What do firms do when M&A attempts fail? About 10 percent of the approximately 450 large M&A deals announced around the world, in any given year, fail to get executed (McKinsey 2019).[1] The cost of deal termination can be quite severe, as it often elicits negative shareholder reactions and results in damage to the firm's reputation. In addition, the party failing to satisfy closing conditions is required to pay a hefty termination fee typically in the range of 1 to 4 percent of the value of the transaction (Officer 2003). Despite the prevalence and severity of M&A deal termination, the consequence of deal termination on corporate strategy is largely unexplored, missing out on a significant phenomenon in the study of M&A. Existing research that considers M&A deal termination has focused on its antecedents when a deal completion is a proxy for M&A performance (e.g., Chakrabarti and Mitchell 2016; Dikova *et al.* 2010, Luo 2005, Muehlfeld *et al.* 2012), the determinants of termination fees in M&A contract structures (Officer 2003, Reuer 2010), and its utility as an empirical strategy to use terminated deals as a comparison group in estimating the effect of completed M&As (e.g., Seru 2014).

When M&A deals go awry, pursuing another target may not be an attractive option when the first-best target is no longer available. Alternatively, firms may resort to strategic alliance as a substitute for the failed M&A attempt as both are key strategic vehicles through which firms grow or source new resources and capabilities (Capron and Mitchell 2009). Indeed, the decision to engage in acquisitions and/or alliances has garnered significant research attention in the corporate strategy literature (Villalonga and McGahan 2005, Wang and Zajac 2007, Yin and Shanley 2008). Strategy literature has long recognized that acquisitions and alliances are substitutes and considered them as alternatives to one another (Capron and Mitchell 2012, Yin and Shanley 2008) along a continuum of governance choices (Villalonga and McGahan 2005, Williamson 1991). Although scholars have developed contingencies that determine the *choice* between acquisition and alliance (Capron and Mitchell 2012, Dyer *et al.* 2004), it remains largely unknown how the *switch* from one mode to another occurs when one attempt fails.

This omission is problematic because acquisition and alliance are not often presented to managers as a menu of options firms can choose from. For example, in a survey of 200 U.S. company executives, Dyer and colleagues (2004) found that firms often do not compare acquisitions and alliances in choosing a vehicle for

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[1] Large deals defined as deals over 1 billion euros. Similarly, according to recent data from S&P Global, 374 (15.6 percent) out of 2,397 announced acquisition attempts targeted towards Russell 3000 firms between 2001 and 2017 fail to close (Oyeniyi and Tortoriello 2018).

growth. While the majority of the managers recognized that acquisitions and alliances can be used as alternatives, only a fraction of them considered alliances when the firm executed its acquisition (Dyer *et al.* 2004). One reason for the discrepancy between what managers know and what they practice is that the choice between acquisition and alliance is not conducted in a vacuum. More often than not, firms that have already made a choice may have to reevaluate and recalibrate their strategy as the strategic landscape changes. This is particularly the case for acquisitions, given the high risk of failure during lengthy and costly due diligence and negotiation processes (Chakrabarti and Mitchell 2016). Firms may therefore search for an alternative and switch to other modes of corporate strategy in order to achieve the same strategic goal to grow and/or fill capability gaps the firm is facing (Ren *et al.* 2022).

In this paper, we aim to examine the underdeveloped notion of switch in corporate strategy transactions.[2] In contrast to choice, which is decision-making when presented with multiple alternatives, switching implies a shift from one mode to another by abandoning the previous mode (e.g., Ren *et al.* 2022). Accordingly, we focus on switching from acquisition to alliance once the acquisition choice is abandoned. Specifically, we examine whether and when firms switch to alliance (and not to internal development) after their initial M&A attempt fails due to deal termination. Thus, we ask the research question, *"Conditional on M&A deal termination, under what conditions do firms switch to alliance?"*

To address this question, we draw on the concept of problemistic search and theorize the switch in corporate strategy transaction mode. We argue that M&A deal termination is an ideal setting to assess this because deal termination is considered a strategic failure that triggers problemistic search that in turn makes a firm recalibrate its sourcing strategy while the strategic goal remains unattained. Many contingencies that firms commonly consider in the choice between alliances and acquisitions may not apply when a switching decision is being made after deal termination. Because deal termination often results in a negative reaction from shareholders, it invokes problemistic search to pivot toward one of the key alternative modes of corporate strategy transactions: strategic alliance. We compare different motives of M&A to theorize which are more susceptible to switch to alliance or to another M&A (Capron and Mitchell 2009, Chatterjee 1986, Feldman and

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[2] Scholars have recently begun to explore the notion of switch. For example, Ren *et al.* (2022) investigated persist-or-switch decisions between alliance and internally building in new product introductions.

Hernandez 2021, Rabier 2017, Tripsas 1997). Drawing on capability-based perspectives of M&A, we argue that acquisitions that are intended to fill technological capability gaps are more likely to trigger a search for an alternative mode after a deal termination (Capron and Mitchell 2009, Folta *et al.* 2016, Karim and Mitchell 2000). Drawing on the insights of problemistic search theory, we expect the termination-triggered switch to be stronger when the performance shortfall is salient. In addition, we posit that firms engage in local search more often which favors switching to alliances rather than internally developing capabilities in-house.

We analyze and test the hypotheses using a sample of 1,009 M&A deal terminations among publicly-traded U.S. firms between 1984 and 2019. We examine regulatory filings and press releases made available both at the time of initial M&A agreements and deal terminations to identify M&A attempts motivated by the acquisition of technological capabilities. Using data on subsequent corporate strategy transactions in the year after deal terminations, we find that in response to a failed technological M&A attempt, firms are more likely to make a switch to alliance within the acquisition target's industry when compared to failed attempts driven by other motives. Consistent with our theory of problemistic search leading to switching, we find that the switch to alliance is stronger when the stock market reaction to termination is negative. We also find evidence that firms are more likely to switch to an alliance than to internally building technological capabilities. We address the potential endogeneity issue related to the difference between terminated deals and completed deals by using a two-stage Heckman estimation and a two-stage least squares (2SLS) estimator where the first stage sample includes both completed and terminated deals. We use change in stock market realized volatility (RV) as an instrumental variable in the first stage equations, where we find that an increase in the market volatility during the negotiation period after deal announcement increases the likelihood of deal termination.

Our results provide strong evidence for the role of problemistic search in switching from acquisition to alliance after the initial attempt fails. Thus, this paper adds nuance to our understanding of the choice between acquisition and alliance by presenting a behavioral approach to acquisition and alliance that focuses on problemistic search (Cyert and March 1963, Iyer and Miller 2008). Despite being depicted as substitutes (Capron and Mitchell 2012, Yin and Shanley 2008), we have limited understanding of how firms use acquisition and alliance, or more specifically, switch from one to the other, in contextual contingencies when one option is limited in availability. We argue that M&A termination is an ideal setting to examine not only problemistic search

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but also substitution because deal termination provides an opportunity for us to observe whether and how firms reconsider the mode of transaction while holding the strategic goal relatively constant.

Our results also contribute to research on M&A more broadly. Despite the frequency of deal termination, extant work analyzing M&A outcomes focuses on completed acquisitions and largely overlooks the consequences of failed acquisition attempts. This paper is one of the few attempts to systematically explore the extent to which an M&A termination impacts the firm's strategic choice. While it is common in the M&A literature to use the sample of realized transactions to explore variations in M&A deals, this fails to account for differences between successful and unsuccessful M&A deals. This paper advances the literature by using a sample of all announced deals while accounting for selection into deal termination to explore the strategic implications of unrealized M&A deals. Our findings highlight the importance of examining both successful and failed M&A attempts.

THEORY & HYPOTHESES

Choice between Acquisition and Alliance

One of the key topics in corporate strategy is the corporate strategy decision of whether to engage in acquisition and/or alliance (e.g., Villalonga and McGahan 2005, Yin and Shanley 2008) following the recognition that both are key drivers of growth (Lamont and Anderson 1985) as well as means to bridge capability gaps (Capron and Mitchell 2009). The choice between acquisition and alliance has long been understood as an organizational governance decision along the market-hierarchy continuum; where acquisition represents a hierarchical governance structure at one end while alliance is located somewhere in the middle (Villalonga and McGahan 2005, Wang and Zajac 2007, Williamson 1975, 1991). More recently, scholars have also generated frameworks that specify the circumstances under which firms prefer one mode over others as strategic substitutes for one another (e.g., Capron and Mitchell 2012, Dyer *et al.* 2004). These works have noted that the choice between acquisition and alliance should depend largely on factors that affect relative attractiveness which may result in the firm favoring alliances over acquisitions: flexibility or optionality (Folta 1998, Gulati *et al.* 2009, Kogut 1991) and information asymmetry that increases the risk of overpayment (Balakrishnan and Koza 1993, Coff 1999, McCann *et al.* 2016, Vanhaverbeke *et al.* 2002). Despite requiring more resource commitment, acquisition may be favored when the needs for integration and coordination are high between the acquirer and the target (Capron and

Mitchell 2012). A full (or majority) ownership of the target allows the firm to fully exploit the target's resources and capabilities (Yin and Shanley 2008).

While this research focuses on one-off choices that firms make, more recent works have taken a more dynamic perspective in exploring the sequence and complementary use of corporate strategy transactions (Feldman 2020, Shi *et al.* 2012). Prior research has also examined the strategic implications of using a series of transactions in a certain sequence. For example, alliance can be used as a tool to gather information about a particular partner (Porrini 2004, Wang and Zajac 2007) and to accumulate partner-specific experience (Gulati *et al.* 2009, Mellewigt *et al.* 2017) which can be useful in the future acquisition of the partner and its acquisition performance (Zaheer *et al.* 2010). Similarly, alliance may precede acquisition as it has a real option value not only for the specific partner but also for the acquisitions of other targets (Folta 1998, Folta and Miller 2002, Vassolo *et al.* 2004). Research has also recognized a complementary use of acquisition and alliance where technological acquisitions are likely to be paired with functional alliances (Nary 2019). Given these findings, scholars are increasingly realizing the importance of managing a "portfolio" of interfirm relationships and developing the capabilities to use both modes (Kale *et al.* 2009, Lamont and Anderson 1985, Lungeanu *et al.* 2016).

