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WHEN OVERCONFIDENT CEOS DELIVER HIGHER RETURNS: EVIDENCE FROM ACQUISITION WAVES

INTRODUCTION

Research indicates a large proportion of CEOs are subject to the cognitive bias of overconfidence, which is manifested by the illusion of superior knowledge and ability, an inflated perception of control and chances of success, and excessive certainty about the accuracy of beliefs (e.g. Hayward, Shepherd, & Griffin, 2006; Griffin & Varey, 1996; Moore & Healy, 2008). In the context of corporate control markets, research has consistently shown that overconfident CEOs are aggressive in making excessive acquisitions (Malmendier & Tate, 2008) in which they overpay for their targets (Hayward & Hambrick 1997; Roll, 1986). While this evidence sheds light on the role of CEO overconfidence in the general case of acquisitions, less attention has been paid to its role in the specific case of acquisitions during waves, which are periods of intense acquisition activities (Harford, 2005; Mitchell & Mulherin, 1996). By contrast to acquisitions in non-wave periods that are driven by desires for growth, synergies, or empire building (Berkovitch & Narayanan, 1993; Walsh & Seward, 1990), acquisitions during waves are often motivated by a need to adapt to changing industry structures caused by deregulation and economic shocks (Harford, 2005; Mitchell & Mulherin, 1996).

More specifically, in acquisition waves, the need for rapid action becomes critical. While acquirers in general benefit from comprehensive information collection and prudent pre-deal processes (Pavićević & Keil, 2021), this approach is less effective in acquisition waves due to the time-consuming nature of such planning and execution. Research shows that returns to acquisitions within a wave are not evenly distributed but instead largely influenced by acquirer positions within the wave (Carow, Heron, & Saxton, 2004; McNamara, Halebian, & Dykes, 2008). Specifically,

acquisitions made in the early stage of waves tend to have higher returns than those made in later stages and as such time of action is critical to the success of acquisitions within waves.

We therefore ask: why are some CEOs more likely to act early during acquisition waves, and what are the implications for value creation? To pursue our research question, we focus on the potential of CEO overconfidence to generate firm benefits in acquisitions waves in which decision speed is critical (Carow et al., 2004; McNamara et al., 2008). Acquirers that react quickly to deregulation and economic shocks benefit from market preemption (Frynas, Mellahi, & Pigman, 2006; Lieberman & Montgomery, 1988, 1998) and availability of high-quality targets (McNamara et al, 2008), which leads to higher acquisition returns. By contrast, acquirers acting late in waves are often driven by bandwagon pressures, with limited acquisition targets, and therefore more likely to make suboptimal acquisition decisions (McNamara et al., 2008). Research has shown overconfidence enlarges the set of opportunities CEOs perceive as possible (Navis & Ozbek, 2016) and prompts fast decision-making and action (Hambrick, Cho, & Chen, 1996; Pavićević & Keil 2021; Picone, Dagnino, & Mina, 2014). This enhanced perception of opportunities allows overconfident CEOs to react more quickly to economic shocks and deregulations compared with their non-overconfident peers, which leads to early entry in the acquisition waves. Because overconfident CEOs tend to initiate acquisitions earlier within these waves, they are more likely to capture preemption opportunities in which they seize high-quality targets or targets with cospecialized assets with lower costs, thereby eliciting more favorable market reactions. Accordingly, we hypothesize that in acquisition waves, the returns to acquisitions undertaken by overconfident CEOs are higher than those by other CEOs, and such a positive effect is mediated by action time.

In addition, we explore whether the above relationships are stronger under conditions in which overconfident CEOs are in firms with pre-wave acquisition experience. More specifically, we draw upon the existing research on organizational learning to argue that firms with pre-wave acquisition experience are more likely to develop acquisition routines (e.g., Halebian, Kim, & Rajagopalan, 2006), which moderates the role of CEO overconfidence in waves, such that this experience facilitates quicker movement into waves. We focus on experience from large, related acquisitions, which involve complex integration and coordination that prompt firms to develop refined and repeatable routines to streamline future acquisition deals and enhance efficiency, especially under time pressure (Ellis, Reus, Lamont, & Ranft, 2011). Well-established routines may facilitate various pre-deal processes that range from deal initiation, target selection, and acquisition announcements (Muehlfeld, Rao, Sahib, & Van Witteloostuijn, 2012). Routines allow overconfident CEOs to act even more swiftly during acquisition waves and enable decisive strategic moves grounded in established processes. Meanwhile, firms with experience in related acquisitions gain deeper insight into asset synergies and industry dynamics (Capron, Dussauge, & Mitchell, 1998), which allows them to perform better in waves. Therefore, we hypothesize that, in the context of acquisition waves, pre-wave experience from large and related acquisitions helps build routines that encourage overconfident CEOs to move even more quickly during acquisition waves. This accelerated decision-making enables overconfident CEOs to secure early-mover advantages, which enhances acquisition returns.

Using a sample of S&P 1500 firms in a 27-year period from 1992 through 2018, we found support for our theory and hypotheses. Our study has the potential to make contributions to the literature of corporate acquisitions in the following ways. First, we contribute to a temporal perspective of acquisitions by highlighting the role of CEO characteristics to influence acquisition

timing. Specifically, we identify the speed mechanism through which CEO overconfidence affects acquisition value. By showing that overconfident CEOs can generate value by acting quickly during acquisition waves, particularly in securing high-quality targets, we offer a more direct explanation and evidence than in prior studies. Although prior research has examined firm-level antecedents that influence the timing of acquisitions in waves (Haleblian, McNamara, Kolev, & Dykes, 2012), the absence of work on CEO traits affecting acquisition timing is surprising given that there is substantial literature on the effects of CEO characteristics on acquisition outcomes (e.g., Shi, Sun, & Prescott, 2012; Chen, Huang, Meyer-Doyle, & Mindruta, 2021; Gamache et al., 2019; Hayward & Hambrick, 1997; Malmendier & Tate, 2008; Roll, 1986). Our study shifts the focus of prior work to examine the manner in which CEO overconfidence influences swift action within waves and the associated market return benefits.

