistent not only with our hypothesis regarding leverage post-crisis, but also with our previous outcomes using the split sample approach. However, we were unable to draw definitive conclusions about the impact of the pandemic as the odds ratios obtained for the leverage interaction term are not statistically significant.

The interaction terms involving profitability and valuation indicate no significant results in either crisis, showing that the relationship between these factors and the likelihood of takeover does not change significantly during times of crisis. Our findings about Tobin's Q are in line with our earlier results that show that the market-to-book ratio is not a major determinant of takeover likelihood post-crisis. Regarding firms' profitability, the results obtained using the dummy variable approach support our hypothesis, which predicts that bidders are likely to acquire more profitable firms both before and after a crisis.

The outcomes of the conditional logit provide no evidence about the influence of the financial crisis on the targeting behavior in M&A based on the size of the company, as we find no statistically significant results relative to the size interaction term. However, we find that larger companies are less likely to be targeted after Covid-19 than before the crisis. Specifically, we find the odds of a takeover for a larger company after Covid-19 period to be 0.910 times the odds for a company of the same size during the pre-crisis period, keeping other variables constant.

Table 10 (Table 10) presents a summary of the regression results obtained using both the split sample approach and the dummy variable approach.

Starting with the split sample approach, we note that the impact of the financial crisis as well as Covid-19 on the probability of being a target is similar with respect to liquidity, leverage, and size. However, we highlight differences between the two crises regarding their influence on firms' Tobin's Q and profitability. While we observe a positive relationship between the profitability of a company post the financial crisis and its takeover likelihood, we find that less profitable firms become attractive targets, following Covid-19, possibly due to the potential positive synergies that acquirers perceive in inefficient firms. Moreover, we explain that bidders do not seem to consider whether firms are undervalued after both crises (the financial crisis and Covid-19) due to the heightened volatility and the need for bidders to survive. For instance, firms with niche knowledge, such as those specializing in digital transformation, are likely to be targeted post-Covid-19, regardless of their market-to-book ratio. Besides, as previously shown in Figure 2, market returns and stock prices tend to be volatile during times of hardship, leading a company's market-to-book ratio to become an irrelevant determinant of M&A behavior.

The dummy variable approach supports our split sample approach findings regarding liquidity, leverage, Tobin's Q, and profitability when studying the impact of the financial crisis. While companies with lower leverage and liquidity were appealing to bidders during the pre-crisis period, bidders became more attracted to firms with higher liquidity and leverage after the Great Recession. Moreover, we note that acquirers continue to show a preference for profitable companies both before and after the financial crisis. However, our dummy variable approach does not find a significant impact of the financial crisis on the market-to-book ratio and the size of the form as determinants of the probability of being a target.

Our findings using Covid-19 sample slightly diverge from our discoveries regarding the financial crisis. We find consistent results between the split sample approach and the dummy variable approach concerning liquidity, size, and Tobin's Q hypotheses. The dummy variable approach fails to capture the impact of Covid-19 on the leverage and profitability hypotheses, as outlined in our earlier results.

5.2 Buybacks

Since the conditional logit is considered more adequate to predict probabilities (Chatla & Shmueli, 2016), we exclusively employ logistic regression in this section.

5.2.1 Split Sample Approach

We analyze the financial crisis and Covid-19 (Covid-19) independently.

5.2.1.1 Financial Crisis

Based on Table 11 (Table 11), we find that the cash-to-asset ratio and the quick ratio display statistically insignificant results during the pre-financial crisis period. The current ratio exhibits positive and significant results at the 1% level across both Models 1 and 2. These outcomes indicate that firms with higher levels of liquidity were more inclined to pursue buybacks before the financial crisis, which is consistent with the literature suggesting that companies opt for share repurchases as a means of deploying excess cash instead of investing in potentially less profitable projects (Isagawa, 2000). Following the financial crisis, we observe that the cash-to-asset ratio maintains a negative trend, but becomes significant at the 5% level. The current ratio and the quick ratio have contrasting signs with no statistical significance. Thus, we conclude that firms with lower liquidity have higher chances of engaging in buybacks post-crisis. This might be because low-liquidity firms are more likely to encounter difficulties in securing external funding during periods of economic uncertainty and investing in risky projects, making buybacks a more appealing strategy for utilizing surplus cash.

Furthermore, our analysis reveals positive and significant coefficients at the 1% level for both the leverage ratio and the long-term debt ratio during the pre-crisis period, which suggests that firms with higher leverage were also more likely to engage in buyback activities prior to the financial crisis. These findings highlight the importance of leverage in shaping firms' decisions regarding buybacks and align with the concept proposed by Guedes and Opler (1996) that the use of debt in share repurchases helps companies approach their optimal debt-equity ratio during “normal” periods. Following the Great Recession, we observe that while the long-term debt ratio maintains its positive relationship with the probability of engaging in buybacks, the leverage ratio becomes negative and significant post-crisis, indicating a higher likelihood among companies with negative current liabilities to engage in buybacks.

We note that ROA and Tobin’s Q exhibit negative statistically significant coefficients during the pre-financial crisis period across Models 1 and 2. Based on the definitions of our variables, this observation suggests that companies with higher asset levels, lower net income, or those perceived as undervalued are more inclined to engage in buybacks before the financial crisis. Such firms may view their stock as undervalued and use buybacks as a strategy to optimize the company's capital structure, signal confidence to investors, and enhance shareholder value by reducing outstanding shares. In the analysis of the post-financial crisis scenario, we find that ROA’s coefficients remain negative and significant at the 1% level, whereas Tobin’s Q loses its statistical significance. Therefore, we conclude that less profitable

firms are more likely to engage in buybacks, both before and after the financial crisis. On the other hand, we find that the heightened market volatility and uncertainty caused by the Great Recession led the market-to-book ratio to become an insignificant determinant of buyback behavior.

Since sales coefficients are null across both Models 1 and 2, we rely on the natural log of total assets to proxy the size of a company. Table 11 indicates that the size of the company does not impact its probability of engaging in buyback deals during a « normal » period, as we obtain insignificant coefficients using the pre-crisis subsample. In contrast, our analysis reveals a tendency for smaller firms to favor buybacks after the financial crisis. This can be explained by the higher agility of smaller firms in adjusting their capital structure compared to larger corporations during changing market conditions, as well as by the willingness of shareholders to concentrate their ownership to protect their control and influence over the company's direction.

We examine the likelihood of buybacks conditional on the probability of being a target and uncover a significant positive relationship at the 10% level, indicating that a higher probability of being a target corresponds to a greater likelihood of engaging in a buyback. This finding supports our hypothesis, which proposes that companies utilize buybacks as a defense mechanism to deter potential takeovers, aligning with previous research done by Bagwell (1991) and Mohanty and Panda (2011), among others. Following the financial crisis, we note that the probability of a company being a target no longer plays a significant role in predicting buybacks. This aligns with our hypothesis, suggesting that the occurrence of a crisis impacts the motives for buybacks. In simpler terms, firms are more likely to engage in buybacks after an economic downturn to pursue growth opportunities and enhance their competitive position rather than to protect themselves from being targeted.

5.2.1.2 Covid-19

Table 12 (Table 12) indicates positive significant coefficients for the cash-to-asset ratio, as well as the leverage ratio and the long-term debt ratio, suggesting that both liquidity and leverage have a positive relationship with the probability of companies engaging in a buyback during the pre-Covid-19 period. These findings are consistent with our earlier discoveries in Section 5.2.1.1 while examining the pre-financial crisis period. Additionally, we note that smaller and less profitable firms are more likely to pursue buybacks during a « normal » period, as presented by negative and significant coefficients at the 5% level. Tobin's Q, however, lacks significance, showing a significant contribution to our models. Regarding the probability of

being a target, we observed positive and significant results at the 10% level during the pre-crisis periods. Thus, we conclude that during « normal » periods, companies are likely to engage in buybacks to avoid being taken over, supporting our hypothesis about the use of buybacks as a defensive strategy against potential takeover attempts.

In our analysis of the post-pandemic scenario, we note that the cash-to-asset ratio exhibits a negative and significant coefficient in Model 2, and the leverage ratio remains negative and significant across both models. Besides, we observe that smaller firms are more likely to pursue buybacks following a crisis (negative coefficient for the natural log of total assets). Based on our findings, we deduce that smaller, less liquid, and less leveraged firms are more inclined to engage in buybacks after a pandemic crisis. It is also important to highlight that there are no significant coefficients for the calculated probability of being a target, suggesting that companies engaging in buybacks are no longer driven by the defensive strategy to avoid being taken over.

5.2.2 Dummy Variable Approach

We replicate our previous work on the buyback sample in Section 5.2.1, replacing the split sample approach with a dummy variable approach. The purpose of our study is not an estimation of the likelihood of buybacks. Instead, we aim to understand the relationship between the takeover likelihood of a company and its probability of engaging in buybacks. We construct an interaction term called "Defensive", which involves an interaction between the dummy variable "ACRISIS" and the calculated probability of being a target using Model 2.

Based on Table 13 (Table 13), we find that « ACRISIS » does not exhibit significant values for either of the two crises. Moreover, although the majority of our firm characteristics show statistical significance, the analysis of the obtained coefficients does not provide insight in the context of our study.

We particularly focus on the analysis of the interaction term. “Defensive” shows statistical significance at the 10% level, allowing us to infer that, holding all other variables constant, the odds of a buyback for companies targeted post-financial (Covid-19) crisis are 0.470 (0.354) times the odds of a buyback for companies with the same takeover targeted pre-financial (Covid-19) crisis. Thus, we conclude that the influence of the takeover likelihood on the probability of engaging in a buyback is weaker post-crisis versus pre-crisis, indicating that firms are less inclined to engage in buybacks as a defensive strategy against takeovers post-

crisis. These results reinforce our earlier discoveries using the split sample approach and align with our hypothesis regarding firms' motivations for engaging in buybacks.