Other research has found evidence of path dependency in using a particular transaction mode as opposed to employing multiple transaction modes (Arikan and McGahan 2010). Repeated use of the same mode of transaction can result in incremental accumulation of capabilities through organizational learning (Hagedoorn and Duysters 2002, Haleblian and Finkelstein 1999, Vermeulen and Barkema, 2001) which, in turn, results in repeated self-selection of the same mode (Anand *et al.* 2016). While some capabilities overlap and experience spillover from one mode to another (Zollo and Reuer 2010), others are specifically relevant to either acquisition or alliance (Arikan and McGahan 2010, Wang and Zajac 2007). Thus, prior history of acquisition or alliance may reinforce path dependency toward using a certain transaction mode.

These two conflicting theoretical predictions and mixed empirical results suggest that how firms sequence corporate strategy transactions may hinge on the contextual conditions. In this paper, we pay particular attention to failed acquisition attempts (i.e., M&A deal terminations) as an important contextual contingency which is a notable omission in prior studies, and explore the role it plays in the subsequent decision to choose between acquisition and alliance.

Exploring the use of corporate strategy transactions in the context of M&A deal termination departs from the prior literature and has two advantages over the existing models of the "borrow or buy" decisions. First, by focusing on post-deal termination transactions, we include failed acquisition attempts both in accounting for prior history of mode choices as well as in the analysis of transaction sequence. Prior research often omits failed acquisition attempts by using the sample of realized transactions which may result in biases when analyzing transaction sequences. Second, analyzing subsequent transactions after a failed acquisition attempt allows for examining the mode choice while holding the initial strategic goal relatively constant. That is, we study whether firms *switch* to alliance while the strategic goal for the acquisition attempt is not met. This is distinct from analyzing *i)* a one-off *choice* between acquisition and alliance to fulfill a single strategic goal (e.g., growth or filling a capability gap) and *ii)* a transaction sequence where each transaction serves a distinct strategic goal. In the following section, we turn to the details of the context of M&A deal termination to explore whether firms switch to an alternative mode or use the same mode by seeking another M&A target.

M&A Deal Termination

An M&A transaction that involves publicly-traded firms in the U.S. consists of two takeover phases: the private and public (Boone and Mulherin 2007). After an acquirer searches and screens a target, the private takeover phase begins as the acquirer indicates preliminary interest in the target (Muehlfeld *et al.* 2012) and subsequently ends when the two parties reach a preliminary M&A agreement. Next, the public takeover phase is initiated when a public announcement of the agreement is made via press release from both parties as well as filing paperwork such as Form 8-K with the SEC for a publicly-traded firm. Also during this phase, the acquirer conducts due diligence, the target seeks shareholder approval, and the two parties plan for post-merger integration (Boone and Mulherin 2007, Chakrabarti and Mitchell 2016, Dikova *et al.* 2010, Luo 2005). Assuming all regulatory conditions are met, this usually takes several months to over a year until the transaction is finalized by either closing or terminating the deal.

Announced M&A deals fail to close for a variety of reasons. The most common cause of deal termination is the target's refusal of the offer (Boone and Mulherin 2007), which often occurs when the target's management and shareholders believe that the deal undervalues the firm. Similarly, an acquirer may lose to another bidder if competing offers emerge. Conversely, there are several situations in which deal terminations

can be attributed to the acquirer. These situations may include *i)* the acquirer's shareholders become skeptical during the process, *ii)* acquirers fail to secure financing, *iii)* acquirers abandon deals after unexpected adverse events causing drops in the targets' stock price, and *iv)* acquirers withdraw the initial offer when new information about the target's problem is revealed during the due diligence process. Some deals are mutually terminated by both parties due to unsuccessful negotiations and changed circumstances such as material changes in the target's operation due to macro-economic and industry conditions. Lastly, because an M&A deal is contingent upon regulatory approvals, a deal can be terminated due to anti-trust, national security, or legal concerns.

Deal termination comes with a hefty cost for the bidding firm. A majority of M&A agreements include termination provisions that require a sizable reverse-termination fee for the potential acquirer (Officer 2003). Termination fees, which are intended to compensate for the expenses of the willing party when the unwilling party decides not to close the deal (i.e., a breach of contract), usually is in the range of 1 to 4 percent of the deal value of the transaction. Deal termination also incurs costs associated with negative stock market reaction (Liu and McConnell 2013, Roosenboom *et al.* 2014) and has a negative impact on firm reputation as it could send a signal that the firm lacks acquisition capabilities and/or has flaws in acquisition routines (Luo 2005, Muehlfeld *et al.* 2012). Future, a public announcement of an M&A agreement reveals information about the acquirer's strategy to its rival (Officer 2003) so a termination would result in a delayed execution of the strategy. There are also costs that become at least partially irreversible and sunk such as advisory expenses (e.g., bankers, consultants, and lawyers) and diverted managerial attention (Harrison *et al.* 1991).

The growing body of work in the M&A literature has considered M&A deal termination. Viewing deal termination/completion as an intermediate goal in the M&A process, scholars have used it as a measure of M&A performance (Chakrabarti and Mitchell 2016, Dikova *et al.* 2010, Luo 2005, Muehlfeld *et al.* 2012, Skaife and Wangerin 2013, Zhou *et al.* 2016). While extant work focuses on determinants of deal termination, scholars have largely overlooked the consequences of failed acquisition attempts (Wong and O'Sullivan 2001). One exception is Muehlfeld *et al.* (2012) in which the authors take the organizational learning perspective to examine the relationship between the past deal termination experience and the subsequent M&A deal completion. Our study, while similar to Muehlfeld *et al.* (2012) in drawing on the behavioral perspective in the context of M&A, departs from it by exploring the use of a different corporate transaction modes upon deal termination.

Problemistic Search upon Deal Termination

We propose that upon deal termination, which is a costly reversal of the firm's initiative, firms may be pushed to recalibrate their mode choice for growth or for external sourcing. Under a behavioral assumption, we theorize that firms operate under bounded rationality with some degree of cost-benefit analysis when choosing their transaction mode (Cyert and March 1963). Extant work on the choice between acquisition and alliance assumes that firms are presented with a menu of options firms can choose from. Thus, as rational decision-makers, managers make an optimal choice by weighing the costs and benefits of each option considering multiple contingencies (Capron and Mitchell 2012). Rather, we follow the behavioral tradition that views organizational decision-making as "a process of search to identify alternative actions" (Posen *et al.* 2018: 7). This view is shared by many recent works focusing on the behavioral aspect of acquisition, mostly focusing on the organizational learning mechanism (Haleblian and Finkelstein 1999, Haleblian *et al.* 2006, Lee *et al.* 2021, Vermeulen and Barkema 2001, Zollo and Singh 2004) but not so much using the notion of problemistic search (Chang 1996, Iyer and Miller 2008, Ren *et al.* 2022, for reviews, see Barkema and Schijven 2008, Devers *et al.* 2020).

Specifically, we argue that a failed acquisition attempt triggers problemistic search for a mode of transaction that achieves the strategic goal. Problemistic search is a process "stimulated by a specific problem and is directed toward finding a solution to that problem" (Cyert and March, 1963: 121). M&A deal termination is an excellent context to apply problemistic search as it represents *i)* a significant strategic failure with a negative performance implication that requires an alternative strategic decision (Chakrabarti and Mitchell 2016, Dikova *et al.* 2010), *ii)* a relatively random discrete event that triggers a search, while *iii)* the underlying strategical goal still remaining. This provides opportunities to investigate the problem-triggered-search that leads to switching while, holding the strategic goal relatively constant.

A deal termination is a "problem" for a bidding firm not only because it incurs significant costs but also because the reversal of the firm's initial strategy requires yet another decision to be made in reaction to the deal termination. The "problem" becomes a "failure" when it receives negative performance feedback, especially when the termination news is met with negative shareholder reaction (Liu and McConnell 2013, Roosenboom *et al.* 2014). We note, however, that a deal termination is not always a failure; the benefit of the deal abandonment can exceed the cost (Dikova *et al.* 2010) or the feedback on the news could be favorable. However, the

termination event still elicits a problem requiring a solution by either pursuing the same strategic goal or abandoning the strategy.

When an M&A attempt fails and the deal is canceled, firms can decide on a subsequent course of action: discarding the strategy to grow or to bridge a capability gap altogether (i.e., "no transaction") or internally building the desired capability through investments in R&D, acquisition of human capital, or incurring capital expenditure towards physical assets (i.e., "build"). Alternatively, firms could also decide to pursue another M&A with a different target (i.e., "buy"). Since the firm may already established routines and accumulated capabilities in acquisition, the firm may rely on existing routines in acquisition. Additionally, the firm may have previously selected an acquisition over other alternatives as a result of the considerations of multiple contingencies (Capron and Mitchell 2012). While the cost of deal termination is severe, pursuing another M&A may allow the firm to recoup investments from the previous M&A attempt such as initiating the process and completing the target searching and screening. It is also possible that the subsequent M&A would have a higher likelihood of success if the firm learns from its prior failure experiences. In fact, Muehlfeld *et al.* (2012) found evidence suggesting that there is a U-shaped relationship between organization learning from prior acquisition failure experience and the likelihood of subsequent deal completion.

Why would a firm that already has chosen an M&A as a vehicle to grow or as a sourcing mode search an alternative and switch to alliance and activate a new routine after a failed M&A attempt? One possibility is that deal terminations are usually preceded by a significant time delay and the contingencies that led the firm to choose M&A could have been changed in a way that favors alliances. Thus, replacing a terminated M&A with another M&A is likely to be a less attractive option than before. In addition, a canceled M&A deal implies that the firm's first-best target choice is removed from the set of potential targets. Thus, it is likely that the firm is left with suboptimal target choices. Even if the firm identifies an optimal second target, because the firm's M&A strategy is no longer private information, competitors are aware of the focal firm's strategy and are more likely to be in a bidding war which will result in an increased cost of acquisition.[3] Consistent with this logic, Chang (1996) argued that a path-dependent search is more likely to be switch to an alternative mode if it exceeds a certain

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[3] Before an M&A agreement is made public, the two parties usually sign a nondisclosure agreement (Officer 2003).

threshold because the opportunity set for a local search diminishes and eventually is depleted of viable opportunities. This is also consistent with the notion that local searches are less likely to deliver significant performance improvement, especially in a complex environment (Levinthal 1997).