Second, we contribute to the literature on the benefits of CEO overconfidence in the context of corporate acquisitions. Prior work has shown that CEO overconfidence is unfavorable in acquisitions, as overconfident CEOs tend to make hasty acquisition decisions (Pavićević & Keil 2021) and overpay for targets (Hayward & Hambrick 1997; Roll, 1986). By contrast, we argue that in the context of acquisition waves, overconfidence emerges as advantageous for CEOs because it is associated with acting swiftly, which is a key success factor during acquisition waves. Recent studies have started to discuss the potential benefits of CEO overconfidence (e.g., Burkhard, Siren, Essen, Grichnik, & Shepherd, 2023; Galasso & Simcoe, 2011; Hirshleifer, Low, & Teoh, 2012). Along these lines, our study reveals a specific context in which CEO overconfidence has benefits—a condition in which action speed is key to success. Our proposed mechanism of fast decision-marking contributes to and compliments the existing literature that typically attributes the benefits

of CEO overconfidence to high risk-taking behavior (Burkhard et al., 2023; Galasso & Simcoe, 2011; Hirshleifer et al., 2012).

Finally, we contribute to research on acquisition experience by exploring the manner in which specific types of acquisition experience interact with CEO characteristics to influence acquisition processes, an area that has received scarce attention. Prior research on corporate acquisitions has typically investigated acquisition experience and CEO characteristics in isolation. Yet, if we consider the significant role of CEOs in acquisitions (e.g., Chen et al., 2021), examining the interplay between types of acquisition experience and CEO characteristics should yield valuable insights that enhance acquisition outcomes. Along these lines, we show that experience from large and related acquisitions encourages overconfident CEOs to move earlier during waves, which leads to enhanced acquisition returns.

THEORY AND HYPOTHESIS

First-mover Advantage in Acquisition Waves

Acquisition waves are periods of intense acquisition activities caused by industry shocks (Harford, 2005; Martynova & Rennboog, 2008; Mitchell & Mulherin, 1996). Under conditions in which industries undergo deregulation, technological advancements or economic shocks, managers react and compete to secure an optimal combination of assets to adapt to the new industry structure (Harford, 2005), which leads to a clustering of acquisition activities.

Scholars in strategic management find evidence for a “first-mover advantage” in acquisition waves (Carow et al., 2004; McNamara et al., 2008), which derives from three factors. First, early movers benefit from market preemption (Frynas et al., 2006; Lieberman & Montgomery 1988, 1998), which allows them to acquire strategic assets at lower costs (Sarkar, Cavusgil, & Aulakh, 1999). For instance, when industry shocks occur, firms engage in acquisitions to obtain better asset

combinations to adapt to changes brought by these shocks. An early acquirer's foresight may allow it to acquire a target firm at a lower cost than its competitors as the early mover acquires key resources in a market and integrates them before competitors fully recognize their true value (McNamara et al. 2008). Second, the short periods following industry shocks are characterized by a high level of uncertainty (Rhodes-Kropf & Viswanathan, 2004; Garfinkel & Hankins, 2011) and a large pool of available targets, which benefits early acquirers by allowing them to select high-quality targets. The acquirer's strategic insight may allow it to obtain distinctive and critical resources (Barney, 1991; Finkelstein, 1997), which leads to enduring economic rents. Finally, by acting early, acquirers can increase their likelihood of seizing the benefits associated with co-specialization of assets (McNamara et al., 2008). The resource-based view of the firm assumes firms create rents by selecting superior resource combinations that produce synergies (Makadok, 2001). Each firm possesses resources whose value is enhanced when combined with complementary resources, as opposed to their value in isolation. By acting earlier on superior information and preempting potentially competing firms, early acquirers can access a larger pool of targets, which increases the likelihood of identifying targets that produce synergies.

By contrast, late acquirers during acquisition waves are more likely to suffer losses. As high-quality targets are acquired by early movers, the pool of quality candidates becomes smaller. As desirable assets become scarcer and in greater demand later in waves, their price increases, which leads to higher premiums for later acquirers (Carow et al., 2004). Moreover, acquirers that join a wave late are often motivated by bandwagon pressures, rather than by rational assessments of the strategic value of acquisitions (McNamara et al., 2008). Thus, instead of conducting a comprehensive investigation of strategic opportunities and the value of alternative actions, firms motivated by an acquisition trend are less likely to scan all information and are less mindful in

decision-making, which leads to value-destroying acquisitions. Therefore, acquirers earn higher acquisition returns if they move earlier in waves but suffer losses if they fall behind. Based on the above discussion, we derive our baseline hypothesis:

Baseline hypothesis. *In acquisition waves, acquirers that act earlier have higher returns to acquisitions.*

CEO Overconfidence and First-mover Advantage in Acquisition Waves

Overconfidence refers to the belief that individuals have knowledge, skills, or ability superior to their peers (Hayward et al., 2006; Griffin & Varey, 1996). One explanation for overconfidence relates to biases in information processing (e.g., Hoch, 1985; Klayman 1995; Koriat, Lichtenstein, & Fischhoff, 1980). When making a judgement, individuals first retrieve relevant information from memory and form a preliminary answer and then continue to search for more information. Mechanisms of associative memory draw their attention to information consistent with initial impressions, which can bias the interpretations of subsequent evidence. Overconfidence occurs when individuals believe that their information search process is unbiased and thus behave consistently with their initial guess more than is justified (Klayman, Soll, & Gonzalez-Vallejo, 1999). Accordingly, overconfidence is manifested as the illusion of superior knowledge and ability compared to the averages (*above-average effect*) (Alicke, 1985; Svenson, 1981; Taylor & Brown, 1988), an inflated perception of control and chances of success (*overestimation effect*) (Langer 1975; Presson & Benassi, 1996), and excessive certainty about the accuracy of beliefs coupled with and underestimation of the volatility of random events (*miscalibration effect*) (Lichtenstein, Fischhoff, & Phillips, 1977; Ronis & Yates, 1987).

Based on this biased information processing, prior research argues and finds that overconfident CEOs tend to overestimate the probabilities of their desired outcomes (Griffin & Varey, 1996; Hayward et al., 2006) and underestimate the potential volatility of these outcomes (Ben-David et al., 2013; Moore & Healy, 2008), which leads to value-destroying decisions. For example, research shows that overconfident CEOs tend to overinvest in capital expenditures (Malmendier & Tate, 2005), engage in earnings management (Schrand & Zechman, 2012), ignore poor performance feedback (Schumacher, Keck, & Tang, 2020) and incur stock crashes (Kim, Wang, & Zhang, 2016). In the acquisition context, overconfident CEOs undertake excessive acquisitions (Malmendier & Tate, 2008) and pay higher premiums to acquire target companies (Hayward & Hambrick, 1997; Roll, 1986).