6 ROBUSTNESS CHECK

We assess the robustness of our results in three ways. First, we examine the reverse relationship between takeover likelihood and the probability of engaging in buybacks by studying the probability of being an M&A target conditional on the probability of engaging in buybacks. Second, we investigate whether both the financial crisis and Covid-19 have the same impact on strategic corporate activity. Third, we aim to determine if the observed variation in the results between different subperiods is a result of chance or the occurrence of the crisis.

6.1 Reverse M&A-Buyback Relationship

Our main results suggest that there is evidence of a positive relationship between the probability of being a target and its likelihood to engage in buybacks during pre-crisis periods, showing that companies tend to use share repurchases as a strategy to protect themselves from hostile takeover attempts during "normal" periods. Alternatively, we investigate the reverse relationship through the examination of the probability of being a target conditional on the probability of share repurchases. We aim to assess whether firms that are more likely to engage in buybacks are also more/less likely to be targeted during the pre-crisis period, as this finding will allow us to determine the impact of a crisis on the use of buybacks as a defensive strategy.

Instead of employing the calculated probability of being a target to predict the buyback likelihood, we compute the probability of engaging in buybacks using the conditional logit model. Subsequently, we use the calculated probability of engaging in buybacks (CPEB) as an explanatory variable to estimate the takeover likelihood. Table 14 (Table 14) presents the results obtained adopting this approach. We compare the buyback subsample coefficients to those obtained in Column 5 (Table 7 and Table 8) and the M&A subsample coefficients to those obtained in Model 2 (Table 11 and Table 12). We find inconsistent results in the direction of the influence of a crisis on both the probability of being a target and the buyback likelihood, as the majority of the coefficients in Table 14 show no statistical significance. with a few exceptions. There are, however, a few relationships that hold such that firms with higher (lower) leverage are more (less) likely to engage in buybacks before (after) the financial crisis, aligning with our results in Table 11. We also note that companies with lower (higher) leverage have a higher probability of being targeted before (after) Covid-19.

We examine the relationship between the calculated probability of engaging in buybacks (CPEB) and the probability of being targeted, and we determine that companies predicted to have higher chances of engaging in buybacks are more likely to be targeted. However, starting

in 2008, following the Great Recession, we find that the buyback likelihood is no longer a significant determinant of M&A activity, suggesting that the financial crisis significantly impacted M&A behavior.

6.2 "All crises are similar" Hypothesis

Based on our findings, we note similarities in the determinants of M&A before and after the financial crises compared to those before and after Covid-19 in terms of liquidity, leverage, and size, with Tobin's Q and profitability being exceptions. While undervalued firms were targeted prior to the financial crisis, the market-to-book ratio was not found to be a significant determinant before Covid-19. Additionally, we find that the profitability of a firm does not determine whether it makes it more or less likely to be targeted post-financial crisis. However, following Covid-19, our findings show that bidders were more inclined towards less profitable firms. In this section, we hypothesize that both the financial crisis and Covid-19 have the same impact on the determinants of M&A and the use of buybacks as a defensive strategy. If we find consistent results with our main findings, we will fail to reject our hypothesis and deduce that the impact of a crisis on the behavior of corporate activities is the same, regardless of the nature and reasons of the crisis.

We create two subsamples: one including the pre-financial crisis and pre-Covid-19 periods, and the other encompassing the post-financial crisis and post-Covid-19 deals. We use conditional logit regression to test our hypothesis.

We start discussing the impact of the crisis on the M&A sample. Based on Table 15 (Table 15), we note that profitability, leverage, and size exhibit negative coefficients both before and after the occurrence of a crisis. Similarly, Tobin's Q shows no statistical significance throughout our period of study. Therefore, we reject our hypothesis that suggests that all crises are the same, and we highlight the importance of studying the impact of each of the Great Recession and the pandemic independently. Despite the insignificance of the macroeconomic variables, we keep them as control variables given the importance of market conditions in influencing corporate activities.

Regarding the buyback sample, we find that smaller, undervalued companies with higher leverage and lower profitability are more likely to engage in buybacks during the pre-crisis period. Following a crisis, smaller, overvalued firms are more likely to repurchase their shares. Given the inconsistent signs of individual measures within the same category, we are

unable to conclude about the impact of a crisis on profitability, leverage, and liquidity, as determinants of buyback behavior.

We further examine the use of buybacks as a defensive strategy, and we noted that the coefficients for the calculated probability of being a target are statistically significant both before and after the crisis, with opposing signs. During the pre-crisis period, we note that companies with higher chances of being targeted were more likely to engage in buybacks. These results align with our main discoveries. However, during the post-crisis period, we find that firms that are less likely to be targeted have higher chances of engaging in share repurchases. Our analysis suggests that firms may use buybacks as a mechanism to protect themselves from hostile takeover attempts during more stable periods. The notable shift in this behavior following a crisis can be attributed to a variety of factors, such as the change in strategic priorities and financial constraints, leading companies to reassess their defensive strategies.

6.3 Pseudo-Crisis Subperiods

In this section, we aim to determine whether the change in M&A determinants and the adoption of buybacks as a defensive strategy are due to the occurrence of a crisis or merely the result of random variation. Instead of dividing our sample into pre-crisis and post-crisis periods based on time (the year in which the deal occurred), we create pseudo pre- and post-crisis periods. First, we assign random numbers to each deal. The actual target and their five pseudo-targets will have the same number. Subsequently, we sort those random numbers from the smallest to the largest. We use the same method for each of the M&A and the buyback subsamples. The first 5076 (6672) deals are designated as M&A (buyback) deals occurring in the pre-crisis period. The remaining deals are considered part of the post-crisis period. Table A in Appendix B (Appendix B) provides a summary of our subsample size division.

Table 16 (Table 16) presents the results of the conditional logit regression obtained when studying the shift in corporate activities' behavior before and after the pseudo-crisis period. We observe that the majority of the variables, including cash-to-asset-ratio, long-term debt, ROA, gross margin, Tobin's Q, and size measures, show no significant change between the pre-pseudo crisis period and the post-pseudo crisis period, indicating that the observed change in M&A and buyback activity is attributed to the impact of a crisis, rather than random variation.

Additionally, we find that the calculated probability of being a target is statistically insignificant both before and after the pseudo-crisis, further supporting our earlier findings and the main discoveries of our study

7 CONCLUSION

Numerous researchers have previously studied M&A activity and predicted the probability of being a target. However, only a few of them have studied M&A in the context of a crisis. In our study, we attempt to understand the importance of the impact of crises on corporate decision-making using two different approaches: the split sample approach and the dummy variable approach.

Our main findings stem from the split sample approach and show that smaller firms with higher liquidity and leverage are more likely to be acquired after a crisis. We use the dummy variable approach to further validate our discoveries, and we note that firms with higher leverage and liquidity are more likely to be acquired post-financial crisis. In contrast, post-Covid-19, smaller firms with high liquidity tend to have a higher takeover likelihood.

Our study contributes to the literature by examining the impact of crises on the determinants of M&A targets. We also provide evidence about the use of buybacks as a defensive strategy against hostile takeover attempts during "normal" periods. Based on our results obtained using both the split sample approach and the dummy variable approach, we find that, following a crisis, managers become less sensitive to the perceived probability of their companies being targeted, leading them to discontinue buybacks motivated by the threat of hostile takeover attempts.

We use three alternative strategies to test the robustness of our findings. First, we study the reverse relationship between the probability of being a target and the buyback likelihood. We find that companies with a higher probability of takeover are more (less) likely to engage in buybacks before (after) the crisis. Second, assuming that both the financial crisis and Covid-19 display a similar impact on corporate activities' behavior, we create two subsamples by merging all pre-crisis observations together and all post-crisis deals together. We note that this alternative split of our sample yields different results compared to our main findings, and we conclude that the financial crisis and Covid-19 exhibit distinct impacts on the determinants of M&A activity. Last but not least, we create pseudo-crisis periods to determine if the observed changes in corporate behavior are genuinely linked to the occurrence of a crisis rather than mere random variation. We find no consistent results across different subperiods, confirming that the observed shift in M&A behavior is driven by the crisis. Therefore, our robustness tests allow us to deduce that our main findings are robust and reliable.

We acknowledge that this research work may be limited in several ways. Despite the use of different firm characteristics as determinants of takeover likelihood and buyback behavior, there may be additional unobserved variables that could have influenced our results, including the growth of target firms and their investment levels in research and development (R&D). Moreover, we were subject to limited data availability, leading us to limit our post-Covid-19 census period to two years only, unlike the other subsamples, which cover six years of observations each.

Future researchers could redefine the pre- and post-crisis periods and potentially use alternative firm characteristics and/or sample construction procedures. While we constructed our sample using a pseudo-matching procedure based on sales and the finest industry code, it would be interesting to replicate this work using propensity scores to match targets with their pseudo-targets and predict the takeover likelihood. Furthermore, scholars could alternatively apply machine learning algorithms such as Random Forest and Support Vector Machines (SVM), which will help provide a deeper understanding of the impact of crises on strategic corporate activities.