More importantly, as noted above, an unsuccessful M&A attempt can result in negative shareholder reactions. Stronger negative feedback from shareholders could invoke a stronger problemistic search for a solution which starts predominantly local in its locus and expands to a more distant search (Baum and Dahlin 2007, Cyert and March 1963, March and Simon 1958). Thus, firms could turn to a proximate alternative to acquisition that is an alternative vehicle for external sourcing: strategic alliance (Capron and Mitchell 2012, Vanhaverbeke *et al.* 2002, Villalonga and McGahan 2005, Wang and Zajac 2007, Yin and Shanley 2008).[4] As such, problemistic search starts locally by searching for solutions close to the prior solution (Ahuja and Katila 2004, Laursen 2012, Rosenkopf and Nerkar 2001, Stuart and Podolny 1996), and start by comparing common external sourcing strategies, another M&A and strategic alliance(s). Under this logic, firms will consider a more distant alternatives to the strategic goal, such as using internal development, only if the local search fails in identifying a satisfactory solution.

Anecdotal evidence confirms that firms consider "build" and "borrow" as alternatives when acquisition attempts fail. For example, in November 2017, Emerson Electric announced a withdrawal from a proposal to acquire Rockwell Automation, an acquisition that targeted Rockwell's technological capabilities in the hybrid and discrete segments of the automation business that Rockwell specializes in. When asked about the company's strategic direction after the failed acquisition attempt in a conference call, Emerson CEO David Farr noted, "Clearly, the Rockwell opportunity is dead and we're moving on. And I think that you're going to see that there're opportunities out there to build [the hybrid business and discrete business] over time." Farr further stated that "You're going to see us also reach out to other people in the world, and particularly some Europeans

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[4] We note that the choice between acquisition and alliance is not exclusive. Rather, firms use multiple modes not only sequentially but also concurrently (Feldman 2020, Lamont and Anderson 1985, Shi *et al.* 2012). That said, scholars have begun to explore how firms manage a portfolio of different modes (Lungeanu *et al.* 2016) which may be a better approach to study the use of modes. In this paper, however, we examine switching decisions when the previous attempt on using one mode fails under the assumption that the motive/goal of pursuing a mode still remains.

and see if we want to do some joint development efforts. . . So I think that we're going to both increase our investments internally and we're going to focus very, very hard on some ventures for partners."[5]

Tech M&A Deal Termination and Switch to Alliance

Capabilities-based perspectives view M&A as a vehicle through which firms access new resources and capabilities or update an existing stock of resources and capabilities (Capron and Mitchell 2009, Folta *et al.* 2016, Karim and Mitchell 2000). Such perspectives primarily explore whether an M&A achieves operational synergies between the target and the acquirer through combinations of resources or capabilities (Capron and Mitchell 2009, Chatterjee 1986, Feldman and Hernandez 2021, Karim and Mitchell 2000, Kaul and Wu 2016, Rabier 2017). Capabilities-based perspectives are particularly useful in analyzing technological acquisitions which are motivated by improving the acquirer's innovative performances through combinations and novel recombinations of scientific and technological knowledge or capabilities between the target and the acquirer (Helfat and Raubitschek 2000, Karim and Mitchell 2000, Larsson and Finkelstein 1999).

In industries where the pace of technological change is fast, innovations that have the potential to disrupt the market are often brought to the market by new entrants (Abernathy and Utterback 1978), creating capability gaps for incumbents. Such technological capability gaps are often not feasible to be filled by internally building the resources and capabilities, particularly when appropriability regime is tight. Therefore, previous work has viewed technological capabilities as widely relying on external sourcing strategies that will both fill the capability gap and allow firms to overcome time compression diseconomies (Capron and Mitchell 2009, Dierickx and Cool 1989, Helfat and Lieberman 2002, Kaul and Wu 2016, Teece 1986, Tripsas 1997). Indeed, studies of external technology sourcing strategy conceptualize acquisition and alliance as key vehicles that firms can substitute for one another (Capron and Mitchell 2012, Hagedoorn and Duysters 2002, Vanhaverbeke *et al.* 2002). Thus, compared to other types of acquisitions, firms pursuing technological acquisitions intended to fill capability gaps are more likely to search for alternative modes after a deal termination.

Existing work present mixed findings on whether to use acquisition versus alliance in external sourcing of technological capabilities. Research that focuses on information asymmetry in the value of technological

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[5] Retrieved from https://seekingalpha.com/article/4129147-emerson-electrics-emr-emerson-withdraws-proposal-to-acquire-rockwell-automation-conference.

capabilities suggests that firms prefer acquisition over alliance (Balakrishnan and Koza 1993, Higgins and Rodriguez 2006, Vanhaverbeke *et al.* 2002, Villalonga and McGahan 2005). On the other hand, research that highlights technological uncertainty firms confront demonstrates that technology alliances are the preferred mode of external sourcing because of the higher real option value and flexibility alliance confers (Folta 1998, Folta and Miller 2002, Hagedoorn and Duysters 2002).

We posit that firms are likely to switch to alliance after failed acquisition attempts when they have initially selected M&A to externally source technological capabilities. In industries where technological capabilities are a critical source of value creation, the technological and competitive landscape would be volatile. In such a volatile technological environment, firms cannot expect to obtain a substantial performance improvement by launching a local search to find another M&A target (Levinthal 1997). Given the significant time gap between M&A announcement and termination and the prolonged time to complete an M&A, the reasons why the firm selected acquisition over alliance may no longer apply, making the faster and more flexible "borrow" option more attractive. In addition, as a public announcement of a deal reveals the firm's sourcing strategy to its competitors, any further pursuit of the same strategy will be met with more competition along with shareholder skepticism (Officer 2003). Given the high likelihood of technological change and the heightened competitive intensity, the flexibility benefit an alliance provides would outweigh the benefits of acquisition (Dyer *et al.* 2004, Folta 1998, Schilling and Steensma 2001, Yin and Shanley 2008). In addition, especially for technological acquisitions where capabilities-based perspectives are best applied, considering target's capability level and context becomes extremely important during selection (Kaul and Wu 2016). With the firm's first-best target no longer available after the deal termination, acquisitions would be a less attractive option vis-à-vis alliances. In sum, we contend that firms are more likely to engage in problemistic search and consider alternative options (i.e., alliance) when faced with a failure of technological acquisition attempt.

> ***Hypothesis 1:*** *Terminated technological acquisition attempts will increase the likelihood of subsequent switch to alliances.*

Negative Market Reaction to Deal Termination and Switch to Alliance

As discussed above, we theorize that M&A deal termination invokes problemistic search pushing firms to consider an alternative mode of corporate strategy transaction. Extant work on problemistic search theorizes that

problemistic search is stimulated by a failure, as seen by a gap between performance and aspiration level (Cyert and March 1963). For instance, firms may start with a local search and exploit existing routines to address the problem that the firm faces and gradually expand toward more distant options when initial efforts do not lead to satisfying alternatives (Billinger *et al.* 2014, Laursen 2012, Levinthal 1997, Levinthal and March 1993). In addition, research suggests that huge failures that are distant from aspiration levels may lead to stronger and distant searches (Baum and Dahlin 2007, Iyer and Miller 2008, Posen and Chen 2013). Applied to the context of deal termination, theory suggests that firms can locally search by looking into the M&A process as a solution that exploits the firm's existing expertise or routines in acquisition (Katila and Ahuja 2002). Not finding a satisfying solution, the firm will sequentially engage in a search to identify alternative solutions such as alliance. The magnitude of failure, however, could impact the search locus suggesting that the larger the failure, the stronger the likelihood of switching away from acquisition (Ren *et al.* 2022).

Stock market reaction is one of the most important and widely used proxies for M&A performance (King *et al.* 2004). Under the efficient market assumption, prior studies employed an event study design using cumulative abnormal returns (CARs) around announcement dates to gauge shareholders' responses to M&A (Haleblian *et al.* 2009). Similarly, one of the most important and immediate performance feedbacks that could stimulate problemistic search would be a negative market reaction around the deal termination date. Thus, we argue that in the presence of a salient performance shortfall caused by a deal termination, the effect of problemistic search will be stronger because it seeks a corporate strategy transaction mode that is different from the initial M&A attempt.

> **Hypothesis 2:** *The positive relationship between termination of technological acquisition and subsequent switch to alliance will be stronger when the market reaction to termination is negative.*

Switch to Alliance Relative to Internally Building Technological Capabilities

Internal development is another alternative mode of acquiring new capabilities that could be used to fill technological resource gaps (Capron and Mitchell 2009). One of the most fundamental tenets of transaction costs economics and property rights theory (Grossman and Hart 1986, Williamson 1985) is that external sourcing and internal development is substitutes to one another (or the make-or-buy decision). Rather than externally sourcing technological capabilities through corporate strategy transactions, firms can create new capabilities by

building on and recombining existing resources and capabilities within the firm. Specifically, technological capability gaps can be filled by internally building capabilities and extending its knowledge base through an increase in R&D investment or by actively picking resources in factor markets.

While internally building technological capabilities may be a valid alternative, a failed technological acquisition attempt has a more proximate solution: strategic alliance. When firms initiate problemistic search locally following a deal termination (Ahuja and Katila 2004, Cyert and March 1963, Rosenkopf and Nerkar 2001), they may compare between two external sourcing modes, acquisition and alliance, and are less likely to consider the distant alternative, internal development. Strategic alliance is a solution that is more proximate to acquisition compared to internal development for several reasons. It is an external sourcing alternative the firm can choose when the firm's target capabilities are not relevant to the existing resources and capabilities (Capron and Mitchell 2012) which could be one of the reasons why the firm attempted to acquisition in the first place. Failures in factor markets could be another reason why firms may depend upon external sourcing. In addition, the "build/make" option has a different time horizon compared to external sourcing modes which may not make itself useful in overcoming time compression diseconomies (Dierickx and Cool 1989).

Thus, we argue that a problemistic search induced by a failed technological acquisition attempt will locally find a solution among external sourcing modes. Firms will prefer strategic alliance over internal development of technological capabilities as a substitute for a technological acquisition. Following the same logic of Hypothesis 2, we also contend that the relative preference for alliance may be stronger if the deal termination elicits a negative response from shareholders.

> **Hypothesis 3a:** *A terminated technological acquisition attempt will increase the likelihood of a subsequent switch to alliances more than it will increase the likelihood of internally building technological capabilities.*

> **Hypothesis 3b:** *The relative increase in subsequent alliances compared to the increase in internal building will be stronger when the market reaction to a termination is negative.*

METHODS

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We test these hypotheses using a sample of terminated M&A deals that involve publicly traded bidders in the U.S. between 1984 and 2019.[6] We begin by identifying a full sample of U.S. publicly traded firms. We exclude privately held and government-owned firms, mutually owned companies, subsidiaries, and firms whose status Thompson One cannot reliably identify. We collect data on completed and terminated M&A deals from Thompson One. We link this sample with the information from the CRSP/Compustat Merged database.