By contrast, though, overconfidence enlarges the set of opportunities perceived by CEOs by diverting their attention from factors that might otherwise cast doubt on the viability of potential opportunities. Therefore, overconfident CEOs are likely to perceive opportunities to exist in which other, less confident CEOs do not (Navis & Ozbek, 2016; Trevelyan, 2008). Research indicates that overconfident CEOs are particularly drawn to risky, challenging, talent- and vision-sensitive projects (Hirshleifer et al., 2012), as they tend to underestimate uncertainty (Li & Tang, 2010) while overestimating the net discounted expected payoffs (Hirshleifer et al., 2012; Malmendier & Tate, 2008). Accordingly, research indicates that overconfident CEOs invest more in capital expenditures and research and development (Ben-David et al., 2013; Campbell, Gallmeyer, Johnson, Rutherford, & Stanley, 2011; Malmendier & Tate, 2005), which leads to greater innovations for their firms (Hirshleifer et al., 2012; Galasso & Simcoe, 2011; Kraft, Dickler, & Withers, 2024).

Deregulation, technological advancements, or economic shocks incur or induce alterations in industry structure, which create great uncertainty among industry participants that may lead to hesitation to take actions (Harford, 2005; Mitchell & Mulherin, 1996). However, we assume overconfident CEOs are more likely to perceive the industrial deregulations and economic shocks as opportunities, as they downplay the uncertainties faced from these shocks. Their inflated belief in their ability to capitalize on perceived changes to industry structure provides them with a cognitive justification to pursue acquisitions to obtain industry assets to better adapt to the new industry structure. Such a decision-making approach enables overconfident CEOs to identify opportunities that their counterparts may overlook (Navis & Ozbek, 2016). For example, economic shocks may reduce demand, which causes some members of the industry to close unprofitable facilities. However, overconfident CEOs may underestimate the long-term impact of the shock-driven decline in demand such that they acquire the remaining facilities to achieve downsizing as they eliminate duplicate facilities and match capacity, which maintains economies of scale under the new industry structure of fewer firms (Dutz, 1989).

In addition, the relationship between overconfidence and opportunity perception will be strengthened in novel contexts in which CEOs face high levels of uncertainty (Navis & Ozbek 2016). Prior work shows that the cognitive bias of overconfidence is amplified in the presence of uncertainty (Hayward et al., 2006; Malmendier & Tate, 2008). In familiar contexts in which information is more readily available to determine the feasibility of possible opportunities, the effects of overconfidence on opportunities perception are mitigated. By contrast, in novel contexts in which information is less accessible, the effects of overconfidence are amplified. In these novel circumstances, CEO overconfidence has a positive and significant effect on the range of perceived opportunities (Navis & Ozbek, 2016).

Since most CEOs rarely experience acquisition waves in their careers, these periods can be seen as novel context in which overconfidence enhances the probability of opportunity perception (Navis & Ozbek, 2016). As noted above, overconfident CEOs are more likely to perceive and identify opportunities than other CEOs. This likelihood becomes especially significant under conditions in which industry shocks create opportunities for firms to reallocate and combine assets which enables them to better adapt to new industry structures. CEOs need to be proactive to recognize such opportunities during acquisition waves (Chen, 1996; Halebian et al., 2012). Along these lines, overconfident CEOs may enter acquisition waves earlier than their counterparts because they perceive the potential to acquire synthesized resources from high-quality targets at lower costs (Carow et al., 2004; McNamara et al., 2008). The onset of acquisition waves typically involves a high degree of uncertainty (Garfinkel & Hankins, 2011; Rhodes-Kropf & Viswanathan, 2004), which can deter risk-averse CEOs from entering acquisition waves immediately. However, overconfident CEOs tend to underestimate uncertainty in the context of deregulations and economic shocks, which further motivates their early entrance in acquisition waves.

Furthermore, overconfident CEOs often have inflated beliefs in the accuracy and adequacy of their information, which leads them to improvise and make decisions rapidly (Ben-David et al., 2013; Hmielecki, Corbett, & Baron, 2013). Overconfident CEOs draw on their intuition and past successful practices in their quick decision-making and associated actions (Hambrick, Cho, and Chen, 1996). For example, research indicates that overconfident CEOs exhibit less hesitation when presented with investment opportunities (Gervais, Heaton, & Odean, 2011). Pavićević and Keil (2021) proposed three ways in which overconfidence accelerates CEO decision-making and associated actions in the context of corporate acquisitions. First, overconfident CEOs often form opinions about acquisition price rapidly without engaging in time-consuming due diligence of the

target. Second, overconfident CEOs excessively rely on their own decision-making models, which leads to less thorough and time-demanding analyses (Picone et al., 2014). Third, overconfident CEOs favor a highly centralized corporate hierarchy (Hiller & Hambrick 2005), which expedites their decision-making. Yet, quick decision-making is potentially fraught with risk as it entails less attention to strategic analysis to assess a firm's resources, and competitive strengths and weaknesses. However, research indicates that faster decision-making may generate higher performance in highly volatile competitive contexts (Eisenhardt, 1989b; Eisenhardt & Bourgeois, 1988). Information in highly volatile contexts is often inaccurate, unavailable, or obsolete (e.g., Meyer, 1982; Bourgeois, 1985). Therefore, the competitive positions in highly volatile contexts change quickly, which makes strategies such as "wait and see" or imitation significantly less effective. As we mentioned above, acquisition waves are formed because managers reallocate and combine assets to cope with the technological, regulatory, or economic shocks that occur in their industries. In such a competitive context, fast decision-making and acting, which may be unfavored in general acquisitions in which more thorough analysis can be beneficial, may enable a firm to capture first-mover advantage and obtain higher returns associated with the early stage of acquisition waves.

Moreover, overconfident CEOs embrace information consistent with their own beliefs while rejecting inconsistent information (Korsgaard, Meglino, & Lester, 1997), which makes them less influenced by the actions of their peers (Tang, Mack, & Chen, 2018). Accordingly, in acquisition waves, overconfident CEOs respond less to bandwagon pressures (McNamara et al., 2008) in which they do not feel obliged to join the wave based on peer actions. Thus, it is reasonable to infer that acquisitions undertaken by overconfident CEOs during waves are concentrated at the early stages of waves. The logic above leads to our first hypothesis:

Hypothesis 1a. *In acquisition waves, overconfident CEOs act earlier than other CEOs.*