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FIGURES

Figure 1: The trends in M&A and Buybacks between 2002 and 2021

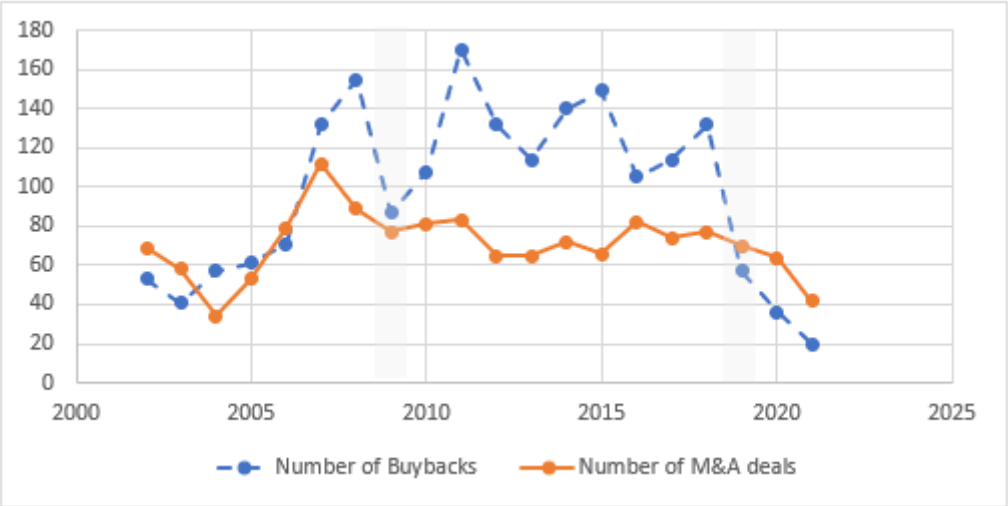


Figure 2: Market Return Volatility Trends between 1999 and 2022

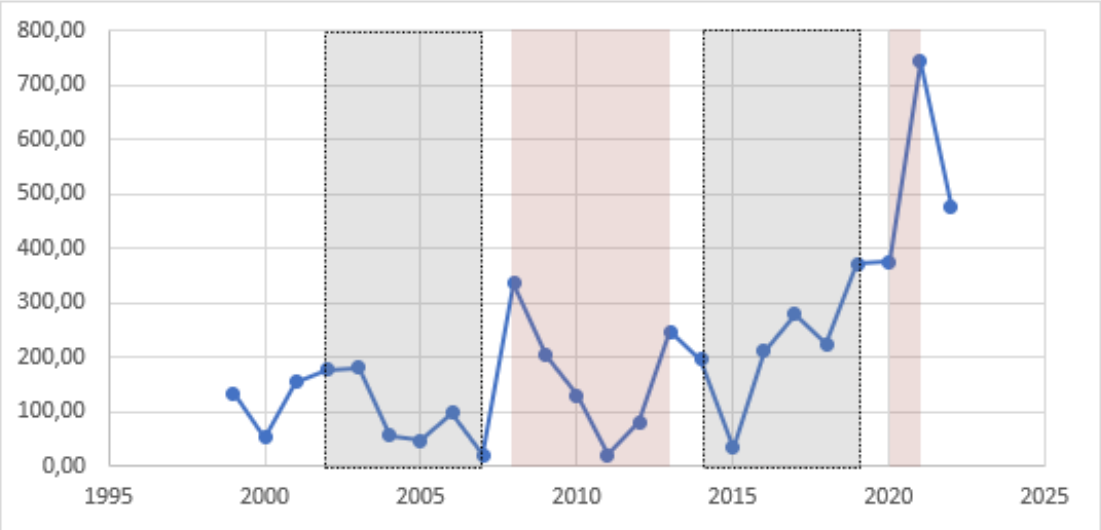


Figure 3: Volatility Index Trends between 1999 and 2022

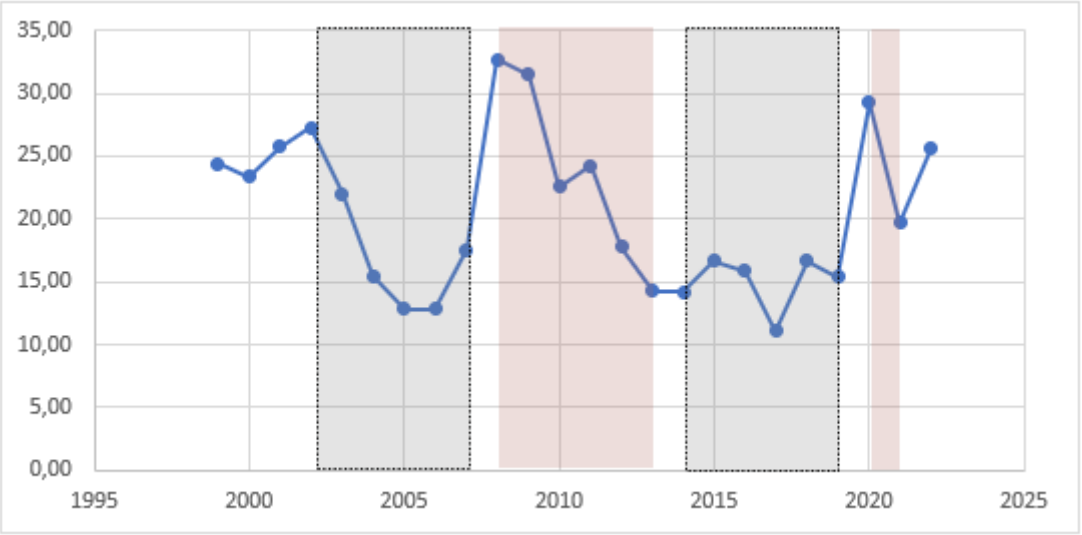
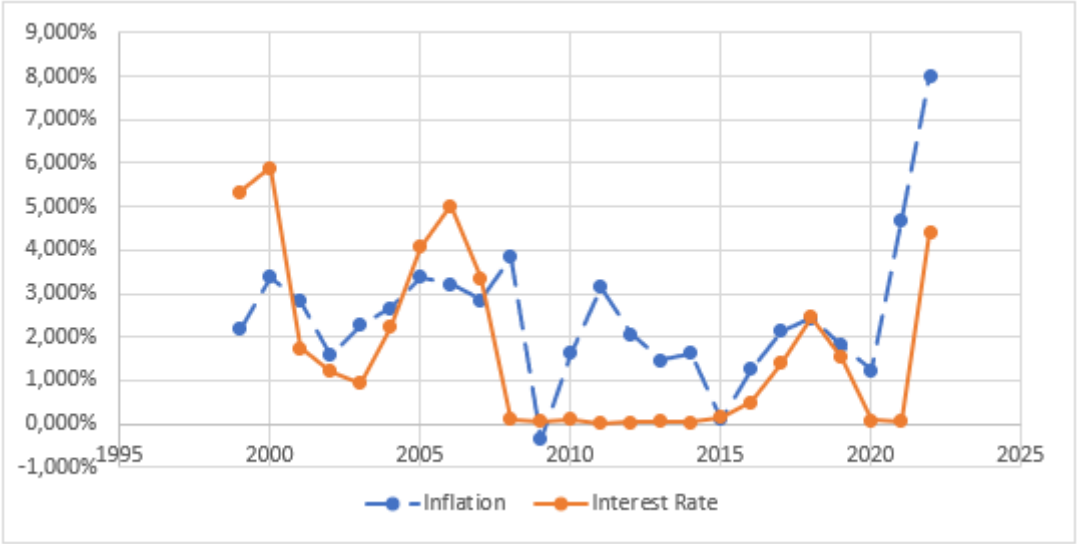


Figure 4: The Relationship between Inflation and the Interest Rates (1999-2022)



TABLES

Table 1: Hypothesized Direction of Influence on the Probability of Being a Target Takeover Before and After a Crisis

Hypothesis	Variables	Variable Name	Anticipated direction of influence on the probability of being a target	
			Pre-crisis	Post-crisis
Liquidity	Cash/Assets Current ratio Quick ratio	CA CR QR	(-)	(+)
Leverage	Leverage ratio Long term debt ratio	LEV LTD	(-)	(+)
Profitability	Return on Asset Gross margin	ROA GM	(+)	(+)
Tobin's Q	Market-to-book ratio	MBK	(-)	(-)
Size	Sales Natural log of Total Assets	SALE LNTA	(0)	(-)

(0) no results; (+) positive relationship; (-) negative relationship

Table 2: Summary Statistics-Measuring the Goodness of the Matching Procedure

Statistic	*Value*
N	16,730
Mean	0.302
Median	0.179
Standard Deviation	0.356
Minimum	0.000
Maximum	12.211
Percentile 25	0.041
Percentile 50	0.179
Percentile 75	0.510

Table 3: Summary Statistics-Overall Dataset between 2002 and 2021

	M&A subsample			Buyback subsample		
Panel A: Actual Targets						
Variable	N	Mean	Sd	N	Mean	Sd
Cash/Assets	1412	0.22	0.25	1934	0.19	0.21
Current ratio	1412	1.39	0.62	1934	1.24	0.24
Quick ratio	1412	1.32	0.55	1934	1.21	0.26
Leverage ratio	1412	0.18	0.43	1934	0.28	0.35
Long term debt ratio	1412	0.23	0.39	1934	0.17	0.22
Return on Assets	1412	0.22	0.46	1934	0.03	0.27
Gross Margin	1412	0.36	0.18	1934	0.16	0.53
Tobin's Q	1412	2.25	1.18	1934	1.94	1.07
Sales	1412	2176.00	10736.41	1934	3451.00	14164.66
Natural log of total Assets	1412	2.56	0.97	1934	2.94	1.00
Panel B: Pseudo Targets						
Variable	N	Mean	Sd	N	Mean	Sd
Cash/Assets	7060	0.21	0.24	9670	0.17	0.21
Current ratio	7060	0.97	0.42	9670	1.02	0.12
Quick ratio	7060	0.49	0.49	9670	0.98	0.29
Leverage ratio	7060	0.10	0.56	9670	0.09	0.76
Long term debt ratio	7060	0.22	0.32	9670	0.22	0.29
Return on Assets	7060	0.30	0.39	9670	0.14	0.48
Gross Margin	7060	0.54	0.65	9670	0.06	0.38
Tobin's Q	7060	2.64	1.46	9670	1.89	1.25
Sales	7060	796.00	2931.61	9670	2140.00	6871.14
Natural log of total Assets	7060	2.37	0.91	9670	2.75	0.99
Panel C: Main sample including Targets and their Pseudo-Targets, Total N=20,0076 events						
Variable	N	Mean	Sd	N	Mean	Sd
Cash/Assets	8472	0.21	0.24	11604	0.17	0.21
Current ratio	8472	1.04	0.45	11604	1.06	0.14
Quick ratio	8472	0.63	0.50	11604	1.02	0.28
Leverage ratio	8472	0.11	0.53	11604	0.12	0.69
Long term debt ratio	8472	0.22	0.33	11604	0.21	0.28
Return on Assets	8472	0.29	0.40	11604	0.11	0.44
Gross Margin	8472	0.51	0.57	11604	0.07	0.41
Tobin's Q	8472	2.57	1.412	11604	1.90	1.22
Sales	8472	1026.00	5160.09	11604	2359.00	8544.41
Natural log of total Assets	8472	2.41	0.92	11604	2.79	0.99

Table 4: Trends in Macroeconomic Variables Before and After the Financial Crisis and Covid-19

	Average VIX	Average Market Return Volatility	Average Interest Rate	Average Inflation
Pre-Financial Crisis (2002-2007)	17.98	96.96	2,81%	2,67%
Post-Financial Crisis (2008-2013)	23.81	169.81	0,07%	1.97%
Pre-Covid-19 (2014-2019)	14.96	219.47	1.02%	1,56%
Post-Covid-19 (2020-2021)	24.45	559.49	0,08%	2.97%

Table 5: Summary Statistics-M&A Subsample

Table 5 reports the mean values, standard deviations are in parentheses.