With the matched dataset, we build our initial sample with M&A bids using specific inclusion criteria. Similar to prior articles (e.g., Malmendier *et al.* 2016), we first require a valid announcement date and a valid completion or termination date. Second, we include M&A bids for acquiring more than 50% shares to gain control of the firm. Third, we require information about the mode of M&A transaction (e.g., cash, stock, or other), the deal size, and the deal premium. Fourth, we require other information that is likely to affect the likelihood of deal termination: hostile bids, deal form, and termination fees. Fifth, following previous literature (e.g., Seru 2014), we exclude M&A deals associated with firms operating in financial (SIC 6000-6999) or government-related industries (SIC 9000-9999). Lastly, we restrict our sample to public-to-public transactions for two reasons. First, M&A deal terminations likely occur in public-to-public transactions. In a private transaction, there is generally no public takeover phase which means that deals are finalized upon announcement because the majority of shareholders likely have agreed to the bid by signing the M&A agreement (Boone and Mulherin 2007). Thus, for private transactions, we are not able to observe deals that have been terminated. Second, considering the difficulty of verifying asset-quality of private firms, potential bidders prefer public targets when targeted assets are intangible such as intellectual property rights (Capron and Shen 2007), particularly in R&D-intensive industries (Shen and Reuer 2005). Because our theory focuses on technological M&As which involve acquisitions of intangible assets, we limit the sample to public targets. The final sample comprised 5,442 bids satisfying the screening criteria, with 4,433 successful bids and 1,009 terminated bids.

Dependent Variables: Subsequent Alliances and Internal Building

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[6] The CRSP/Compustat Merged dataset currently provides daily security information of each firm after 1983. In this study, we need about a half year pre-window to calculate our moderating variable, so our sample include M&A deals announced after 1983.

We first measure post-deal termination *Alliances* t_{T+1} as a dummy variable, which equals to 1 if a bidder announces an alliance in the subsequent year after the deal termination, at t_{T+1}, and 0 otherwise.[7] Our theory suggests that bidders "switch" to alliances after the deal termination, meaning an alternative mode (i.e., alliance) replaces the initially selected mode (i.e., acquisition). For an alliance to (fully or partially) replace an acquisition, the alliance partner should be in the same industry as that of the initial acquisition target.[8] Therefore, we construct another dependent variable, *Alliances (Matched)* t_{T+1}, which takes a value of 1 if a bidder announces an alliance with a partner whose (4-digit) SIC code overlaps with that of the terminated M&A target, and 0 otherwise. All data used to construct these variables are gathered from the SDC Platinum dataset.

We construct another dependent variable, *Internal build* t_{T+1}, which equals to 1 if a bidder increases the amount of R&D expenses or the number of employees by more than 10% in the subsequent year after the deal termination at t_{T+1}, and 0 otherwise.[9] Prior articles show that significant changes in R&D expenses represent a strategic shift of a focal firm's focus on R&D activities (Mudambi and Swift 2014). Also, we consider the fact that firms hire new employees to develop technological capabilities (Ganco *et al.* 2020, Song *et al.* 2003).[10]

Independent Variable: Terminated Tech M&A

Terminated Tech M&A is an indicator that equals to 1 if the terminated bid is primarily motivated to obtain the target firm's technological capabilities and resources, and 0 otherwise. Since there is some latitude in defining a technological acquisition in prior literature, we explain how we create this variable using two main steps. First, we search for credible sources that reveal the motivations of bidders. Following the prior literature on M&A motives (Rabier 2017), we begin by coding deal purposes that bidders described when entering acquisitions from (a) the press release announcements, (b) the conference call transcripts, and (c) the Securities and Exchange Commission (SEC) reports.[11] The second step is to determine a set of criteria which identifies whether the bid is

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[7] Our results are robust to the use of the logarithm of the number of alliances undertaken at t_{T+1}. The results are reported in Table A2.
[8] Some firms may undertake an alliance with the initial acquisition target. We find that a total of 263 bidders (out of 1,009 terminated bidders) subsequently undertake an alliance after the deal termination. Among them, only 4 firms announce an alliance with the initial target. Our results are robust to the exclusion of alliances with the initial acquisition targets.
[9] We use a 10% increase as a cutoff to determine if a focal firm pursues an internal build after the deal termination to capture a significant strategic increase, which is comparable to other modes. The results are robust to the use of several other thresholds (e.g., 5%, 7.5%).
[10] As a robustness check, we also test our hypothesis by employing different types of proxies of internal development using USPTO patent datasets – e.g., the number of patent applications or the number of inventors hired from other firms in the aftermath of deal termination. The estimations generate similar results to the main results.
[11] The first two sources are collected from Lexis Nexis and Factiva, and the SEC filing reports were available from the EDGAR system of the SEC. Press releases and conference calls have been widely used means of disclosure (Kimbrough and Louis 2011). All US public firms are required to submit an 8-K after major events, including the announcements of acquisitions, and other internal operational changes,

intended to acquire technological resources of the target. Following Ahuja and Katila (2001), we define a bid as a technological acquisition if the bidder reported technology as a primary factor for the bid or if technology would be a part of the transferred assets of the target firm. Thus, if a bid is described in media to have multiple motives, we exclude M&A bids that clearly list other motivations such as access to distribution, achieving financial synergies, or increasing market power (Makri *et al.* 2010). Through these procedures, we identify 217 terminated tech M&A bids out of 1,009 terminated bids.[12]

Moderating Variable: Negative Market Response

Our moderator, *Negative Response* t_T, is defined as negative one multiplied by the bidder's cumulative abnormal return (CAR) at the deal termination. Because Hypothesis 2 states that a negative market response at the deal termination triggers a recalibration of the firm's sourcing strategy post-merger attempts, we reverse-code the sign of CARs at the deal termination for each event. For each deal termination, we calculate the CAR, the sum of the daily abnormal returns on the bidder firm's stock around the termination event. CAR represents the excess return which is the daily unanticipated movement in the stock price for each firm over the event period. Following prior literature (e.g., Mackinlay 1997, Oxley *et al.* 2009), we use an estimation period of 150 days, beginning on day $t = -170$ and ending on day $t = -21$, prior to the deal announcement date.[13] Using this estimation window, we compute the CARs for bidders at deal termination over a three-day window [-1, 1].[14]

Control Variables

We include a series of control variables in our regression analyses. First, we control for deal-level characteristics. *Negative Response* t_A is defined as CARs for each bidder at the deal announcement date. Other deal information of each bid is also included. *Cash Deal* (in percent) is expressed as a fraction of the total payment. *Target Size* is the

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which could be of major interest to shareholders. The SEC also requires the filing of S-4, 14A, or 14D when the bidder seeks to own 100% of the public target's securities after the transaction. However, these reports are not filed when the acquisitions are financed with 100% cash or 100% debt. Furthermore, our sample includes bids for public firms in foreign countries which are often not subject to some disclosure requirements. In these cases, we rely on press releases, conference calls, and 8-K or 10-K reports.

[12] As a robustness check, we apply two additional criteria: industry and size. We analyze using acquisition bids with 1) deal sizes less than $500 million, a criteria adopted by Makri *et al.* (2010), and 2) targets operating in the high-tech industries, an approach similar to Desyllas and Hughes (2008). Our results are robust to the adoption of such criteria (reported in Table A3). The results are also robust to the use of several different criteria (e.g., bidders in the high-tech industries, asset size, patent counts).

[13] We utilize a pre-announcement period as our estimation window to calculate CARs because prior studies showed that the deal announcement per se subsequently influence the stock market valuation of deal participants (e.g., Malmendier *et al.* 2016). As a robustness check, we calculate CARs using different estimation periods prior to the deal announcement. Our results are robust to the use of different estimation periods (e.g., [-21, -170], [-42, -170], [-63, -170], and [-21, 100]). The results are available upon request.

[14] As a robustness check, we test several different event windows to check the sensitivity of our findings: [-1, 1], [-2, 2], [-3, 3], [5, 5] and [-3, 10]. The results are robust to the use of several different event windows (reported in Table A5).

logarithm of the target's market value of equity (in billions of 2017 dollars). *Relative Deal Size* is the logarithm of the transaction value over the bidder's market value of equity. *Offer Premium* is the difference between the offer price and the target stock price four weeks before the deal announcement date. *Bidder's Termination Fee* and *Target's Termination Fee* represent the amount of the penalty fees, in billions of 2017 dollars, that each side of participants would pay in deal termination. *Tender Offer* and *Hostile* are binary indicators of tender offers and hostile bids, respectively. *Cross Border* deal takes a value 1 if a bidder and target are located in a different country.

Next, we include several firm-level characteristics. *Firm Age* is calculated as the number of years since the bidder's initial public offering. We also control for *Firm Size*, measured as the logarithm of total assets, *EBIT/Sales*, and *Capex/Sales* (Berger and Ofek 1995). *Diversification* is gauged as the entropy of a bidder's assets by an operating segment in the deal announcement year. Additionally, we include *q of Bidder*, which is measured as a ratio of a bidder's market to book value in the deal announcement year. We also include controls for a firm's *M&A Experience* and *Alliances Experience*, which are measured as the logarithm of the number of M&A and alliances undertaken by bidders within the past 3 years prior to a focal deal, respectively. In a similar vein, we include *Terminated Bid Experience* which equals to 1 if a bidder experiences another bid termination prior to the deal announcement date, and 0 otherwise.

Instrumental Variable: Δ Realized Volatility

Because (some) M&A terminations do not randomly occur, there could be unobservable differences between (the bidders of) completed and terminated deals. The factors driving bidders (or targets) to terminate their deals may be correlated in unobserved ways with the firm's motivations to undertake an alliance, conditional on M&A deal termination. This sample-induced endogeneity can inflate or deflate the treatment effect of our explanatory variable (Certo *et al.* 2016). Also, our explanatory variable, *Terminated Tech M&A* t_T, can be endogenous because of different types of endogeneity (e.g., omitted variables correlated with an explanatory variable). To account for these potential endogeneity problems, we use and propose an instrument variable – *⊿ Realized Volatility* – for our two-stage Heckman selection estimator and a two-stage least squares estimator. [15] In particular, Heckman

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[15] Following prior studies (e.g., Certo *et al.* 2016), we attempt to assess whether our instrument satisfies the exclusion restriction. First, we check the correlation between the inverse Mills ratio and the independent variable, *Terminated Tech M&A* t_T, showing that the correlation is only 0.15. Second, we confirm that our instrument does not affect the outcome of interest in the second stage. We find that our instrument has insignificant impact on the likelihood of subsequent alliances (reported in Table A4). Lastly, to strengthen the substantive grounds of our instrument, it is worthwhile to describe how an alliance choice after the deal termination is distinct from one when

selection models without a valid instrument may raise another empirical concern (Certo *et al.* 2016, Wolfolds and Siegel 2019). We provide our economic intuition and the construction process of this variable in this section.