Based on the above discussion, overconfident CEOs are prone to initiate acquisitions at the outset of waves under conditions in which the pool of high-quality targets or targets with cospecialized assets is larger. Therefore, the returns to acquisitions undertaken by overconfident CEOs during an acquisition wave are more likely to be higher than those undertaken by other CEOs. While overconfident CEOs are often criticized for making value-destroying acquisitions (Malmendier & Tate, 2008) due to their tendency to overestimate the value of targets and overpay for them (Hayward & Hambrick, 1997; Roll, 1986), we contend that the situation is different in the context of acquisition waves. Acquisitions undertaken by overconfident CEOs during waves are mainly concentrated at the waves' onset, when the true values of the targets remain unrevealed, which allows acquirers to obtain strategic targets at lower costs (McNamara et al., 2008). Thus, we hypothesize as follows:

Hypothesis 1b. *In acquisition waves, the returns to acquisitions undertaken by overconfident CEOs are higher than those undertaken by other CEOs.*

Mediating Effect of Action Time

The preceding discussion suggests that the key mechanism through which overconfident CEOs outperform others in acquisition waves is their time of action, i.e., they act earlier than other CEOs. Overconfident CEOs are more likely to perceive deregulation and industry shocks as opportunities and they make swift decisions, which enable them to enter acquisition waves early. As noted previously, early movers benefit from market preemption as they secure high-quality targets or targets with cospecialized assets with lower costs, which leads to higher returns to acquisitions. Therefore, we expect that acquirer action time (speed of action) mediates the positive

relation between CEO overconfidence and the acquisition returns in acquisition waves. We therefore hypothesize as follows:

Hypothesis 2. *In acquisition waves, action time mediates the positive relation between CEO overconfidence and returns to acquisitions. Specifically, overconfident CEOs act earlier than other CEOs, which in turn increases the returns to acquisitions.*

To further test the argument of action time, in the next section, we identify factors that are likely to increase the speed of decision-making for overconfident CEOs in acquisition waves and thus strengthen the positive effects of overconfidence. In particular, we examine CEO experience in acquiring large, related targets. We argue that, since large targets are relatively more complex, they contribute to the development of more sophisticated firm-level acquisition routines, which may enable overconfident CEOs to move even faster within acquisition waves. Additionally, experience from acquiring related targets equips firms with valuable insights into the strategic configurations that generate value within their industry. We develop these ideas below.

Moderating Effect of Acquisition Experience

Behavioral learning theory assumes that organizational experience produces organizational routines, which can become a competitive advantage by shaping the rules of strategic decision-making (Levitt & March, 1988). Routines are essentially patterns of action that reflect the prior experience of an organization with particular tasks (Nelson & Winter, 1982). As firms accumulate experience in a certain organizational routine, they develop expertise and competence, thereby becoming proficient in performing associated tasks (Anand, Mulotte, & Ren, 2016). In the context of acquisition, experience leads to the development of routines associated with the acquisition

process (Haleblian et al., 2006), such as templates or guidelines to integrate targets more effectively.

McNamara et al. (2008) argued that firms with greater acquisition experience are less likely to achieve early-mover advantages, based on the logic that procedural memory developed through acquisition routines may constrain the scope of information search for acquiring firms. Nevertheless, because the empirical findings on the association between acquisition experience and acquisition returns are mixed (e.g., Barkema, Bell, & Pennings, 1996; Haleblian & Finkelstein, 1999; Hayward, 2002; Uhlenbruck, Hitt, & Semadini, 2006; Zollo & Singh, 2004), we believe that “important contingencies are at play” (Barkema & Schijven, 2008b: 595). Motivated by Ellis et al. (2011), we decompose pre-wave acquisition experience and theorize that experience from acquiring large and related targets prior to acquisition waves fosters routines, which facilitate overconfident CEOs to act more rapidly during waves.

Overall, we argue routines developed from large, related acquisitions provide overconfident CEOs with greater assurance of the potential success of strategic actions, which compels them to act earlier in waves. Large acquisitions as compared to small ones require a more complex integration process and greater managerial capacity to realize synergies (Ellis et al., 2011; Lubatkin, 1983; Seth, 1990; Shrivastava, 1986). Managing large acquisitions involves numerous interrelated decisions and the coordination of multiple organization members across business units, departments, and functional areas. Under conditions in which firms acquire many large targets, they develop more streamlined acquisition routines that can serve as blueprints for subsequent acquisitions. These routines represent codified knowledge and repeatable processes that firms have refined over time through managing the complex challenges inherent in large-scale deals. Such routines contain formal procedures for processing essential due diligence information about

targets, negotiating with target shareholders (Amburgey & Miner, 1992; Paine & Power, 1984), and established approaches to the timing and sequencing of integration (e.g., Haspeslagh & Jemison, 1991; Zollo & Singh, 2004). With increased experience from acquiring large targets, firms finetune their routines and apply them semiautomatically. In particular, firms can exploit and refine routines that contribute most to their success while filtering out less successful ones (Cyert & March, 1963; Vermeulen & Barkema, 2001). With gradually refined routines, firms can conduct negotiations more efficiently, which facilitates the acquisition process.

Importantly, in the context of acquisition waves in which swift action is important, these refined routines developed prior to waves become particularly valuable for overconfident CEOs. In fast-paced environments, overconfident CEOs are empowered to act quickly. Under conditions in which overconfident CEOs identify new acquisition opportunities, especially in time-pressured environments such as acquisition waves, they can rely on well-established routines developed from large acquisitions to quickly mobilize the necessary resources, and coordinate cross-functional teams. Accordingly, rather than re-inventing the wheel, overconfident CEOs may draw upon a playbook of proven acquisition process tactics, which allows for a smoother and faster transition from opportunity identification to deal announcement, thereby providing a competitive edge in acquisition waves in which timing is critical. By relying on these procedures established in large acquisitions prior to waves, CEOs may perceive the risks associated with new acquisitions as manageable, since much of the uncertainty is potentially mitigated by the organization's prior learning and routinized responses. The sense of preparedness and predictability enable CEOs already inclined to make acquisitions, such as overconfident CEOs, to pursue ambitious acquisition strategies, particularly in fast-paced, competitive environments such as acquisition waves in which decisive action is required.

In addition, experience from acquiring related targets equips firms with knowledge not only about the acquisition process itself, but also about the strategic configurations that generate value within their industry. This experience allows CEOs to better understand the manner in which targets with different types of assets—such as technologies, customer bases, distribution channels, or human capital—interact and complement one another to create industry level competitive advantage (Zollo & Singh, 2004; Capron et al., 1998). Rather than evaluating targets solely on standalone performance or size, experience from acquiring related targets enables acquirers to leverage industry relevant factors that may contribute to economies of scale, scope, or enhanced innovation potential (Haleblian et al., 2006). This experience with related targets enables overconfident CEOs to pursue acquisitions that potentially blend more effectively with the acquiring firm than less related firms.