	Financial Crisis		Covid-19	
	Pre-crisis	Post-crisis	Pre-crisis	Post-crisis
Time period	2002-2007	2008-2013	2014-2019	2020-2021
	Dependent Variable			
Dependent Variable	0.17	0.17	0.17	0.17
	(0.37)	(0.37)	(0.37)	(0.37)
	Independent Variables			
Liquidity				
Cash/Assets	0.23	0.22	0.20	0.18
	(0.25)	(0.25)	(0.24)	(0.23)
Current ratio	0.89	0.91	1.01	0.99
	(0.47)	(0.32)	(0.35)	(0.50)
Quick ratio	0.63	0.65	0.67	0.58
	(0.55)	(0.43)	(0.39)	(0.57)
Leverage				
Leverage ratio	0.11	0.14	0.09	0.10
	(0.69)	(0.31)	(0.52)	(0.28)
Long term debt ratio	0.20	0.20	0.24	0.27
	(0.34)	(0.35)	(0.32)	(0.30)
Profitability				
Return on Asset	0.14	0.23	0.16	0.28
	(0.46)	(0.41)	(0.12)	(0.38)
Gross margin	0.21	0.32	0.18	0.31
	(0.58)	(0.50)	(0.47)	(0.64)
Tobin's Q				
Market-to-book ratio	2.71	1.59	1.31	2.11
	(1.58)	(1.27)	(1.32)	(1.43)
Size				
Sales	652.41	1050.26	1289.52	1522.79
	(2846.39)	(4811.95)	(5361.65)	(9223.37)
Natural log of Total Assets	2.24	2.31	2.59	2.73
	(0.89)	(0.93)	(0.91)	(0.94)
Macroeconomic effects				
Inflation	-1.56	-1.59	-1.98	-1.81
	(0.11)	(1.34)	(0.46)	(0.08)
Interest Rate	-1.59	-2.79	-2.51	-2.30
	(0.26)	(0.78)	(0.64)	(0.61)
Volatility Index	1.24	1.35	1.17	1.30
	(0.14)	(0.10)	(0.06)	(1.37)
Market Return Volatility	1.99	1.84	2.21	2.57
	(0.22)	(0.47)	(0.32)	(0.01)

Fixed Effects				
Cash	0.51 (0.5)	0.5 (0.5)	0.46 (0.5)	0.37 (0.48)
Tender	0.12 (0.33)	0.20 (0.4)	0.15 (0.36)	0.08 (0.28)
Horizontal	0.38 (0.49)	0.38 (0.49)	0.39 (0.49)	0.29 (0.46)
Hostile	0.01 (0.11)	0.01 (0.11)	0.01 (0.07)	0.01 (0.01)
Public Bidder	0.57 (0.50)	0.45 (0.5)	0.51 (0.5)	0.39 (0.49)
Number of observations	2430	2760	2646	636

Table 6: Summary Statistics- Buyback Subsample

Table 6 reports the mean values, standard deviations are in parentheses.

	Financial Crisis		Covid-19	
	Pre-crisis	Post-crisis	Pre-crisis	Post-crisis
Time period	2002-2007	2008-2013	2014-2019	2020-2021
Dependent Variable				
Dependent Variable	0.17 (0.37)	0.17 (0.37)	0.17 (0.37)	0.17 (0.37)
Independent Variables				
Liquidity				
Cash/Assets	0.19 (0.22)	0.18 (0.21)	0.15 (0.20)	0.14 (0.19)
Current ratio	0.94 (0.11)	1.16 (0.38)	1.04 (0.14)	0.84 (0.41)
Quick ratio	0.91 (0.62)	1.11 (0.44)	1.02 (0.75)	0.82 (0.32)
Leverage				
Leverage ratio	0.10 (0.32)	0.09 (1.23)	0.07 (0.35)	0.11 (0.10)
Long term debt ratio	0.19 (0.28)	0.20 (0.30)	0.23 (0.27)	0.26 (0.24)
Profitability				
Return on Asset	0.14 (0.40)	-0.15 (0.61)	0.06 (0.10)	-0.007 (0.34)
Gross margin	-0.081 (0.66)	0.24 (0.33)	0.041 (0.22)	0.34 (0.37)
Tobin's Q				
Market-to-book ratio	1.97 (1.67)	1.91 (1.14)	1.85 (0.74)	1.68 (1.01)
Size				
Sales	2551.87 (8577.90)	2028.10 (7217.05)	2530.07 (9223.37)	3330.21 (7261.39)
Natural log of Total Assets	2.73 (1.03)	2.66 (0.97)	2.90 (0.98)	3.29 (0.83)
Control Variables				
Macroeconomic effects				
Inflation	-1.56 (0.1)	-1.61 (0.13)	-1.95 (0.42)	-1.8 (0.08)
Interest Rate	-1.59 (0.27)	-2.87 (0.75)	-2.64 (0.63)	-2.25 (0.59)
Volatility Index	1.22 (1.33)	1.36 (0.1)	1.16 (0.06)	1.29 (0.13)
Market Return Volatility	1.99 (0.22)	1.86 (0.45)	2.24 (0.3)	2.57 (0.002)
Number of observations	2490	4596	4182	336

Table 7: Analysis of the Impact of the Financial Crisis on the Probability of Becoming the Target of M&A Activity

We report coefficients as well as their statistical significance levels using T-statistics and Wald test statistics (in between parentheses) obtained using the linear probability model (columns 1-3) and the conditional logit (columns 4-6), respectively. Column 1 and Column 4 include only firm characteristics, Column 2 and Column 5 incorporate firm characteristics along with macroeconomic factors, Column 3 and Column 6 account for the characteristics of the firm, macroeconomic variables, and deal-fixed effects. Our rule of thumb to interpret our findings is the following: we conclude based on the overall findings of the hypothesis, not the individual measures. We interpret primarily based on statistical significance. For example, if for the same hypothesis, one variable shows insignificant results, and the other provides insignificant results, we rely on the significant findings. In cases in which linear regression provides significant results, but the conditional logit shows insignificant results, we rely on the linear probability model. If the conditional logit and linear regression both provide significant results but contrasting views, we rely on the conditional logit, as it has been described as the more adequate model in probability prediction (Chatla & Shmueli, 2016). Time periods are defined as follows: pre-financial crisis (2002-2007), and post-financial crisis (2008-2013). Statistical significance levels are represented by ***, **, and *, indicating significance at the 1%, 5%, and 10% levels, respectively. Our models across all columns (1-6) are significant at the 5% level.

	Actual Target =1, Financial Crisis											
	(1)		(2)		(3)		(4)		(5)		(6)	
	Pre-crisis	Post-crisis	Pre-crisis	Post-crisis	Pre-crisis	Post-crisis	Pre-crisis	Post-crisis	Pre-crisis	Post-crisis	Pre-crisis	Post-crisis
Intercept	0.153***	0.097***	0.0172	0.104	0.174	0.115	0.1672***	0.02098***	0.1628	0.02007	0.1628	0.02077
	(6.082)	(3.932)	(1.211)	(0.334)	(1.182)	(0.364)	(72.268)	(111.857)	(2.402)	(0.787)	(0.179)	(0.779)
Liquidity												
Cash/Assets	-0.0039**	0.0007**	-0.0040**	0.00084***	-0.0040*	0.00086**	-0.0253**	0.00572**	-0.0257**	0.00642***	-0.0255***	0.00652***
	(3.241)	(2.289)	(-2.2056)	(2.523)	(-1.881)	(2.544)	(5.179)	(6.299)	(5.213)	(6.941)	(7.125)	(7.036)
Current ratio	0.0014	0.0002	0.0002	-0.00002	0.0018	-0.00002	0.0063	0.004	0.0097	0.00002	0.0066	0.00002
	(0.579)	(0.865)	(0.089)	(-0.501)	(0.078)	(-0.054)	(0.438)	(1.066)	(0.448)	(0.672)	(0.447)	(0.669)
Quick ratio	-0.0256**	0.00004	-0.0014	0.00004	-0.0012	0.00004	-0.0063	-0.00003	-0.0065***	-0.00001	-0.0063***	-0.00001
	(-4.053)	(0.914)	(-0.286)	(0.889)	(-0.105)	(0.090)	(0.437)	(0.796)	(10.568)	(0.031)	(10.156)	(0.031)
Leverage												
Leverage ratio	0.0001	0.0002***	0.0001	0.0002**	0.0001	0.00018**	-0.0055	0.00301**	-0.0056	0.00397**	-0.0059	0.00398**
	(0.074)	(3.315)	(0.076)	(2.452)	(0.851)	(2.454)	(0.345)	(5.441)	(0.285)	(5.163)	(0.405)	(5.152)
Long term debt ratio	-0.0002**	-0.0005**	-0.0019**	-0.00044	-0.0009*	-0.00044	-0.0004***	0.00426*	-0.0004***	0.00374*	-0.0003***	0.00374**
	(-2.861)	(-2.029)	(-2.394)	(1.163)	(-3.125)	(-1.211)	(7.586)	(3.546)	(14.048)	(2.952)	(14.985)	(3.586)
Profitability												
Return on Asset	0.0001	0.00004*	0.0014**	0.00004*	0.0015**	0.00004*	0.0056***	-0.00061	0.0505***	-0.00046	0.0058	-0.00045