Savor and Lu (2009) demonstrate that a lot of acquisitions could be terminated due to, either upward or downward, changes in economic conditions. Such changes can influence not only the valuation of a target firm but also the expectations of the bidder or target firms' managers on whether the acquisition can create value post-deal completion. Based on the economic intuition, we employ *Realized Volatility* as our instrument in the selection equation. While a type of implied volatility measures the market's assessment of future volatility, *Realized Volatility* is designed to capture what actually happens over the period of interest. A *Realized Volatility* (in percent) is calculated by multiplying the square root of annualized realized variance in daily return by 100. We first calculate the *Realized Volatility* (RV) over the period between the announcement and the termination date.[16]

We conduct the same procedure for an RV over the pre-announcement period. Considering similar processes in M&A, we choose to use an estimation window beginning on day $t = -170$ and ending on day $t = -28$ prior to the deal announcement date. Once a firm decides to acquire another firm, the firm begins a target search and an evaluation process upon the selected target, and initiates a negation with the target. The M&A preparation processes take place intensively for months prior to the deal announcement. Bloomberg Law (2021) reports that public M&A bids take an average of 12 months to complete. So, it is considerably reasonable that such pre-announcement activities of bidders would be concentrated over a half year prior to the deal announcement.

We employ the absolute value of the difference between these two RVs. Our economic intuition of this instrument is much closer to the severity of changes in economic conditions between the two periods, than to the direction of them. Figure 1 depicts that the bidders of terminated bids have likely undergone a relatively greater change in economic conditions over the post-announcement period, relative to those of successful bids.

[Insert Figure 1 about here]

Empirical Estimation

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uncertainty increases. While existing studies argue that firms are likely to form alliance when high uncertainty emerges (e.g., Beckman *et al.* 2004), we examine a switch to alliance with a partner whose resources and capabilities are similar to those of the initial merger target.

[16] The mathematical equation of our *Realized Volatility* is: $100 \times \sqrt{\frac{252}{N} \sum_{t=1}^{N} r_t^2}$ where r_t denotes the daily return and N shows the number of observations of daily return. For the daily return, we utilize daily returns on the value-weighted S&P500.

To account for potential endogeneity issues, we report estimations based on three research designs: *i)* a two-stage Heckman selection regression, *ii)* a two-stage least squares (2SLS) regression, and *iii)* a panel data (within) regression model. It is worthwhile to note first why each estimator is appropriate to test our hypotheses. Our research aims to capture variations among terminated M&A deals, so we first examine our hypotheses using the sample of terminated deals. Because there could be unobservable differences between completed and terminated deals, we employ a two-stage Heckman selection model where the first stage sample includes both completed and terminated deals. However, Heckman models do not effectively resolve other types of endogeneity. Prior studies suggest that 2SLS models are more appropriate than Heckman selection models when other types of endogeneity (e.g., omitted variables) are potentially present (Certo *et al.* 2016). Furthermore, the first research design has other potential caveats. First, the outcome from the first research design could be driven by the focal firms' motivations themselves to develop technological capabilities – not by the deal termination effects of technological acquisitions. To account for the endogeneity problems, we utilize a 2SLS regression model and instrument our explanatory variable, using the sample of completed and terminated technological M&A deals. Similarly, the results may be driven by idiosyncratic characteristics of the bidders of the terminated technological M&A deals. Thus, we use a panel data (within) regression estimator to capture the within-differences between the periods of pre- and post-termination of technological M&A. The detail of each estimator is as follows.

To test Hypotheses 1 and 2, we first utilize two-stage Heckman selection regressions using the sample of M&A deals. Following prior literature on two-stage Heckman models, we employ Probit in the first stage with RV as an instrument and OLS in the second stage (Wolfolds and Siegel 2019). Year and industry dummies are included to control for idiosyncratic effects in certain years or industries. Standard errors are clustered by industries of bidders as the subsequent decisions tend to be correlated with those of other firms within the same industries. To test Hypotheses 3a and 3b where we predict that a focal bidder will prefer alliances to internal building, we use a subset of deals that undertook alliances or internal building in the subsequent year after the deal termination in the second stage.

In the second design, we conduct 2SLS regressions with RV as an instrument in the first stage using the successfully completed technological acquisition bids as the counterfactual sample to terminated technological

acquisitions.[17] As a firm's problemistic search occurs in response to organizational problem (Greve 2003), it can be predicted that if a firm fails to acquire technological capabilities of targets through M&A, the firm is more likely than successful acquirers to search for alternatives in the subsequent year. To select completed technological acquisitions among 4,433 completed bids in our data, we apply two criteria following prior studies on technological acquisitions (e.g., Puranam *et al.* 2006, Rios 2021). First, we restrict the sample to target firms smaller than 50% of the bidder in terms of both patents and assets held. Second, we also limit our counterfactual sample to bidders operating in the high-tech industries, similar to the approach of Puranam *et al.* (2006). Using these methods, we attain a total of 1,406 successfully completed technological acquisition deals (vs. 217 terminated technological acquisition deals) among a whole completed acquisition deal.[18]

Lastly, we run panel data (within-firm) regression analyses with the sample of terminated tech M&A deals which aims to capture the within-firm variation of the propensity to choose alliances over the periods of pre- and post-deal termination. We choose a relatively short post-time window (i.e., [-5, 1]).[19] Corporate transactions can be determined by an overarching strategy so that examining the firm's propensity in the subsequent year after the deal termination is more likely to capture an exogenous change triggered by the deal termination. All the panel data regression models include deal fixed effect and industry group × year fixed effect to control for time-invariant characteristics of each deal and industry- and time-varying components of economic activity that may influence the decisions of a bidding firm.[20] We use 217 terminated technological M&A bids which yield 1,364 firm-year observations in the estimation.

RESULTS

Table 1 shows descriptive statistics and correlations for all key variables from all public-to-public M&A deal sample (N=5,442). In Table 2, Model 1 reports the results of the first-stage selection model, whereas Models 2 to 9 show the results of the second-stage outcome model for the probability of a focal firm's switching to alliances

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[17] One empirical concern is that when a variable is endogenous, the interaction term with it can be endogenous (Bun and Harrison 2019). As suggested from prior literature, we thus utilize the interaction term, $RV \times Negative\ Response\ t_T$, to instrument the potentially endogenous interaction term in the second stage. The 2SLS models with two instruments satisfy statistical requirements (F-stat = 18.81).

[18] As a robustness check, we conduct the 2SLS estimations with different counterfactual samples. First, we find that the results are robust to the use of completed deals targeting smaller firms (than bidders) in the high-tech industries, similar to the approach of Desyllas and Hughes (2008). Second, we test our theories with a counterfactual sample matched by using Stata's propensity score matching, based on key covariates (e.g., bidder's market value, firm size, or industry). The results from the estimations also generate similar results. Indeed, we find that as shown in the Table A1, completed and terminated deal in our sample are remarkably similar along many dimensions.

[19] The results are robust to several different time windows (e.g., [-6, 1], [-7, 1], or [-8, 1]). The results are available upon request.

[20] Our estimations with the use of continuous variables winsorized at the 1st and 99th percentiles generate similar results.

in the subsequent year. Model 1 reports that the coefficient of $\varDelta$ *Realized Volatility* is positive and significant (β = 0.241 [p = 0.000]). Models 2 and 4 show that the coefficient estimates of *Terminated Tech M&A* are positive and significant (β = 0.051 [p = 0.079] and β = 0.049 [p = 0.073] in Models 2 and 4, respectively), thereby supporting for Hypothesis 1. The result indicates that termination of technological acquisitions is more likely than other types of M&A to make a bidder subsequently switch to alliance by approximately 5 percent.

Consistent with Hypothesis 2, Models 3 and 5 demonstrate that the coefficient for the interaction term is positive and significant (β = 0.661 [p = 0.002] and β = 0.572 [p = 0.007] in Models 3 and 5, respectively). Based on the results with the use of *Alliances* t_{T+1}, we calculate the marginal effect of the moderating variable, showing that the likelihood of a focal bidder's subsequent switch to alliances will increase by 0.66 percent as a 1 percent point of *Negative market response* t_T increases. The marginal plot shows that the change in the likelihood of a firm's subsequent switch to alliances ranges from -0.22 to 0.58 as a negative market response increases.

[Insert Table 1, Table 2, and Figure 2a about here]

Models 6 to 9 show the results of the second-stage outcome model for the probability of a firm's switch to alliances, conditional on undertaking alliances or internal building after the deal termination. Model 6 shows that the coefficient of *Terminated Tech M&A* is positive but statistically insignificant (β = 0.058 [p = 0.186]) whereas Model 8 supports Hypothesis 3a (β = 0.090 [p = 0.084]). Consistent with Hypothesis 3b, Models 7 and 9 report that the coefficient for the interaction term is positive and significant (β = 0.881 [p = 0.056] and β = 0.893 [p = 0.088] in Models 7 and 9, respectively).[21] The results generate support for our hypotheses.

Second, we conduct the 2SLS regressions with the use of RV as our instrument. Table 3 presents the results of our 2SLS regression analysis to test Hypotheses 1 and 2.[22] We include the same controls for the 2SLS regression models. Consistent with Hypothesis 1, Models 2 and 3 demonstrate that *Terminated Tech M&A* is positive and significant (β = 0.487 [p = 0.061] and β = 0.540 [p = 0.047] in Models 2 and 3, respectively). Also, we find supporting evidence for Hypothesis 2 (β = 2.919 [p = 0.007] and β = 3.213 [p = 0.048] in Models 5 and 6, respectively). Based on the results from Model 5, we calculate the marginal effect of our moderating variable,

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[21] As a robustness check, we employ multinominal logistic regressions to measure the ratio of the probability of a focal firm's choosing of "alliances" over the probability of choosing "internal build" in the subsequent year after M&A deal termination The results are consistent with Hypotheses 3a and Hypothesis 3b (reported in Table A9 and Figure A1). The results are robust to the use of *Alliances (Matched)* t_{T+1}.
[22] We do not run 2SLS regressions for Hypothesis 3a and 3b because completed acquisitions would add employees and R&D (budgets for) in-progress projects from an acquired target to an acquiring firm in the subsequent year after the deal completion (Cheng 2004).

indicating that the likelihood of a bidder's subsequent switch to alliances will increase by 2.92 percent as a 1 percent point of *Negative market response* t_T increases. The marginal plot shows that the change in the likelihood ranges from -1.04 to 2.46 as a negative market response increases.