Overall, then, pre-wave experience of acquiring large and related targets moderates the relationship between CEO overconfidence and acquisition returns during industry waves, as such experience enhances the effectiveness of overconfident CEOs' rapid action. Therefore, we hypothesize as follows:

Hypothesis 3a. *In acquisition waves, pre-wave large and related acquisition experience strengthens the effect of CEO overconfidence on action time.*

Hypothesis 3b. *In acquisition waves, pre-wave large and related acquisition experience strengthens the effect of CEO overconfidence on acquisition returns.*

RESEARCH METHOD

Sample and Identification of Acquisition Waves

We began with all U.S. domestic acquisitions (both the acquirer and target are from U.S.) between 1980 and 2018 from Securities and Data Corporation (SDC) database (e.g., Hardford, 2005; McNamara et al, 2008). Consistent with prior work, we excluded financial services industries (four-digit SIC codes starting with 6) since firms in these industries have different asset structures and acquisition strategies from other industries (Haleblian et al., 2012). We also excluded transactions associated with repurchases, minority stake purchases, self-tender, and transactions where the acquirer obtained less than 50% of the target's equity (e.g., Hayward & Hambrick, 1997; Pavićević & Keil, 2021). These two steps resulted in a total of 132,368 completed acquisitions by 58,312 firms, which formed the basis for identifying acquisition waves.

Next, we followed prior studies (e.g., McNamara et al., 2008; Haleblian et al., 2012) and identified industry acquisition waves by calculating the number of completed acquisitions in each four-digit SIC industry by year. We then screened for relatively short periods—a maximum of six years—of intense acquisition activity¹. For each rolling six-year period in an industry, if the number of acquisitions went up by greater than 100% (peak year) over the first year, and then declined by greater than 50 percent from the peak year, then we identified the period as an acquisition wave. We identified a year as the final year of a wave if, for the first time in the six-year period, the number of acquisitions in that year was less than half of the number recorded in the peak year. Therefore, the length of a wave could be six years or any other duration. For example, if the number of acquisitions went down by 50% over the peak year at the 4th year, then the length of the wave was considered 4 years. This process produced 28 acquisition waves occurring in 27 industries, with a total of 5,461 completed acquisitions. The details of acquisition waves are shown in Table 1.

Insert Table 1 about Here

To ensure that the identified acquisition wave represents a genuine wave rather than a random occurrence, we follow Harford (2005) by assessing whether the increase in acquisition frequency exceeds what would be expected by chance. Specifically, we calculated the total number of acquisitions within an industry during a presumed wave. We then simulated 1,000 distributions of these acquisitions over the same period by randomly assigning each acquisition to one of the years within the period, with each year having a $1/6$ probability of assignment. For each of the 1,000 simulations, the peak concentration (the highest number of acquisitions) is determined. Finally, we assessed the probability that the number of acquisitions in the peak year of our presumed acquisition wave was due to chance. According to Harford's (2005) logic, a period can be identified as a true acquisition wave if the actual peak concentration of acquisitions exceeds the 95th percentile peak concentration in the simulated distribution set. In our analysis, the actual peak concentration in all identified acquisition waves surpassed this threshold. These results confirm that the acquisition waves we identified were not random occurrences but reflected significant, nonrandom increases in acquisition activity during these periods.

From the 5,461 acquisitions in waves, we excluded acquirers that were privately held firms or lacked financial information in Compustat. This step reduced the sample to a total of 1,299 transactions. Subsequently, these transactions were merged with the Execucomp database, which provides detailed information on executives of S&P 1,500 firms (including names, positions, compensation, options, etc.), allowing us to calculate CEO overconfidence. This process resulted in a final sample of 624 acquisitions. Since our main analysis is based on S&P 1,500 firms, we also

conducted an additional analysis that incorporates non-S&P1500 acquirers to address potential concerns regarding sample selection bias.

Dependent Variables

Action Time. Following Haleblan et al. (2012), we calculated the timing of firm action within an acquisition wave by dividing the number of days each acquisition announcement occurred after the first acquisition in a wave by the total number of days in the wave.² Thus, this measure ranges from zero to one, with the first acquisition in the wave having the lowest value, and the last acquisition having the highest value. We used this ratio as the dependent variable because we aimed to capture the relative position of an acquisition within a wave. In the unreported analysis, we changed the dependent variable to the absolute number of days between an acquisition announcement date and the first acquisition date in a wave and obtained consistent results.

Cumulative Abnormal Returns (CAR). Studies on corporate acquisitions typically use the acquirer's cumulative abnormal returns around the acquisition announcement date to evaluate the return of an acquisition (e.g., Malmendier & Tate, 2008). Following prior work, we first calculated daily abnormal return as the difference between the raw return of a security and the market return, measured by CRSP value-weighted return (Bao & Edmans, 2011; Malmendier & Tate, 2008). Next, to assess the influence of an acquisition event on the acquirer, we calculated the cumulative abnormal returns from three days before to three days after the announcement of the acquisition. In untabulated analysis, we repeated regressions using both shorter and longer windows to account for both potential information leakage before announcements and any price adjustments after announcements (Carow et al. 2004; McWilliams & Siegel, 1997), and we obtained consistent results.

Independent and Moderating Variables

CEO Overconfidence. We used CEO stock option holdings and exercising decisions to identify overconfident CEOs (Malmendier & Tate 2005, 2008; Banerjee, Humphery-Jenner, & Nanda, 2015). Malmendier and Tate (2015, p40) noted that “the most common approach to measuring CEO overconfidence has been to use decisions that the executive makes on his or her personal portfolio of company stock options.” Kaplan, Sørensen and Zakolyukina (2022) further validated this measure by demonstrating that it is significantly related to several specific characteristics typically associated with overconfidence, thereby supporting the validity of the option-based measure of CEO overconfidence.