Gross margin	(0.572)	(1.661)	(2.102)	(1.697)	(2.215)	(1.758)	(10.012)	(0.871)	(9.851)	(0.378)	(10.894)	(0.378)
	0.0041**	0.00001*	0.00434**	0.00007**	0.0047***	0.00007**	0.0040**	0.00001	0.0040**	0.00001	0.0004***	0.00001
	(2.323)	(1.855)	(2.331)	(2.019)	(2.789)	(2.012)	(5.490)	(0.471)	(5.487)	(0.487)	(7.891)	(0.482)
Tobin's Q												
Market-to-book ratio	0.0038	0.00000	0.00012	0.00000	0.0004	0.00000	-0.0008	0.00032	-0.0022**	0.00031	-0.0024**	0.00031
	(0.092)	(-0.312)	(0.104)	(-0.321)	(0.003)	(0.309)	(4.541)	(1.852)	(4.563)	(1.660)	(5.102)	(1.620)
Size												
Sales	0.0002***	-0.00002*	0.0002***	-0.00018	0.0002***	-0.00002	0.0001***	0.00000	0.0001***	0.00000	0.0001***	0.00000
	(6.719)	(-1.865)	(6.708)	(-0.084)	(6.726)	(-0.118)	(22.368)	(1.099)	(22.309)	(0.000)	(22.587)	(0.000)
Natural log of Total Assets	-0.0051	-0.00026***	-0.0005	-0.00027***	-0.0005	-0.00027***	0.0022**	-0.0020***	0.0026**	-0.0019**	0.0027**	-0.00196
	(-0.466)	(-2.791)	(-0.481)	(-2.617)	(-0.484)	(-2.644)	(5.788)	(7.766)	(6.101)	(5.920)	(6.213)	(6.073)
Macroeconomic effects												
Inflation			0.0013	0.00010	0.0014	0.00013			0.0068	-0.00065	0.0065	-0.00086
			(0.103)	(0.916)	(0.112)	(0.138)			(0.005)	(0.009)	(0.005)	(0.016)
Interest Rate			0.0016	0.00001	0.0013	0.00001			-0.0162	-0.00009	-0.0133	-0.00012
			(0.199)	(0.943)	(0.162)	(0.109)			(0.75)	(0.008)	(0.500)	(0.016)
Volatility Index			0.0028	0.00001	0.0027	-0.00006			-0.0112	0.00002	-0.0099	0.00045
			(0.170)	(0.995)	(0.161)	(-0.031)			(0.009)	(0.014)	(0.007)	(0.001)
Market Return Volatility			-0.0004	0.00004	-0.0004	0.00005			0.0012	-0.0025	0.0012	-0.00033
			(-0.061)	(0.896)	(-0.061)	(0.167)			(0.001)	(0.14)	(0.001)	(0.025)
Deal Fixed Effects[3]	No	No	No	No	Yes	Yes	No	No	No	No	Yes	Yes
Overall Model Significance	***	***	***	***	***	***	***	***	***	**	***	**

[3] The deal fixed effects include variables such as bidder public status, method of payment, identification of a horizontal deal, whether the deal is a tender offer, and the deal attitude.

Table 8: Analysis of the Impact of Covid-19 on the Probability of Becoming the Target of M&A Activity

See column definition, interpretation method, and time periods detailed in Table 7., We define our time periods as follows: pre-Covid-19 (2014-2019), and post-Covid-19 (2020-2021). Statistical significance levels are represented by ***, **, and *, indicating significance at the 1%, 5%, and 10% levels, respectively. Our models across all columns (1-6) are significant at the 5% level.

	Actual Target =1, Covid-19											
	(1)		(2)		(3)		(4)		(5)		(6)	
	Pre-crisis	Post-crisis	Pre-crisis	Post-crisis	Pre-crisis	Post-crisis	Pre-crisis	Post-crisis	Pre-crisis	Post-crisis	Pre-crisis	Post-crisis
Intercept	0.010 (0.338)	-0.0284 (-1.379)	-0.464 (-0.881)	0.0181 (0.558)	-0.436 (-0.819)	0.0165 (0.720)	0.2856*** (140.718)	0.03721*** (35.832)	0.6336* (2.851)	0.03290*** (19.855)	0.5949 (2.210)	0.03152*** (15.170)
Liquidity												
Cash/Assets	-0.00117*** (-3.490)	0.00141** (2.013)	-0.000119*** (-3.512)	0.00140** (2.003)	-0.00118*** (-3.433)	0.00134* (1.875)	-0.0846*** (10.350)	-0.00933 (2.699)	-0.0854*** (10.463)	-0.00906 (2.528)	-0.0849*** (10.002)	-0.00836 (2.044)
Current ratio	-0.00008 (-1.251)	-0.00004 (-1.623)	-0.00009 (-1.278)	-0.00004 (-1.256)	-0.00008 (-1.259)	-0.00001 (-1.615)	0.0135 (1.462)	0.00454 (1.343)	0.0138 (1.501)	0.00484 (1.474)	0.0131 (1.406)	0.00492 (1.509)
Quick ratio	0.008 (1.151)	0.005 (1.163)	0.00008 (1.177)	-0.001* (-1.664)	0.00008 (1.161)	-0.00001* (-1.751)	-0.0126 (1.239)	-0.00454 (1.341)	-0.0128 (1.278)	-0.00483 (1.472)	-0.0122 (1.191)	-0.00492 (1.506)
Leverage												
Leverage ratio	-0.00007** (-2.311)	0.00081** (2.422)	-0.00007** (-2.035)	0.00083** (2.468)	-0.00008** (-2.052)	0.00083** (2.452)	0.0070 (0.139)	0.01631** (4.092)	0.0076 (0.163)	0.01650** (4.142)	0.0080 (0.181)	0.01701** (4.348)
Long term debt ratio	0.00057 (1.422)	0.00137** (2.679)	-0.00058** (-2.427)	0.00136*** (2.653)	-0.00058** (-2.420)	0.00137*** (2.634)	-0.0041** (6.565)	0.00877** (5.598)	-0.0041** (6.598)	0.00868** (5.459)	-0.0041** (6.574)	0.00868** (5.373)
Profitability												
Return on Asset	-0.00007 (-0.612)	-0.00013 (-0.945)	-0.00008 (-0.647)	-0.00013 (-0.954)	-0.00008 (-0.665)	-0.00014 (-0.984)	0.0047 (0.260)	0.00027 (0.028)	0.0051 (0.302)	0.00022 (0.018)	0.0053 (0.319)	0.00029 (0.030)
Gross margin	0.00001*** (3.469)	-0.00015*** (-3.033)	0.00001*** (3.477)	-0.00016*** (-3.085)	0.00001** (5.197)	-0.00016*** (-3.055)	0.0004 (2.612)	-0.0014** (4.912)	0.0004** (5.633)	-0.0015** (5.325)	0.0004** (5.268)	-0.0087** (5.373)
Tobin's Q												
Market-to-book ratio	0.00001	-0.00005	0.00001	-0.00007	0.00001	-0.00004	-0.0007	-0.00002	-0.0007	-0.00003	-0.0007	-0.00002

	(0.520)	(-0.004)	(0.517)	(-0.012)	(0.538)	(-0.003)	(0.223)	(0.001)	(0.212)	(0.003)	(0.228)	(0.002)
Size												
Sales	0.000007*** (5.136)	-0.00003** (-2.304)	0.000007*** (5.169)	-0.00003** (-2.347)	0.000007*** (5.197)	-0.00003** (2.322)	0.0000*** (9.428)	-0.00002* (3.245)	0.0000*** (9.525)	0.00000 (1.423)	0.0000*** (9.768)	0.00000 (1.506)
Natural log of Total Assets	0.00043*** (4.573)	-0.00064*** (-3.416)	0.00043*** (4.601)	-0.00065*** (-3.475)	0.00044*** (4.617)	-0.00068*** (-3.519)	0.0351*** (21.027)	-0.00550*** (9.009)	0.0355*** (21.255)	-0.00565*** (9.306)	0.0359*** (21.316)	-0.00594*** (9.679)
Macroeconomic effects												
Inflation			-0.083 (-0.954)	-0.015 (-0.833)	-0.080 (-0.907)	-0.019 (-0.699)			0.0595 (0.836)	-0.0021 (0.563)	0.0565 (0.739)	-0.0033 (0.648)
Interest Rate			0.004 (0.308)	-0.076 (-0.536)	0.002 (0.192)	-0.081 (-0.459)			-0.027 (0.082)	-0.008 (1.059)	-0.0016 (0.028)	-0.0183 (0.963)
Volatility Index			0.044 (0.311)	0.014 (0.865)	0.033 (0.232)	0.022 (0.745)			-0.0396 (0.120)	0.0130 (0.563)	-0.0277 (0.066)	0.0261 (0.387)
Market Return Volatility			0.120 (0.954)	0.718 (0.561)	0.115 (0.903)	0.623 (0.351)			0.0595 (0.836)	-0.0041 (0.757)	-0.0824 (0.744)	0.0056 (1.003)
Deal Fixed Effects	No	No	No	No	Yes	Yes	No	No	No	No	Yes	Yes

Table 9: Dummy Variable Approach-M&A Subsample

Table 9 indicates the outcomes of both the linear probability model and the conditional logit model, using the dummy variable approach. We distinguish between the financial crisis and the Covid-19 crisis. We introduce « ACRISIS », a binary variable that indicates one for the post-crisis period and zero otherwise. We construct interaction terms for each of our five main hypotheses—liquidity, leverage, profitability, Tobin's Q, and size. Using our earlier regression findings, we identify the most significant measure for each hypothesis to serve as part of the interaction term. Our table presents the coefficients from the linear probability model and the odds ratios from the conditional logit, with T-statistics and the Wald test shown in parentheses, respectively. Statistical significance levels are represented by ***, **, and *, indicating significance at the 1%, 5%, and 10% levels, respectively.