Lastly, we conduct panel data (within-firm) regression analyses for terminated technological acquisition deals. Table 4 presents the results from the panel regression analyses. In these estimations, *After* is an indicator variable that takes a value of 1 for the subsequent years after the deal termination. Models 1 and 3 show that the coefficient of *After* is economically and statistically insignificant. However, Models 2 and 4 demonstrate that the coefficient for the interaction term is positive and significant ($\beta = 0.254$ [$p = 0.040$] and $\beta = 0.370$ [$p = 0.000$] in Models 2 and 4, respectively), consistent with Hypothesis 2. Similarly, Models 5 and 7 show that the coefficient of *After* is insignificant but the coefficient for the interaction term is positive and significant ($\beta = 0.597$ [$p = 0.000$] and $\beta = 0.702$ [$p = 0.003$] in Models 6 and 8, respectively), thereby supporting Hypothesis 3b.

[Insert Table 3, Figure 2b, and Table 4 about here]

Robustness Checks

Exclusive switch. Previous findings suggest that a firm subsequently undertakes alliances when it fails to acquire technological capabilities through acquisitions. However, our "switch" theory may not be valid if a focal bidder simultaneously pursues alliances and acquisitions in the subsequent year after the deal termination. Therefore, we construct new dependent variables: *Alliances Only* and *Alliances Only (Matched)*. *Alliances Only* equals to 1 if a focal bidder undertakes alliances and no acquisition in the subsequent year, and 0 otherwise. *Alliances Only (Matched)* takes a value of 1 if a focal bidder announces an alliance with a partner whose SIC codes overlap with those of the terminated M&A target without an attempt to acquire another target whose SIC codes overlap with those of the terminated M&A target. We conduct our estimations with the use of the two variables as our dependent variables (reported in Tables A6-A8). The results from the models generate similar results. In particular, Models 3 and 4 (Table A8) which utilize *Alliance Only (Matched)*, display statistically significant coefficient estimates for *After* ($\beta = 0.211$ [$p = 0.005$], Model 3) and the interaction term ($\beta = 0.333$ [$p = 0.024$], Model 4).[23]

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[23] We also report the propensity of a focal bidder's pursuing each corporate transaction mode (reported in Tables A10 and A11). It shows that a focal bidder is more likely to choose a mode of alliances (instead of others) particularly when a market response is negative.

Endogenous deal termination. Another concern is that deal termination can be endogenously determined. Particularly, some deal termination events may become known to stock market participants prior to the deal termination announcement. Or, market participants may predict the termination of the deal, based on news on deal participants or economic conditions. In such cases, our moderator, *Negative Response* t_T, may not be a good proxy of a market response to deal termination. We thus conduct the Heckman and 2SLS regressions with the subset of bids whose *Negative Response* t_T lies in the lowest or highest 25% of the whole sample.[24] We assume that the analyses with the use of these sub-samples are more appropriate to capture exogeneous changes by deal termination. The results from the estimations are consistent with our predictions (reported in Table A12).

Reasons for termination. We also control for other potential alternative explanations related to reasons for deal termination. For example, if tech M&A bidders are more likely to voluntarily walk away from the deal when the bidders find a suitable alliance partner, we would see an increase in alliances after tech deal terminations without problemistic search. To account for this, we conduct our main estimations with indicator variables for termination reasons: *Failure Reason: Bidder Side*, *Failure Reason: Target Side*, *Failure Reason: Mutual*, and *Failure Reason: External*. Following prior articles (Savor and Lu 2009), we manually identify a termination reason for each bid based on the combined sources of Factiva, LexisNexis, and the synopsis by SDC. We then classify each bid into one of the four categories.[25] The results are robust to the use of these controls (reported in Table A13).

Real option as an alternative explanation. Lastly, we recognize a possibility that M&A deal termination itself may subsequently increase a firm-specific and/or market-specific uncertainty, which may lead the bidder to choose alliance as a real option (e.g., Beckman *et al.* 2004, Burgers *et al.* 1993, Kogut 1991, Santoro and McGill 2005). To rule out this alternative explanation, we include two uncertainty measures as controls: *Bidder Firm-specific Uncertainty* t_T and *Bidder Market-specific Uncertainty* t_T. Those uncertainty variables are measured in the termination year, t_T, of each deal. Following Beckman *et al.* (2004), we use the volatility of a firm's stock price for the measurement of firm-specific uncertainty. Market uncertainty is defined as the mean monthly stock price

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[24] The results are robust to the use of several different cutoffs (e.g., 5%, 10%, 20%, or 25% greater or less than the mean).
[25] For example, if deal participants mutually agreed to terminate the deal or a bidder lost to a competing bid, the deals are classified into *Failure Reason: Mutual*. Some bids could be terminated because of due diligence revelations about target or because of bad news about target, which are classified into *Failure Reason: Target Side*. Also, some other deals are classified into *Failure Reason: Bidder Side* if the bids were unconsummated because of target refusal about the offer or because of problems in bidder's operations. Last, we classify bids into *Failure Reasons: External* if the deals were terminated by regulatory interventions or macroeconomic changes. As a robustness check, we also test with more concrete termination reason indicators. However, the results are robust to the use of the indicator variables.

volatility of firms in the focal firm's industry. Our results are robust to the use of firm-specific and bidder market-specific uncertainty measures (reported in Table A14).

DISCUSSION

In this study, we have investigated what corporate strategy transactions firms resort to when their initial "buy" option fails. Using a unique sample of announced M&A deals that are terminated, we find that M&A deals targeting technological capabilities can be switched to alliances when the deals go awry. We also find that the likelihood of the switch to alliance increases when the firm is met with a negative stock market reaction upon the announcement of deal termination. We argue that this is evidence of problemistic search in the choice of sourcing strategy where a failed M&A attempt triggers the firm to pivot toward one of the key alternative courses of action: strategic alliance. We also find that failed technological acquisition attempts prompt firms to pursue the "borrow" option more than the "build/make" option which we suggest is a result of a local search instead of switching to a distant solution.

This paper presents a theory of search-based switch in corporate strategy transaction modes which is distinct from a choice between acquisition and alliance. For a switch, many contingencies that firms commonly consider in the choice between acquisitions and alliances may not necessarily dominate the decision. In line with the recent work that explores persist-or-switch decisions between alliance and internally building (Ren *et al.* 2022), this paper is one of the first attempts to establish the antecedents of switching decisions. We find that the switching decisions are related to the underlying motives and the nature of acquisition attempts.

The finding that intangible assets such as technological resources are more likely to be switched to alliances upon deal termination runs counter to existing research which suggests that intangible assets are often sourced through acquisition because they are particularly susceptible to appropriation by alliance partners (Villalonga and McGahan 2005). The discrepancies between these two results attest to the value of modeling *switch* beyond the existing models of *choice* between acquisition and alliance (Capron and Mitchell 2012).

Managers often do not have the luxury of having a menu of options in a "build/make", "borrow", or "buy" decision. Deal termination is one context where acquisition versus alliance is not presented as a choice to rational decision-makers. Rather, we view it as a contextual contingency where boundedly rational managers are forced to recalibrate their growth or sourcing strategy and discover a satisficing solution. Thus, we advance a

behavioral approach to M&A by applying problemistic search which is one of the key ideas of the behavioral theory of the firm (Cyert and March 1963) in the "borrow or buy" decision.

One of the key puzzles in M&A research is that firms continue to undertake acquisitions while empirical evidence suggests that many M&A fail to generate above-average returns for the acquirer (Chakrabarti and Mitchell 2016, King *et al.* 2004). If managers are rational actors, we would expect to see fewer firms choosing M&As when M&As fail. Using a sample of failed M&A attempts, this paper unravels whether and why firms pursue another M&A or switch to alternative modes such as alliance. This paper argues that problemistic search and the availability of alternatives depending on M&A motives may provide an account of such patterns.

Although our results are replicated across multiple designs and robustness checks, the present study is not without limitations. One limitation is that we are not able to fully observe the switch of transaction modes. This is not only a conceptual issue that one mode cannot be fully substituted by another mode but also an empirical problem in which there is no systematic way to find a one-to-one match of strategic motives for different modes, especially in a cross-industry setting (Ren *et al.* 2022). Second, while the concept of problemistic search provides a lens through which we understand the consequences of M&A deal termination, there may be concerns with the specific mechanisms at play. While we show the results that are consistent with our theory of problemistic search, we are limited in our ability to provide further evidence that taps into cognitive processes of executives. Future work addressing these issues would be a welcomed addition.

The above limitations notwithstanding, this paper makes contributions in several streams of literature. First, this paper contributes to the literature on the choice between acquisition versus alliance by highlighting an additional contextual factor that forces firms to reconsider their choice between acquisition and alliance and search for alternative options. Prior research demonstrates that acquisitions and other modes of growth or sourcing are substitutable such that the relative attractiveness of other options would affect the mode choice (Capron and Mitchell 2012). Our analysis of switch from acquisition to alliance after deal termination is consistent with the existing argument that firms consider the two modes as substitutes. A natural extension of this paper is to examine whether the results are symmetric for alliance when alliance attempts fail. Specifically, future work could explore whether a failure to form strategic alliances results in switches across modes similar to the firms switch from M&A to alliance. In addition, we expand the literature by identifying an important

boundary condition to the model of choice/switch between acquisition and alliance: M&A motives. Our finding suggests that the extent of substitution between acquisition and alliance differs by the firm's motivation for the corporate strategy transaction. In the case of switch from acquisition to alliance, we find that non-tech M&As intended to pursue market power synergies or financial synergies are less likely to be replaced with other modes.