The basic logic is that under-diversified and risk-averse CEOs normally exercise their in-the-money options early. If CEOs persistently delayed the exercise of their in-the-money options, we inferred that they were overconfident in their ability to keep the firm’s stock price rising and wanted to profit from expected price increases by holding the options. To operationalize this, we first calculated the total value per option of in-the-money options as the total realizable value of exercisable options (Execucomp item: opt_unex_exer_est_val) divided by the number of exercisable options (Execucomp item: opt_unex_exer_num). Next, we calculated the average percent value of in-the-money options by dividing the total value per option of in-the-money options by the stock price at the end of the fiscal year (Compustat item: prcc_f). If CEOs’ average percent value of in-the-money options was in the top quartile of all CEOs in a given year, we classified them as exhibiting overconfident behavior for that year (Banerjee et al., 2015). We defined CEO Overconfidence as a binary variable that equaled 1 if a CEO was classified as overconfident in a given year, and 0 otherwise. In additional analyses, we repeated regressions

using alternative measures of CEO Overconfidence based on CEO's stock purchases and firm investment and obtained consistent results.³

Pre-wave Large and Related Acquisition Experience. Following previous research on acquisition experience (e.g., Ellis et al., 2011; Porrini, 2004), we considered acquisition experience in a rolling window of four years.⁴ We first operationalized Pre-wave All Acquisition Experience as the number of acquisitions a firm made during the four years prior to the year before an acquisition wave began in the firm's industry. Similarly, we operationalized Pre-wave Large & Related Acquisition Experience as the number of large and related acquisitions a firm made during the four years prior to the year before an acquisition wave began in the firm's industry. An acquisition is defined as large and related if the deal was at least US \$ 100 million and the target was in the same two-digit SIC code as the acquirer (Ellis et al., 2011) (our results are robust to the usage of four-digit SIC code). We then measure Pre-wave Other Acquisition Experience as the difference between Pre-wave All Acquisition Experience and Pre-wave Large & Related Acquisition Experience. For the ease of interpretation, these variables were mean-centered.

Control Variables

Several factors at CEO, firm, and deal level were included in the model to control for their effects on acquisition returns. At the CEO-level, we included CEO Age (measured as the logarithm form of a CEO's age), CEO Tenure (measured as the logarithm of a CEO's tenure), CEO Bonus to Salary (measured by dividing a CEO's salary by his bonus), CEO Vested Option (measured by dividing a CEO's number of unexercised exercisable options by common shares outstanding), and Female CEO (a binary variable indicating whether the CEO was a female), all of which could be

correlated with the level of overconfidence and influence acquisition returns (Malmendier & Tate, 2005, 2008).

Ideally, we should control for variables that proxy for board power. However, board-level data before year 2000 in the BoardEx and IRRC databases are incomplete (Chen, Crossland, & Huang, 2016; Larcker, So, & Wang, 2013). Given that a significant portion of acquisition waves occurred prior to the year 2000, excluding these acquisitions would result in the loss of approximately one-third of the sample. To address this limitation, we instead controlled for CEO power, based on the assumption that greater CEO power likely reduces the effectiveness of board monitoring. Following prior research, we captured CEO power using the following variables: (1) CEO Duality, which was coded as 1 if the CEO was also the chairman of the board, and 0 otherwise (Finkelstein & D'Aveni, 1994); (2) CEO Ownership, which was measured as the logarithm form of CEOs share percentage (Kang, Zhu, & Zhang, 2021); (3) CEO Title Number, which was measured as the number of titles the CEO held within the firm (Bigley & Wiersema, 2002); (4) CEO Pay Slice, which was measured as CEO total compensation relative to the total compensation of the top five executives within the firm (Bebchuk, Cremers, & Peyer, 2011).

At the firm-level, we controlled several factors found to influence acquisition behavior in waves (Haleblian et al., 2012). Research indicates that smaller firms are more likely to conduct exploration (March, 1991), and as such firm size may influence a firm's awareness of opportunities, which in turn influences its action time in acquisition waves (Haleblian et al., 2012). We used Total Assets (measured as the logarithm of a firm's total assets) to proxy for firm size. Research has also shown that firms with heavily technological development activities tend to be pioneers and early entrants in acquisition waves (Haleblian et al., 2012; Robinson & Chiang, 2002; Schoenecker & Cooper, 1998). Accordingly, we used R&D Spending (measured by dividing a firm's R&D

spending by its total assets) to proxy for firm technology intensity. Research has shown less diversified firms are more focused, which enables them to enter acquisition waves earlier (Haleblian et al., 2012), thus, we also included Level of Diversification (measured by the entropy index for the firm (Palepu, 1985)). Since higher financial slack and performance provide a firm greater capability and legitimacy to act quickly in acquisition waves (Haleblian et al., 2012), we included Free Cash Flow (measured by dividing a firm's operation cash flow by its total assets) and ROA (measured by dividing a firm's net income by its total assets) in our models. In addition, we controlled several firm characteristics that may influence both acquisition returns and CEO overconfidence, which include Capital Intensity (measured by dividing a firm's capital expenditures by its total assets), Intangible Assets (measured by dividing a firm's intangible assets by its total assets), Asset Turnover (measured by dividing a firm's sales by its total assets), Debts to Assets Ratio (measured by dividing a firm's long-term debts by its total assets), and Sales Growth (measured as a firm's sales divided by its lagged sales minus one (Haleblian et al., 2012; Harford, 2005; Malmendier & Tate, 2008)). The above firm-level variables were measured at the end of the year before the acquisition year.

We also controlled deal-level factors that influence acquisition returns. Whether an acquisition is diversified or not influences the potential synergies between the acquirer and the target (Beckman & Haunschild, 2002). Consistent with this view, research shows firms that undertake related acquisitions outperform those that undertake diversified acquisitions (Morck, Shleifer, & Vishny, 1990). We included Diversified Acquisition (a binary variable indicating that an acquirer and a target were in different industries based on 2-digit SIC code) to capture this distinction. Carow et al. (2004) posited the methods of payment used by acquirers were also likely to influence the relationship between the positions in the waves and acquisition returns. The use of stock

payment signals the acquirer is less certain about the underlying value of the acquisition, which may lead to a later move in the acquisition waves. Therefore, acquisitions with stock payment tend to yield lower returns than those paid with cash. Accordingly, we included Stock Payment (a binary variable indicating that an acquirer used stock for part or the entirety of the transaction) to account for this effect. Studies show that whether the target is a public firm will influence acquisition returns (e.g., Banerjee et al. 2015). We included Public Target (a binary variable that indicates the target is a public firm) to account for such effects. The attitudes underlying acquisitions are also expected to affect acquisition returns, as hostile acquisitions are likely to trigger target firms' response and resistance, which lead to increased acquisition costs (Comment & Schwert 1995). We included Tender Offer (a binary variable, which indicates whether an acquisition started as a tender offer) to account for an acquirer's attitudes.

Finally, we controlled for market conditions and industry-specific factors. As firms highly valued by the capital market are more likely to conduct acquisitions (Rhodes-Kropf & Viswanathan 2004), we included Market to Book Ratio (measured by dividing an acquirer's market value at the end of the year before acquisition year by its book value of assets) to capture the acquirer's relative market valuation. We also included industry binary variables to account for the systematic differences across the industries explored in the study (Haleblian et al. 2012).