	Financial Crisis		Covid-19	
Regression model / Variable	Linear Probability Model	Conditional Logit Model	Linear Probability Model	Conditional Logit Model
Intercept	0.112		-0.197	
	(1.204)		(-0.483)	
ACRISIS	-0.001	1.018*	-0.073	0.487*
	(-0.016)	(2.765)	(-1.018)	(3.401)
Liquidity				
Cash/Assets	0.037	0.748***	0.124***	0.447***
	(1.154)	(6.705)	(3.776)	(10.801)
Current ratio	-0.001***	1.005*	-0.000005	1.185
	(-2.169)	(3.325)	(-0.621)	(2.275)
Quick ratio	0.001**	0.995*	0.000	0.844
	(2.178)	(3.319)	(0.510)	(2.264)
Leverage				
Leverage ratio	0.011**	0.884**	0.022	0.889
	(1.975)	(5.415)	(1.162)	(0.809)
Long term debt ratio	-0.006	1.084	0.055**	0.680**
	(-0.244)	(1.472)	(2.333)	(5.928)
Profitability				
Return on Asset	0.001	0.937	-0.001	0.996
	(0.739)	(0.357)	(-0.056)	(0.002)
Gross margin	-0.000009****	1.001***	0.000***	1.055
	(-2.696)	(-3.497)	(-3.497)	(2.051)
Tobin's Q				
	0.000001	1.008	0.001	0.992
Market-to-book ratio	(0.320)	(1.964)	(0.640)	(0.281)
Size				
Sales	0.000007*	1.000***	0.000005***	1.000***
	(4.215)	(12.717)	(5.223)	(10.653)

Natural log of Total Assets	0.012	0.916	0.049***	0.697***
	(1.280)	(1.577)	(5.439)	(22.825)
Liquidity	0.044	1.717*	0.044	1.683*
(Cash/Assets * ACRISIS)	(0.961)	(3.005)	(0.581)	(3.491)
Leverage	-0.029	1.226*	0.086	0.574
(Long-term debt*ACRISIS)	(-0.848)	(2.831)	(1.511)	(2.134)
Profitability	0.001	1.018	-0.009	1.082
(ROA* ACRISIS)	(0.411)	(0.032)	(-0.478)	(0.311)
Valuation	0.000	1.026	0.003	0.977
(Tobin's Q *ACRISIS)	(-0.554)	(0.855)	(0.649)	(0.360)
Size	0.000	0.994	0.005	0.910*
(Natural log of Total Assets* ACRISIS)	(0.031)	(0.004)	(0.262)	(2.822)
Macroeconomic effects				
Inflation	-0.003	1.028	-0.048	1.469
	(-0.063)	(0.007)	(-0.597)	(0.412)
Interest Rate	0.005	0.961	0.004	0.963
	(0.462)	(0.243)	(0.320)	(0.165)
Volatility Index	0.005	0.965	-0.036	1.288
	(0.086)	(0.006)	(-0.407)	(0.145)
Market Return Volatility	0.006	0.956	0.065	0.600
	(0.298)	(0.099)	(0.586)	(0.374)
Number of observations	5190	5190	3282	3282
Time period	2002-2013	2002-2013	2014-2021	2014-2021

Table 10: M&A Conditional Logit Results Summary

	Financial Crisis			Covid-19		
	Split Sample Approach		Dummy Variable Approach	Split Sample Approach		Dummy Variable Approach
	Before	After		Before	After	
Liquidity	(-)	(+)	✓	(-)	(+)	✓
Leverage	(-)	(+)	✓	(-)	(+)	[*]
Profitability	(+)	(+)	✓	(+)	(-)	[*]
Size	(+)	(-)	[*]	(+)	(-)	✓
Tobin's Q	(-)	(!)	✓	(!)	(!)	✓

(!) insignificant results; (+) positive relationship; (-) negative relationship; ✓ Dummy variable approach and split sample approach yield consistent results; [*] Dummy variable approach and split sample approach yield inconsistent results.

Table 11: Conditional Logit Results – Buybacks conditional on the Probability of Being a Target amid the Financial Crisis

Model 1 incorporates firm-specific characteristics, along with the calculated probability of being a target based on Column 4, as defined in Table 7. Model 2 involves firm-specific characteristics, macroeconomic variables, and the calculated probability of being a target based on Column 5, as specified in Table 7. We report the obtained coefficients and Wald test statistics in between parentheses. Our pre-financial crisis period covers the years between 2002 and 2007, and our post-financial crisis period covers the years between 2008 and 2013 Statistical significance levels are represented by ***, **, and *, indicating significance at the 1%, 5%, and 10% levels, respectively. Both Models 1 and 2 show overall model significance at the 1% level.

	Actual Target =1			
Conditional Logit Regression	Model 1		Model 2	
	Pre-crisis	Post-crisis	Pre-crisis	Post-crisis
Intercept	1.844***	2.066	2.380**	1.338
	(59.696)	(171.111)	(4.087)	(0.650)
Calculated probability of being a target	0.715*	0.327	0.754*	0.103
(CPBT)	(3.442)	(2.392)	(3.444)	(0.188)
Liquidity				
Cash/Assets	-0.435	-0.460**	-0.433	-0.481**
	(2.201)	(5.381)	(2.259)	(4.962)
Current ratio	0.007***	0.047	0.006***	0.043
	(13.679)	(0.843)	(13.789)	(0.794)
Quick ratio	0.001	-0.045	0.001	-0.041
	(0.267)	(0.773)	(0.302)	(0.729)
Leverage				
Leverage ratio	2.148***	-0.177***	2.169***	-0.186***
	(10.413)	(13.718)	(10.565)	(13.883)
Long term debt ratio	1.114***	1.033***	1.132***	1.119***
	(13.679)	(21.176)	(13.976)	(21.635)
Profitability				
Return on Asset	-1.294***	-0.534***	-1.315***	-0.488***
	(28.755)	(21.930)	(29.103)	(18.376)
Gross margin	-0.002	0.011	-0.002	0.012
	(0.290)	(1.628)	(0.311)	(1.860)
Tobin's Q				
Market-to-book ratio	-0.154***	-0.003	-0.155***	0.002
	(36.226)	(0.029)	(36.437)	(0.19)
Size				
Sales	0.000	0.000	0.000	0.000
	(2.509)	(2.052)	(2.488)	(1.273)
Natural log of Total Assets	-0.112	-0.227***	-0.112	-0.216***

	(0.2.350)	(18.459)	(2.390)	(14.567)
Macroeconomic effects				
Inflation			0.072	-0.297
			(0.005)	(0.345)
Interest Rate			-0.244	0.007
			(0.229)	(0.009)
Volatility Index			-0.841	0.317
			(0.532)	(0.109)
Market Return Volatility			0.105	-0.091
			(0.065)	(0.338)
Overall Model Significance	***	***	***	***

Table 12: Conditional Logit Results – Buybacks conditional on the Probability of Being a Target amid Covid-19

Models 1 and 2 are previously defined under Table 7. The pre-Covid-19 period covers 2014-2019 and the post-Covid-19 period covers 2020-2021. We report the obtained coefficients and Wald test statistics in between parentheses. Both Models 1 and 2 during the pre-crisis period show overall significance at the 1% level. Following Covid-19, the overall models show significance at the 10% level. Statistical significance levels are represented by ***, **, and *, indicating significance at the 1%, 5%, and 10% levels, respectively.

	Actual Target =1			
Conditional Logit Regression	Model 1		Model 2	
	Pre-crisis	Post-crisis	Pre-crisis	Post-crisis
Intercept	2.422***	3.963	4.254	3.815***
	(160.120)	(15.622)	(2.011)	(10.810)
Calculated probability of being a target	0.157*	-0.407	0.106*	-0.847
(CPBT)	(3.562)	(0.520)	(3.263)	(1.891)
Liquidity				
Cash/Assets	0.545**	-1.226	0.544**	-1.387*
	(5.776)	(2.260)	(5.733)	(2.956)
Current ratio	0.056	0.025	0.056	0.032
	(2.111)	(0.069)	(2.078)	(0.117)
Quick ratio	-0.054	-0.065	-0.054	-0.061
	(2.009)	(1.085)	(1.976)	(1.002)
Leverage				
Leverage ratio	0.832**	-1.566*	0.825*	-1.538*
	(3.874)	(3.583)	(3.809)	(3.487)
Long term debt ratio	0.390**	0.351	0.418**	0.486
	(4.290)	(0.247)	(4.694)	(0.458)
Profitability				
Return on Asset	-0.553***	-0.981	-0.550***	-1.018
	(13.992)	(1.741)	(13.813)	(1.811)
Gross margin	-0.019**	0.307	-0.019**	0.328
	(4.219)	(0.800)	(4.391)	(0.902)
Tobin's Q				
Market-to-book ratio	-0.007	-0.022	-0.007	-0.010
	(1.137)	(0.045)	(1.165)	(0.010)
Size				
Sales	0.000	0.000	0.000	0.000

	(0.051)	(0.057)	(0.048)	(0.041)
Natural log of Total Assets	-0.309***	-0.625**	-0.305***	-0.578**
	(33.903)	(4.954)	(31.175)	(4.190)
Macroeconomic effects				
Inflation			0.270	0.126
			(0.280)	(0.061)
Interest Rate			0.033	-0.025
			(0.227)	(0.010)
Volatility Index			-0.183	-0.056
			(0.045)	(0.210)
Market Return Volatility			-0.452	0.203
			(0.382)	(0.055)
Overall Model Significance	***	*	***	*

Table 13: Buyback Conditional Logit Results- Dummy Variable Approach

Table 13 presents the conditional logit results using the dummy variable approach. The dummy variable « ACRISIS » indicates one if the deal occurred post-crisis and zero otherwise. We display the odds ratios derived from the conditional logit, with Wald tests in parentheses. Statistical significance levels are represented by ***, **, and *, indicating significance at the 1%, 5%, and 10% levels, respectively.