This paper also contributes to the broader research on M&A. Despite the high number of deal terminations, existing work on M&A focuses on completed deals and samples on realized M&A transactions, largely overlooking a significant portion of M&A activities. Our research is unique in that our primary focus is on variations among terminated deals. Our empirical model estimates the selection between realized and terminated deals by employing Heckman's two-stage approach and the 2SLS approach which accounts for the difference between realized and unrealized deals. By focusing on deal termination, our work also highlights the importance of M&A processes (Jemison and Sitkin 1986) as a response to the call for more research on M&A processes and its implication on firm strategy and performance (Haleblian *et al.* 2009, King *et al.* 2004).

In addition, our study complements a prominent stream of research on the behavioral aspect of M&A (Barkema and Schijven 2008, Devers *et al.* 2020). This paper is one of the few studies that apply problemistic search in the context of M&A and corporate strategy in general (Chang 1996, Iyer and Miller 2008, Ren *et al.* 2022). More broadly, our work extends the work on learning from failures in corporate strategy (Haleblian and Finkelstein, 1999, Vermeulen and Barkema, 2001). We examine how firms react to failed corporate strategy transactions when the need for a transaction still exists. In this sense, deal terminations may provide researchers with an excellent opportunity to not only test problemistic search but also organizational learning, in that M&A terminations are salient failure events that reset the firm strategy while the strategic goal is still not fulfilled. Additionally, our work also empirically advances the performance feedback literature by using an event-based measure that induces feedback in measuring aspiration gaps. We view that using discrete events such as deal terminations complement existing works that rely on measures of performance aspirations based on accounting performance which are often vulnerable to endogeneity issues.

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Figure 1. Density Distribution of Δ Realized Volatility in Successful and Terminated Bids
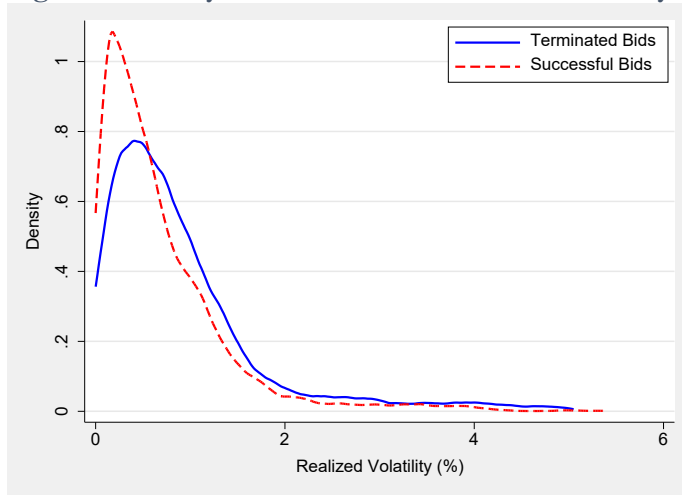
Note. Figure 1 depicts the density distribution of our instrument between the samples of terminated and completed M&A bids.

Figure 2a. Marginal Effects of Negative Response t_T on Alliances t_{T+1} (Heckman)
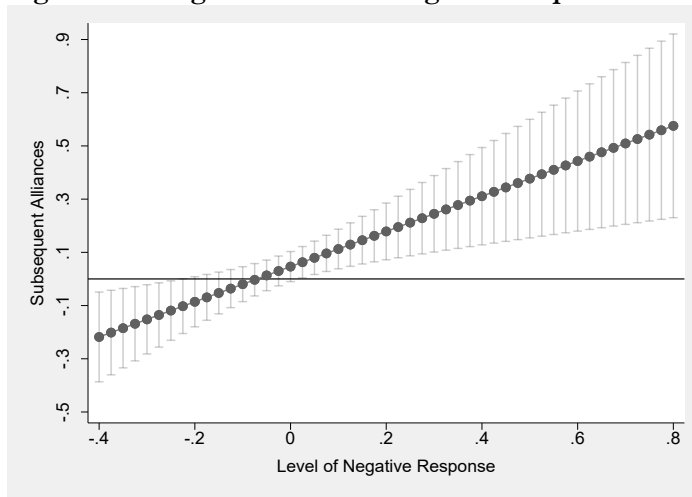
Note. Figure 2a plots the change in the likelihood of the subsequent switch to alliances after a deal termination for each level of a negative market response in the Heckman selection regression models.

Figure 2b. Marginal Effects of Negative Response t_T on Alliances t_{T+1} (2SLS)
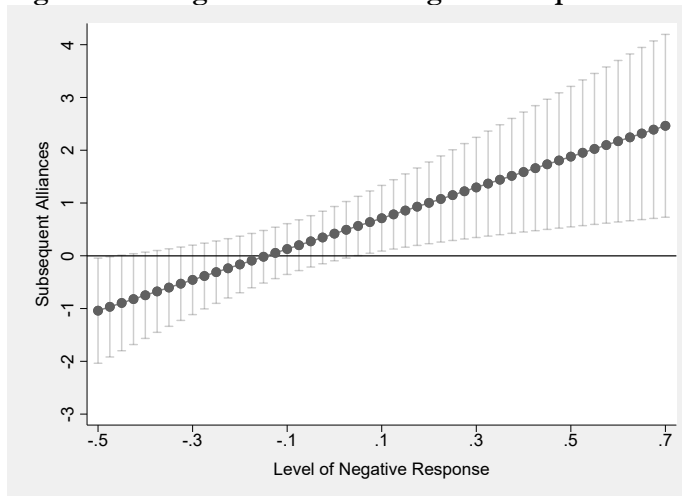
Note. Figure 2b plots the change in the likelihood of the subsequent switch to alliances after a deal termination for each level of a negative market response in the 2SLS regression models.

Table 1. Descriptive Statistics and Pearson Correlations

Variables	Mean	SD	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)	(21)	(22)	(23)	(24)	(25)	(26)
(1) Deal Termination t_T	0.19	0.39	1.00																									
(2) Alliances t_{T+1}	0.37	0.48	-0.11	1.00																								
(3) Alliances (Matched) t_{T+1}	0.29	0.46	-0.11	0.84	1.00																							
(4) Internal Build t_{T+1}	0.45	0.50	0.01	0.03	0.02	1.00																						
(5) Terminated Tech M&A	0.22	0.41	-	0.12	0.13	0.11	1.00																					
(6) Δ Realized Volatility	0.72	0.73	0.11	-0.03	-0.02	-0.06	0.03	1.00																				
(7) Negative Response t_T	-0.00	0.08	0.04	0.01	0.00	-0.01	-0.01	-0.02	1.00																			
(8) Negative Response t_A	0.01	0.10	0.01	0.05	0.05	0.04	0.06	0.01	0.09	1.00																		
(9) Cash Deal	42.96	45.58	-0.06	0.07	0.05	-0.02	0.01	0.05	-0.01	-0.11	1.00																	
(10) Target Size	0.56	0.75	0.02	0.23	0.26	-0.09	0.04	0.04	-0.01	0.08	-0.01	1.00																
(11) Relative Deal Size	0.30	0.44	0.21	-0.16	-0.13	-0.05	-0.02	0.03	0.02	0.06	-0.16	0.16	1.00															
(12) Offer Premium	0.47	2.27	0.00	0.02	0.02	0.00	0.05	-0.01	-0.01	0.02	0.04	0.00	0.03	1.00														
(13) Bidder's Termination Fee	0.02	0.20	0.00	0.07	0.09	-0.01	0.13	0.03	0.00	0.03	-0.04	0.41	0.07	0.00	1.00													
(14) Target's Termination Fee	0.04	0.17	-0.05	0.13	0.15	-0.02	0.08	0.02	0.00	0.05	-0.04	0.57	0.07	-0.01	0.68	1.00												
(15) Tender Offer	0.23	0.42	-0.11	0.06	0.04	0.01	0.01	0.02	0.00	-0.06	0.43	-0.01	-0.09	0.02	-0.05	-0.06	1.00											
(16) Hostile	0.04	0.19	0.23	-0.02	-0.02	-0.01	-0.09	0.01	0.00	-0.01	0.07	0.09	0.07	0.01	-0.02	-0.03	0.17	1.00										
(17) Cross Border	0.13	0.34	-0.01	0.02	0.02	0.01	-0.02	0.02	-0.01	-0.03	0.10	-0.04	-0.08	0.00	-0.03	-0.07	0.16	0.01	1.00									
(18) Firm Age	21.70	17.20	-0.07	0.21	0.17	-0.15	-0.07	0.07	-0.01	-0.03	0.23	0.30	-0.17	0.04	0.08	0.13	0.14	0.04	0.06	1.00								
(19) Firm Size	6.92	2.58	-0.18	0.36	0.33	-0.15	0.03	0.03	-0.02	0.04	0.25	0.48	-0.26	0.02	0.12	0.20	0.14	0.01	0.07	0.60	1.00							
(20) EBIT/Sales	-0.42	6.68	-0.05	0.02	0.02	-0.01	-0.06	-0.03	0.02	0.01	0.05	0.05	-0.08	0.00	0.01	0.02	0.04	0.01	-0.01	0.06	0.14	1.00						
(21) Capex/Sales	0.18	2.95	0.03	-0.02	-0.01	0.01	-0.02	0.02	0.03	0.00	-0.03	-0.02	0.02	0.00	0.00	-0.01	-0.02	0.00	0.04	-0.03	-0.03	-0.29	1.00					
(22) Diversification	0.22	0.41	-0.04	0.06	0.00	-0.05	-0.08	0.00	0.00	-0.03	0.10	0.11	-0.10	-0.01	0.00	0.02	0.15	0.05	0.00	0.37	0.26	0.04	-0.02	1.00				
(23) q of Bidder	1.90	3.01	-0.02	0.07	0.07	0.10	0.12	-0.02	0.01	-0.01	-0.07	-0.02	-0.04	0.00	0.00	0.00	-0.05	-0.04	0.02	-0.09	-0.08	-0.36	0.03	-0.08	1.00			
(24) Terminated Bid Experience	0.19	0.40	0.02	0.15	0.12	-0.06	0.02	0.04	0.00	-0.01	0.10	0.10	0.19	-0.08	0.01	0.07	0.10	0.06	0.05	0.05	0.32	0.31	0.04	-0.01	0.14	1.00		
(25) M&A Experience	0.91	0.89	-0.12	0.26	0.24	-0.01	0.06	0.02	-0.01	0.02	0.18	0.17	-0.17	0.01	0.04	0.08	0.08	-0.03	0.09	0.27	0.47	0.06	-0.03	0.15	0.01	0.24	1.00	
(26) Alliance Experience	0.80	1.05	-0.13	0.51	0.48	0.00	0.17	-0.01	0.01	0.05	0.09	0.26	-0.20	0.02	0.11	0.18	0.06	-0.03	0.05	0.30	0.48	0.04	-0.02	0.07	0.07	0.25	0.43	1.00

Note. N=5,442. This table lists descriptive statistics for the sample of M&A bids undertaken by US publicly-listed firms between 1984 and 2019. The unit of analysis is deal.