Analysis

Because we require acquisition announcement returns for our analysis, our sample includes only firms that conducted acquisitions. To mitigate the potential concerns of sample selection bias, we adopted Heckman's two-stage procedure widely used in acquisition studies (e.g., Chen et al., 2016). In the first stage, for all the S&P 1500 firms during the sample period, we created a dummy variable that equaled 1 if a firm engages in an acquisition in a certain year and 0 otherwise. Next,

we ran a probit model to estimate the likelihood of a firm conducting an acquisition in a given year by regressing this dummy on a set of lagged CEO-level and firm-level variables, while controlling for industry and year fixed effects (e.g., Chen et al., 2016; Li & Peng, 2021). Finally, we calculated the Inverse Mill's Ratio (IMR) and included it in our second-stage regression models to control for potential sample selection bias.

It is crucial in the first stage to select an instrument variable that meets specific criteria. The instrument must predict the likelihood of a firm conducting acquisitions in a year and be unrelated to the action time or acquisition returns in the second-stage models (Certo, Busenbark, Woo, & Semadeni, 2016; Wang, Zhu, Avolio, Shen, & Waldman, 2023). We argue that pre-acquisition interim industry-level volatility satisfies these conditions. Bhagwat, Dam, and Harford (2016) showed that exposure to interim market volatility decreases acquisition activity because potential acquirers and targets are concerned that market conditions may deteriorate between the deal announcement and completion date. Their results suggest that higher industry-level interim market risk was negatively related to industry-wide acquisition activities. Along similar lines, we operationalized Pre-Acquisition Industry Volatility as the median annual standard deviation of an acquirer's industry peer abnormal returns. Because this variable is derived from industry peers, it should not be directly related to either a firm's specific future acquisition time or returns.

Our main analysis explores whether overconfident CEOs act earlier, and therefore, perform better than other CEOs in the acquisition waves. We first used the Tobit regression to test the hypotheses about time of action, as the dependent variable, Action Time, is censored at 0 and 1 (Haleblian et al. 2012).⁵ Then, we used OLS regression to test hypotheses about acquisition returns. We used an industry fixed-effect model to test our hypothesis, because it allowed us to account for idiosyncratic industry differences that are not captured by our control variables (Haleblian et al.

2012)⁶. We obtained robust standard errors to account for the potential heteroskedasticity of the observations. In additional analysis, we combined within-wave observations with non-wave observations to explore whether overconfident CEOs perform better in acquisition waves than in other periods.

RESULTS

Table 2 presents descriptive statistics and the correlation matrix. Overall, the correlations among variables are low. To further exclude the possibility of multicollinearity among variables, we calculated variance inflation factors (VIF) to detect the presence of any multicollinearity. The average VIF for all variables is 2.15, and the VIFs for individual variables range from 1.05 to 3.61, which are well below the rule-of-thumb cutoff of 10 (Neter, Wasserman, & Kutner, 1985). Therefore, we did not find evidence of multicollinearity in our sample.

Insert Table 2 about Here

We follow prior studies (e.g., Malhotra, Zhu, & Reus, 2015; Pavićević & Keil 2021) to adopt a Heckman two-stage regression to address the self-selection problem in our sample selection. Table A in the Online Appendix reports the results for the first-stage regression, which predicted the likelihood of a firm conducting acquisitions in a given year. The findings indicate the instrument variable is negatively related to the likelihood of a firm undertaking acquisitions in a year. Our further untabulated analysis shows the instrument variable is not related to action time or acquisition returns in the second-stage models. To examine the strength of the instrument, we conducted an F-test by regressing the first-stage dependent variable on the instrument variable

alone (Koh, Qian, & Wang, 2014; Kotha, Zheng, & George, 2011). The F statistic was 13.26, well above the critical value, which indicates the variable is a strong instrument (Certo et al., 2016). We then added the IMR generated from the first-stage analysis as a control variable in the second-stage analysis to account for potential sample selection bias (Pavićević & Keil, 2021).

Table 3 presents the second-stage regression results that test our baseline and first set of hypotheses. Model 1 and Model 2 only include control variables, while Model 3, Model 4, and Model 5 only include independent variables. Model 6 regresses CAR on Action Time and control variables to test the baseline hypothesis, which proposes acquirers who act earlier in waves have higher returns to acquisitions. The coefficient estimate of Action Time is negative and significant ($\beta = -0.039$, $p = 0.010$), which suggests acquirers benefit from the first-mover advantage in acquisition waves (Carow et al. 2004; McNamara et al. 2008). Model 7 regresses Action Time on CEO Overconfidence to test Hypothesis 1a, which proposes that overconfident CEOs act earlier in acquisition waves. In support of this hypothesis, the coefficient estimate of CEO Overconfidence is negative and significant ($\beta = -0.096$, $p = 0.001$). Model 8 regresses CAR on CEO Overconfidence and control variables to test Hypothesis 1b, which posits that in acquisition waves, overconfident CEOs have higher returns to acquisitions than other CEOs. The coefficient estimate of CEO Overconfidence is significantly positive ($\beta = 0.023$, $p = 0.038$), which supports Hypothesis 1b. In terms of economic significance, our results suggest in acquisition waves, on average, overconfident CEOs act 210.24 ($0.096 \times 365 \times 6$) days faster and earn 2.3% higher returns than non-overconfident CEOs.

Insert Table 3 about Here

In Hypothesis 2, we posited CEO overconfidence is positively associated with early action in acquisition waves, which, in turn, enhances acquisition returns. To test this mediation effect, we performed a Sobel (1982) test. Because our sample size may not fully meet the distribution assumptions underlying the Sobel test (Fritz & Mackinnon, 2007), we used the bootstrapping technique (5000 iterations) suggested by Preacher and Hayes (2004). The test confirms the statistical significance of the mediating effects of Action Time ($z=1.82$, $p=0.069$).

For a further robustness test of mediation, we employed the causal step method first used by Baron and Kenny (1986), which involves estimating three separate regression equations. In the first step, CAR is regressed on CEO Overconfidence and the control variables (Table 3, Model 8). In the second step, the mediating variable, Action Time, is regressed on CEO Overconfidence and control variables (Table 3, Model 7). In the final step of the mediation analysis, CAR is regressed on CEO Overconfidence, Action Time, and control variables, the results of which are presented in Table 4. Although CEO Overconfidence influences CAR and Action Time (i.e., the mediating factor) in the first two steps, the effect of CEO Overconfidence on CAR is smaller in absolute terms under conditions in which the mediator is included (step 3 presented in Table 4, $\beta = 0.020$, $p = 0.072$), compared to when the mediator is excluded (step 1 presented in Table 3 Model 8, $\beta = 0.023$, $p = 0.034$), which is consistent with Action Time mediating the relationship between CEO Overconfidence and CAR. In additional analysis, we used an alternative measure of CEO Overconfidence to repeat the analysis, and the results remain consistent.