Variable Name	Financial Crisis	Covid-19
ACRISIS	0.862	0.642
	(1.177)	(2.046)
Calculated probability of being a target	2.195**	1.109
(CPBT)	(4.601)	(0.252)
Defensive (CPBT*ACRISIS)	0.470*	0.354*
	(3.333)	(3.180)
Liquidity		
Cash/Assets	0.576***	0.542***
	(10.939)	(7.752)
Current ratio	1.005**	1.056*
	(3.928)	(2.793)
Quick ratio	0.997	0.948
	(1.055)	(2.651)
Leverage		
Leverage ratio	0.857***	1.890
	(12.979)	(2.678)
Long term debt ratio	2.998***	1.522**
	(35.305)	(5.107)
Profitability		
Return on Asset	0.509***	0.564***
	(37.368)	(15.545)
Gross margin	1.000	1.020**
	(0.002)	(4.637)
Tobin's Q		
	0.977**	0.993
Market-to-book ratio	(5.112)	(1.138)
Size		
Sales	1.000*	1.000
	(3.242)	(0.040)
Natural log of Total Assets	0.836***	0.727***
	(16.555)	(35.880)

Macroeconomic effects		
Inflation	0.902	1.244
	(0.115)	(0.196)
Interest Rate	0.994	1.032
	(0.010)	(0.201)
Volatility Index	0.849	1.027
	(0.154)	(0.001)
Market Return Volatility	0.983	0.699
	(0.024)	(0.271)
Time period	2002-2013	2014-2021
Number of observations	7086	4518

Table 14: Conditional Logit Results-Takeover Likelihood conditional on the Probability of Engaging in Buybacks

We report conditional logit coefficients, with Wald test statistics between parentheses. Statistical significance levels are represented by ***, **, and *, indicating significance at the 1%, 5%, and 10% levels, respectively.

Actual Target =1	Buyback subsample				M&A subsample			
	Before the financial crisis	After the financial crisis	Before Covid-19	After Covid-19	Before the financial crisis	After the financial crisis	Before Covid-19	After Covid-19
Intercept	2.386**	1.332	4.289	4.052***	0.1268	0.2067**	0.5835	0.1967
	(4.122)	(0.645)	(2.045)	(12.720)	(1.407)	(6.047)	(2.104)	(2.341)
Liquidity								
Cash/Assets	-0.407	-0.485**	-0.542**	-0.169	-0.0156	0.0542**	-0.0773***	-0.0535
	(2.014)	(5.050)	(5.693)	(1.144)	(0.429)	(5.488)	(7.031)	(0.692)
Current ratio	0.006	0.044	0.057	0.022	0.0071	0.0003	0.0131	0.0485
	(0.642)	(0.812)	(2.247)	(0.049)	(0.00472)	(0.842)	(1.342)	(1.461)
Quick ratio	0.002	-0.042	-0.056	-0.069	-0.0071	-0.0003	-0.0121	-0.0484
	(0.565)	(0.747)	(2.1441)	(1.238)	(0.470)	(0.692)	(1.114)	(1.459)
Leverage								
Leverage ratio	2.206***	-0.189***	0.828*	-1.580	-0.0026	0.0284**	0.0114	-0.1309
	(10.817)	(14.478)	(3.845)	(1.633)	(0.94)	(4.751)	(0.338)	(2.401)
Long term debt ratio	1.056***	0.164***	0.397**	0.229	-0.0192	0.0307	-0.0462***	0.0987**
	(12.780)	(28.504)	(4.455)	(0.119)	(0.930)	(1.193)	(6.740)	(6.508)
Profitability								
Return on Asset	-1.304***	-0.486***	-0.552***	-0.981	-0.0007	-0.0048	0.0083	0.0082
	(29.111)	(18.323)	(13.9099)	(1.750)	(0.051)	(0.617)	(0.672)	(0.305)
Gross margin	-0.002	0.011	0.020***	0.298	0.0042**	0.0001	0.0005	0.0134**
	(0.283)	(1.851)	(4.425)	(0.748)	(5.920)	(0.440)	(1.793)	(4.477)
Tobin's Q								
Market-to-book ratio	-0.154***	0.002	-0.007	-0.019	0.0012	0.0030	-0.0006	0.0016

	(35.990)	(0.022)	(1.188)	(0.034)	(0.367)	(1.809)	(0.166)	(0.084)
Size								
Sales	0.000	0.000	0.000	0.000	0.0000***	0.0000	0.000***	0.000
	(1.476)	(1.268)	(0.030)	(0.071)	(22.586)	(1.128)	(9.538)	(1.441)
Natural log of Total Assets	-0.068	-0.207***	-0.311***	-0.674**	0.0071	-0.0183**	-0.0312***	-0.0354
	(0.983)	(15.334)	(33.957)	(6.266)	(0.803)	(5.715)	(9.575)	(1.989)
Calculated probability of engaging in a buyback (CPEB)	-	-	-	-	1.501**	1.025	1.269	3.208
					(3.934)	(0.476)	(0.448)	(0.211)
Macroeconomic effects								
Inflation	0.061	-0.296	0.269	0.021	0.0063	0.0036	0.0569	0.00153
	(0.003)	(0.342)	(0.277)	(0.563)	(0.005)	(0.062)	(0.760)	(0.022)
Interest Rate	-0.255	0.007	0.034	0.000	-0.0187	-0.0029	-0.0033	-0.0198
	(0.250)	(0.009)	(0.231)	(0.000)	(0.100)	(0.124)	(0.123)	(1.086)
Volatility Index	-0.870	0.313	-0.174	0.145	-0.0134	-0.0103	-0.0370	-0.0125
	(0.570)	(0.107)	(0.041)	(0.406)	(0.012)	(0.018)	(0.120)	(0.569)
Market Return Volatility	0.119	-0.091	-0.445	-0.563	-0.0012	-0.0021	-0.0828	-0.0096
	(0.084)	(0.333)	(0.369)	(0.005)	(0.001)	(0.015)	(0.762)	(0.541)
Overall Model Significance	***	***	***	***	***	***	***	***
Time period	2002-2007	2008-2013	2014-2019	2020-2021	2002-2007	2008-2013	2014-2019	2020-2021
Number of observations	2490	4596	4182	336	2430	2760	2646	636

Table 15: Conditional Logit Results-Testing the Hypothesis "Crises are the same"

For the ease of interpretation, we particularly focus on the influence of statistically significant coefficients per category, without distinguishing between the results obtained for each individual measure. We have five categories, namely liquidity, leverage, profitability, Tobin's Q, and Size. We report conditional logit coefficients, with Wald test statistics between parentheses. Statistical significance levels are represented by ***, **, and *, indicating significance at the 1%, 5%, and 10% levels, respectively. Our models are significant at the 1% level.

	Actual Target =1			
Conditional Logit Regression	Pre-crisis		Post-crisis	
	M&A sample	Buyback sample	M&A sample	Buyback sample
Intercept	0.226***	0.938	0.2111*	11.839***
	(14.952)	(0.963)	(6.099)	(13.190)
Liquidity				
Cash/Assets	-0.0491***	-0.262	-0.0710***	-3.615***
	(8.693)	(1.146)	(11.822)	(11.721)
Current ratio	0.0103	-0.002	0.0005	0.065*
	(1.792)	(0.399)	(1.994)	(2.858)
Quick ratio	-0.0103	0.005	-0.0004	-0.058
	(1.792)	(1.645)	(1.695)	(2.335)
Leverage				
Leverage ratio	0.0005	1.170***	-0.0377***	-0.394
	(0.004)	(10.319)	(7.200)	(1.649)
Long term debt ratio	-0.0247**	0.769***	0.0096	0.744***
	(4.104)	(19.387)	(0.282)	(9.610)
Profitability				
Return on Asset	-0.0013	-0.728***	-0.0057	-0.754***
	(0.102)	(30.910)	(2.264)	(30.210)
Gross margin	0.0006*	-0.003	0.0001	0.017*
	(3.205)	(0.9955)	(0.626)	(3.216)
Tobin's Q				
Market-to-book ratio	0.0001	-0.013**	0.0026	0.115***
	(0.008)	(6.519)	(2.492)	(7.525)
Size				
Sales	0.0000***	0.000	0.000*	0.000
	(30.689)	(0.730)	(3.193)	(2.147)

Natural log of Total Assets	-0.0159***	-0.100	-0.0221***	-1.201***
	(9.125)	(2.263)	(12.307)	(13.170)
Calculated probability of being a target	-	6.507*	-	-45.859***
(CPBT)		(3.604)		(9.307)
Macroeconomic effects				
Inflation	-0.0059	0.028	-0.0062	-0.238
	(0.145)	(0.042)	(0.184)	(2.098)
Interest Rate	-0.0018	0.019	-0.0025	-0.123*
	(0.045)	(0.087)	(0.092)	(2.719)
Volatility Index	-0.0307	0.007	0.000	-0.138
	(0.734)	(0.000)	(0.000)	(0.047)
Market Return Volatility	0.0089	-0.089	0.0002	0.005
	(0.272)	(0.315)	(0.000)	(0.003)
Time period	2002-2007 & 2014-2019		2008-2013 & 2020-2021	
Number of observations	5076	6672	3396	4932
Overall Model Significance	***	***	***	***

Table 16: Conditional Logit Results- Pseudo-Crisis Periods

Table 16 displays conditional logit coefficients, with Wald test statistics between parentheses. Statistical significance levels are represented by ***, **, and *, indicating significance at the 1%, 5%, and 10% levels, respectively.