Table 2. Heckman Selection Regression Results with Deal Termination Sample

Sample:		Tech M&A + Non-Tech M&A Terminations				Tech M&A + Non-Tech M&A Terminations (Conditional on Alliances or Internal Build at t_{T+1})			
	First Stage	Second Stage							
DV:	Deal Termination t_T	Alliances t_{T+1}		Alliances t_{T+1} (Matched)		Alliances t_{T+1}		Alliances t_{T+1} (Matched)	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Δ Realized Volatility	0.241***								
	(0.033)								
Terminated Tech M&A		0.051*	0.046	0.049*	0.045*	0.058	0.055	0.090*	0.089*
		(0.029)	(0.029)	(0.027)	(0.027)	(0.044)	(0.045)	(0.052)	(0.052)
Terminated Tech M&A × Negative Response t_T			0.661***		0.572***		0.881*		0.893*
			(0.211)		(0.210)		(0.458)		(0.519)
Negative Response t_T	0.582**	-0.011	-0.163	-0.003	-0.134	0.025	-0.291	-0.014	-0.362
	(0.240)	(0.114)	(0.110)	(0.096)	(0.086)	(0.231)	(0.357)	(0.251)	(0.375)
Negative Response t_A	0.108	0.046	0.057	0.082	0.091	-0.135	-0.140	-0.049	-0.054
	(0.214)	(0.111)	(0.103)	(0.127)	(0.117)	(0.257)	(0.248)	(0.285)	(0.263)
Cash Deal	0.002**	-0.001**	-0.001**	-0.001**	-0.001**	-0.001**	-0.001**	-0.001**	-0.001**
	(0.001)	(0.000)	(0.000)	(0.000)	(0.000)	(0.001)	(0.001)	(0.000)	(0.000)
Target Size	0.265***	-0.000	0.003	0.040	0.042	-0.072	-0.067	-0.002	0.003
	(0.048)	(0.031)	(0.032)	(0.027)	(0.028)	(0.063)	(0.063)	(0.064)	(0.065)
Relative Deal Size	0.355***	-0.096***	-0.096***	-0.088***	-0.088***	-0.050	-0.044	-0.069	-0.062
	(0.073)	(0.036)	(0.036)	(0.029)	(0.028)	(0.075)	(0.075)	(0.076)	(0.079)
Offer Premium	0.003	-0.011	-0.011	-0.004	-0.004	-0.026**	-0.025**	-0.013	-0.013
	(0.007)	(0.007)	(0.007)	(0.006)	(0.006)	(0.010)	(0.010)	(0.010)	(0.010)
Bidder's Termination Fee	0.184	0.100*	0.105*	0.133**	0.137**	0.082	0.091	0.095	0.104
	(0.172)	(0.055)	(0.055)	(0.056)	(0.056)	(0.083)	(0.086)	(0.094)	(0.095)
Target's Termination Fee	-1.042***	0.157*	0.146	0.123	0.113	0.232	0.201	0.182	0.148
	(0.338)	(0.093)	(0.092)	(0.097)	(0.096)	(0.148)	(0.152)	(0.183)	(0.191)
Tender Offer	-0.748***	0.120*	0.112*	0.101*	0.095*	0.200*	0.185*	0.166*	0.149
	(0.079)	(0.064)	(0.064)	(0.057)	(0.057)	(0.101)	(0.103)	(0.097)	(0.104)
Hostile	1.442***	-0.156**	-0.147**	-0.136**	-0.128**	-0.284**	-0.265**	-0.269**	-0.246*
	(0.092)	(0.069)	(0.070)	(0.065)	(0.064)	(0.112)	(0.116)	(0.119)	(0.126)
Cross Border	0.268***	-0.021	-0.015	0.012	0.017	-0.049	-0.041	-0.020	-0.012
	(0.068)	(0.048)	(0.048)	(0.045)	(0.045)	(0.073)	(0.072)	(0.085)	(0.084)
Firm Age	0.002	0.001	0.001	0.001	0.002*	0.003	0.003*	0.004**	0.004**
	(0.002)	(0.001)	(0.001)	(0.001)	(0.001)	(0.002)	(0.002)	(0.002)	(0.002)
Firm Size	-0.115***	0.040***	0.039***	0.026***	0.025***	0.067**	0.065**	0.054**	0.053**
	(0.017)	(0.011)	(0.011)	(0.009)	(0.009)	(0.029)	(0.030)	(0.025)	(0.026)
EBIT/Sales	-0.003	-0.002	-0.002	-0.000	-0.001	-0.003	-0.003	0.002	0.002
	(0.003)	(0.001)	(0.001)	(0.001)	(0.001)	(0.005)	(0.005)	(0.002)	(0.002)
Capex/Sales	0.008*	-0.002*	-0.002*	-0.001	-0.001	-0.004	-0.004	-0.001	-0.000
	(0.005)	(0.001)	(0.001)	(0.001)	(0.001)	(0.003)	(0.003)	(0.002)	(0.002)
Diversification	-0.055	0.092**	0.091**	-0.043	-0.044	0.076	0.077	-0.078	-0.078
	(0.061)	(0.045)	(0.044)	(0.040)	(0.040)	(0.064)	(0.064)	(0.068)	(0.067)
q of Bidder	-0.007	0.006	0.006	0.004	0.004	0.034**	0.037**	0.025*	0.028*
	(0.006)	(0.005)	(0.005)	(0.004)	(0.004)	(0.015)	(0.015)	(0.013)	(0.014)
Terminated Bid Experience	0.235***	-0.086***	-0.085***	-0.088***	-0.087***	-0.155***	-0.148***	-0.167***	-0.161***
	(0.053)	(0.031)	(0.031)	(0.031)	(0.031)	(0.052)	(0.053)	(0.058)	(0.061)
M&A Experience	0.015	0.009	0.011	0.022	0.024	0.033	0.035	0.042	0.043
	(0.056)	(0.021)	(0.022)	(0.020)	(0.020)	(0.037)	(0.038)	(0.040)	(0.040)
Alliance Experience	-0.063**	0.181***	0.178***	0.133***	0.131***	0.171***	0.169***	0.128***	0.126***
	(0.026)	(0.019)	(0.019)	(0.018)	(0.018)	(0.029)	(0.029)	(0.033)	(0.032)
Inverse Mills ratio (λ)		-0.197**	-0.184**	-0.170**	-0.159**	-0.360***	-0.330**	-0.301**	-0.267*
		(0.080)	(0.080)	(0.077)	(0.076)	(0.125)	(0.133)	(0.138)	(0.150)
Year and Industry FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Log Likelihood	-2139	-	-	-	-	-	-	-	-
R-squared	-	0.362	0.366	0.313	0.317	0.414	0.418	0.399	0.403
Observations	5,442	1,009	1,009	1,009	1,009	530	530	492	492

Notes. *** p<0.01, ** p<0.05, * p<0.10. Standard errors clustered by industries

Table 3. 2SLS Regression Results with Tech M&A Attempt Sample

Sample:	Terminated Tech M&A + Completed Tech M&A					
	First Stage	**Second Stage**		**First Stage**	**Second Stage**	
DV:	Terminated Tech M&A t_T	Alliances t_{T+1}	Alliances t_{T+1} (Matched)	Terminated Tech M&A t_T	Alliances t_{T+1}	Alliances t_{T+1} (Matched)
	(1)	(2)	(3)	(4)	(5)	(6)
Δ Realized Volatility	0.053***			0.054***		
	(0.011)			(0.011)		
Δ Realized Volatility × Negative Response t_T				0.148		
				(0.222)		
Terminated Tech M&A		0.487*	0.540**		0.420	0.466
		(0.260)	(0.272)		(0.263)	(0.304)
Terminated Tech M&A × Negative Response t_T					2.919***	3.213**
					(1.079)	(1.627)
Negative Response t_T	-0.037	0.261**	0.098	-0.129	-0.463**	-0.699*
	(0.080)	(0.124)	(0.127)	(0.131)	(0.200)	(0.363)
Year and Industry FE	Yes	Yes	Yes	Yes	Yes	Yes
Control Variables	Yes	Yes	Yes	Yes	Yes	Yes
F-Test	24.33	-	-	18.81	-	-
R-squared	0.433	0.321	0.256	0.433	0.324	0.261
Observations	1,623	1,623	1,623	1,623	1,623	1,623

Notes. *** $p<0.01$, ** $p<0.05$, * $p<0.10$. Standard errors clustered by industries

Table 4. Panel Data (Within) Regression Results with Terminated Tech M&A Attempt Sample

Sample:	Observations Pre + Post Tech M&A Termination				Observations Pre + Post Tech M&A Termination (Conditional on Alliances or Internal Build at t_{T+1})			
DV:	Alliances t_{T+1}		Alliances t_{T+1} (Matched)		Alliances t_{T+1}		Alliances t_{T+1} (Matched)	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
After	0.000	-0.003	-0.015	-0.019	0.076	0.078	-0.028	-0.027
	(0.066)	(0.066)	(0.046)	(0.047)	(0.067)	(0.066)	(0.075)	(0.070)
After × Negative Response t_T		0.254**		0.370***		0.597***		0.702***
		(0.118)		(0.087)		(0.088)		(0.209)
Deal FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year × Industry FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Control Variables	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
R-squared	0.685	0.686	0.696	0.696	0.770	0.771	0.785	0.786
Observations	1,364	1,364	1,364	1,364	772	772	722	722

Notes. *** $p<0.01$, ** $p<0.05$, * $p<0.10$. Standard errors clustered by industries. We employed a six-day unbalanced time window [-5, 1] for the panel regression models. The result is robust to the use of several different time windows (e.g., [-6,1] through [-10,1]). After is an indicator variable that takes a value one for all the years after a technological acquisition bid is terminated. All the panel regression models include deal fixed effect and industry group × year fixed effect to control for time-invariant characteristics of each deal and industry- and time-varying components of economic activity that may influence the decisions of a bidder firm. Age is absorbed by Year × Industry FE, and Negative Response t_T is absorbed by Deal FE.