Actual Target =1				
Conditional Logit Regression	Pseudo pre-crisis		Pseudo post-crisis	
	M&A sample	Buyback sample	M&A sample	Buyback sample
Intercept	0.241***	1.7188**	0.206***	9.029***
	(21.372)	(4.857)	(10.358)	(11.709)
Liquidity				
Cash/Assets	-0.0607***	-0.420*	-0.057***	-2.297***
	(12.642)	(3.663)	(7.499)	(10.785)
Current ratio	0.013	0.000	0.001*	0.071*
	(2.311)	(0.015)	(3.096)	(3.334)
Quick ratio	-0.018	0.003	-0.001***	-0.069*
	(2.135)	(0.562)	(6.854)	(3.183)
Leverage				
Leverage ratio	-0.0022	1.197***	-0.031***	-0.332***
	(0.087)	(10.735)	(6.167)	(12.376)
Long term debt ratio	-0.0189	0.670***	-0.0004	1.152***
	(2.363)	(17.227)	(0.000)	(33.082)
Profitability				
Return on Asset	-0.0039	-0.720***	-0.0047	-0.690***
	(0.504)	(30.290)	(1.595)	(30.164)
Gross margin	0.005	0.000	0.0001	0.015
	(2.507)	(0.030)	(1.686)	(2.983)
Tobin's Q				
Market-to-book ratio	0.000	-0.012**	0.0022	0.067**
	(0.000)	(5.843)	(1.973)	(5.037)
Size				
Sales	0.000	0.000	0.000***	0.000***
	(0.000)	(0.775)	(15.962)	(2.088)
Natural log of Total Assets	-0.0187	-0.149***	-0.0175	-0.774***
	(1.589)	(6.784)	(1.867)	(12.947)
Calculated probability of being a target (CPBT)	-	2.781	-	-33.186
		(1.565)		(1.960)

Macroeconomic effects				
Inflation	-0.0019	-0.011	-0.0046	-0.108
	(0.035)	(0.006)	(0.148)	(0.545)
Interest Rate	-0.0042	0.023	-0.0026	-0.093
	(0.526)	(0.127)	(0.144)	(1.706)
Volatility Index	-0.0241	-0.130	-0.0074	-0.377
	(0.520)	(0.140)	(0.032)	(0.343)
Market Return Volatility	0.0005	-0.023	0.0051	0.166
	(0.003)	(0.023)	(0.164)	(2.078)
Number of observations	5076	6672	3396	4932
Overall Model Significance	***	***	***	***

APPENDIX A

The dataset covers a 20-year period between 2002 and 2021. We extract deal information from the Refinitiv mergers and acquisitions database. Corporate accounting data is sourced from Compustat on the Wharton Research Data Services server. All firm characteristics are measured as of the fiscal year-end before the deal announcement.

We obtain macroeconomic variables from a combination of providers, namely the Chicago Board Options Exchange (CBOE), the Center for Research in Security Prices (CRSP), and the Federal Reserve Bank of St. Louis (FRED).

We define our variables as follows:

Variable	Study
Firm Specific Variables	
o Cash/Assets = Cash and Cash Equivalents/Total Assets.	Fairhurst & Greene (2022)
o Current ratio =Current Assets/Current Liabilities.	Adelaja et al. (1999)
o Gross Margin = (Sales – Cost of Goods Sold) / Sales.	Leahy (2012)
o Leverage ratio = (Debt in Current Liabilities + Long-Term Debt) /Total Assets.	Fairhurst & Greene (2022)
o Long Term Debt Ratio = Long Term Debt / Total Assets.	Adelaja et al. (1999)
o Quick ratio = (Current Assets - Inventories) / Current Liabilities.	Adelaja et al. (1999)
o Return on Assets = Net Income / Total Assets.	Fairhurst & Greene (2022)
o Sales = Net Sales/Turnover.	Fairhurst & Greene (2022)
o Natural log of Total Assets = log (Total Assets)	Beccalli & Frantz (2013)
o Tobin's Q = Market Value of Assets/Total Assets = (Total Assets – Common Book Equity + Stock Price * Common Shares Outstanding) /Total Assets.	Fairhurst & Greene (2022)
Deal Specific Variables	
o Cash = A dummy variable that takes the value of one if the deal has been completely paid in cash and zero otherwise.	Fairhurst & Greene (2022)

o Horizontal = A dummy variable that takes the value of one if Refinitiv indicates that the bidder and target operate within the same industry and zero otherwise.	Fairhurst & Greene (2022)
o Hostile = A dummy variable that takes the value of one if Refinitiv indicates that a deal is hostile and zero otherwise.	Fairhurst & Greene (2022)
o Public Bidder = A dummy variable that takes the value of one if the bidder is a publicly traded company and zero otherwise.	Fairhurst & Greene (2022)
o Tender= A dummy variable that takes the value of one if Refinitiv indicates that a deal is a tender offer and zero otherwise.	Fairhurst & Greene (2022)
Macroeconomic Variables	
o Volatility Index (VI) =log (Annual average volatility index)	Kuwornu (2012)
o Interest Rate (IR) = log (3-month Treasury bill)	Kuwornu (2012)
o Market Return Volatility (MRV)=log (standard deviation of the annual market return)	Kuwornu (2012)
o Inflation (INF)= log (Consumer Price Index)	Kuwornu (2012)

APPENDIX B

Figure A: Flowchart-Data Collection Procedure

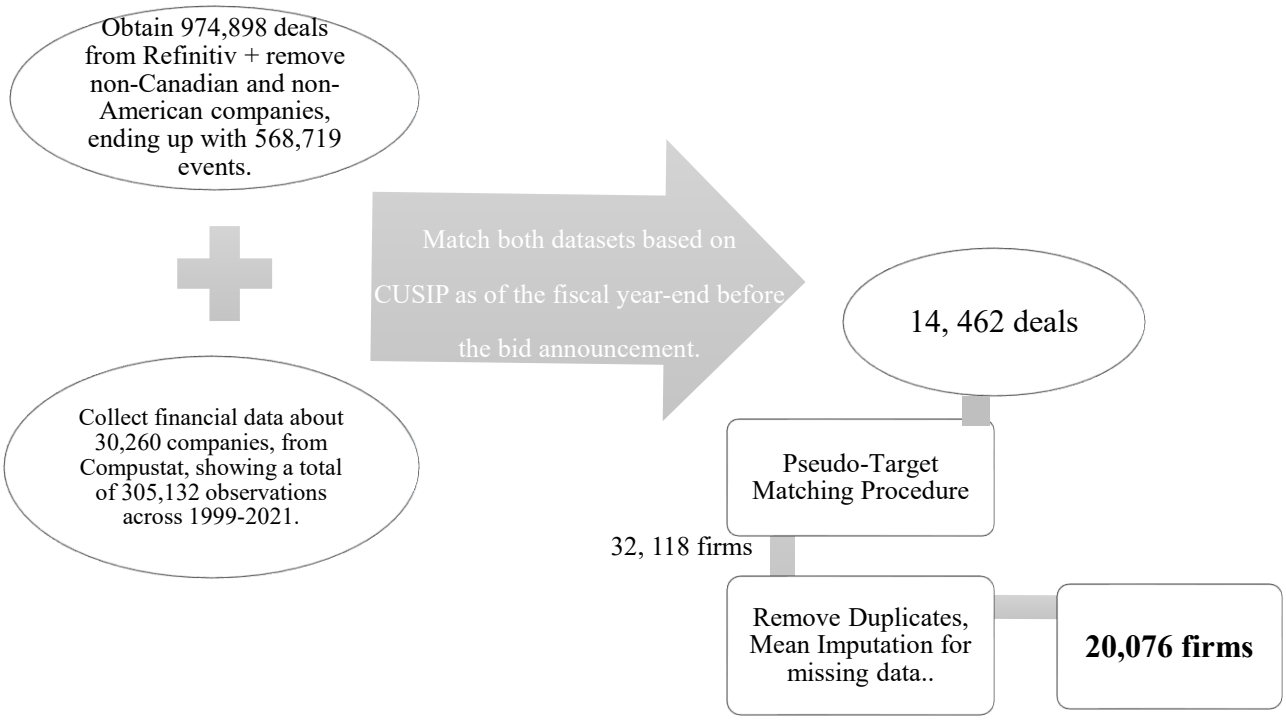


Table A: Descriptive statistics- “All crises are the same” hypothesis

Table A shows that the M&A and the buyback subsamples include 8472 and 11604 companies, respectively. As explained in Section 6.2, we merge the pre-crisis deals together and the post-crisis deals together. The pre-crisis period covers deals between 2002-2007 and 2014-2019, while the pos-crisis period covers deals between 2008-2013 and 2020-2021. We find that 5076 (6672) companies involved in mergers and acquisitions (buybacks) are included in the pre-crisis period, and the other 3396 (4932) are included in the post-crisis period.

	M&A subsample	**Buyback subsample**
Pre-crisis	5076	6672
Post-crisis	3396	4932
Total	8472	11604

Table B: Correlation Matrix

This panel presents correlations between our independent variables. Refer to Table 1 and Appendix A for variables' definitions.

	LTD	QR	ROA	CA	GM	VI	MRV	SALE	INF	MBK	LNTA	IR	LEV	CR
LTD	1.000													
QR	-0.021	1.000												
ROA	-0.004	0.001	1.000											
CA	0.009	0.201	0.000	1.000										
GM	-0.009	0.000	0.015	0.000	1.000									
VI	-0.007	-0.003	0.000	-0.013	-0.008	1.000								
MRV	-0.019	0.021	0.008	-0.002	-0.003	0.058	1.000							
SALE	0.088	0.152	0.001	0.003	0.004	-0.011	0.058	1.000						
INF	0.018	-0.012	-0.007	0.005	0.010	-0.215	-0.112	-0.031	1.000					
MBK	0.013	0.000	-0.278	0.000	0.000	-0.013	0.001	0.007	-0.008	1.000				
LNTA	-0.186	0.035	0.004	-0.003	-0.027	-0.008	-0.020	0.396	0.028	-0.005	1.000			
IR	-0.051	-0.011	-0002	-0.011	-0005	0.407	0.094	-0.027	-0.335	-0.009	0.021	1.000		
LEV	-0.536	0.028	0.008	-0.005	0.003	0.003	-0.006	-0.052	0.006	-0.012	0.161	0.006	1.000	
CR	0.021	0.784	-0.001	0.295	0.000	0.003	-0.021	-0.153	0.013	0.000	-0.034	0.011	-0.028	1.000