In sum, we find evidence that action time at least partially mediates the relationship between CEO overconfidence and returns to acquisitions, suggesting that overconfident CEOs tend to move earlier in acquisition waves, which in turn leads to higher acquisition returns. Although our limited

sample size did not allow a test of full mediation, the results indicate action time plays an important role in converting CEO overconfidence into enhanced acquisition returns.⁷

Insert Table 4 about Here

Table 5 presents the second-stage regression results of testing the moderating effects (Hypotheses 3a and 3b). In Model 1 and Model 2, we decomposed Pre-wave All Acquisition Experience into Pre-wave Large & Related Acquisition Experience and Pre-wave Other Acquisition Experience. Model 3 and Model 4 include the interaction term between CEO Overconfidence and Pre-wave Large & Related Acquisition Experience. Model 3 tests Hypotheses 3a, which proposes that large and related acquisition experience strengthens the effect of CEO overconfidence on action time in acquisition waves. It shows that the coefficient of the interaction term between CEO Overconfidence and Pre-wave Large & Related Acquisition Experience significantly predicts Action Time ($\beta = -0.154$, $p = 0.050$), which supports Hypothesis 3a. Model 4 tests Hypothesis 3b, which proposes that large and related acquisition experience strengthens the effect of CEO overconfidence on acquisition returns in acquisition waves. The coefficient estimate of the interaction term between CEO Overconfidence and Pre-wave Large & Related Acquisition Experience significantly predicts CAR ($\beta = 0.051$, $p = 0.033$), which supports Hypothesis 3b. Economically, a one standard deviation increase in the value of Pre-wave Large & Related Acquisition Experience will speed up overconfident CEOs by 134.90 ($0.4 \times 0.154 \times 365 \times 6$) days and make them earn 2.04% higher acquisition returns⁸.

In Figures 1 and 2, we plotted the interaction between CEO Overconfidence and Pre-wave Large & Related Acquisition Experience, while other variables were held at their mean values. Figure 1 shows the Action Time decreases as Pre-wave Large & Related Acquisition Experience increases for both Overconfident CEOs (long solid line with circle symbol) and Other CEOs (dash line with triangle symbol). However, the slope of Overconfident CEOs is significantly steeper than Other CEOs, which supports Hypothesis 3a. Figure 2 shows CAR increases with Pre-wave Large & Related Acquisition Experience for both Overconfident CEOs (long solid line with circle symbol) and Other CEOs (dash line with triangle symbol). More importantly, the slope of Overconfident CEOs is significantly steeper than Other CEOs, which supports Hypothesis 3b.

Insert Table 5, Figure1, and Figure 2 about Here

ADDITIONAL ANALYSIS

We conducted several tests to mitigate endogeneity concerns. First, to address concerns about omitted variables that may influence both CEO overconfidence and acquisition speed, we included the predicted probability of CEO overconfidence in our analysis in which we found the coefficient of CEO Overconfidence consistent with our main results. Next, using propensity score matching (Rosenbaum & Rubin, 1983), we paired overconfident CEOs with similar non-overconfident CEO in which we used bootstrapped standard errors to conduct statistical inference. We found that overconfident CEOs acted 214.62 days faster on average, which supports our main results. Robustness checks using the impact threshold of a confounding variable (ITCV) (Frank, 2000) show that a confounder would need a much higher correlation than observed to overturn our findings, which indicates our results are unlikely to be invalidated by omitted variables.

In addition, we further address the concern that overconfident CEOs may achieve higher returns due to unobservable firm-level factors, like access to private information, rather than decision-making speed. If this were true, acquisition returns of overconfident CEOs should be similar both within and outside waves. To address this concern, we combined acquisitions that occurred within waves and outside waves. We created a dummy variable, *Wave*, to indicate whether an acquisition is within a wave or not. We re-ran the OLS regression with the interaction term of *Wave* and CEO Overconfidence in the combined sample. We found that the interaction term significantly and positively predicts acquisition returns, which indicates that overconfident CEOs perform better within waves. Thus, unobservable firm-level factors are less likely to confound the results. We discussed the details and results of these tests in Appendix B.

We conducted several additional analyses to demonstrate the robustness of our results. First, we tested whether overconfident CEOs acted earlier using the alternative waves identified by Mitchell and Mulherin (1996) and Harford (2005), which occurred in the 1980s and 1990s. Despite the limited sample size, regression analyses continued to show overconfident CEOs acted earlier in these waves, which supports H1a. Second, we conducted robustness checks by incorporating board-related variables. We re-estimated the regressions for all hypotheses with these additional controls and confirmed that our results remained consistent. Third, we used an alternative behavioral measure of CEO overconfidence based on CEO net purchase of firm stock (Malmendier & Tate, 2005). We found that the coefficient estimate of the stock-based measure of CEO Overconfidence predicts Action Time, which supports Hypothesis 1a. Finally, to mitigate the potential concern of sample selection bias, we also included an alternative sample by including non-S&P 1500 firms. Because CEO-level data for these firms was not available in the existing database, we constructed an alternative measure of CEO overconfidence based on firm investment

data, which is accessible in Compustat. Our results are robust to the expanded sample and the usage of the investment-based measure of CEO overconfidence (Campbell et al., 2011). We discussed the details and results of these tests in Appendix C.

We also conducted several tests to exclude alternative explanations. First, to exclude the possibility that the higher returns achieved by overconfident CEOs stem from their superior target-selection ability, we compared the returns to acquisitions for overconfident and non-overconfident CEOs in the first year of waves in which we found that overconfident CEOs did not achieve higher returns to acquisitions than other CEOs in the first year of waves. Second, to rule out the possibility that the premiums paid by overconfident CEOs influences action time in waves, we included acquisition premium as a control variable and tested Hypothesis 1a using a reduced subsample (we were only able to calculate acquisition premiums for public targets). Even with the limited sample size, we continued to find that overconfident CEOs acted earlier than other CEOs in acquisition waves. We elaborate on the details and results of these tests in Appendix D. Finally, we provide further evidence on the decision-making speed mechanism. We argue that overconfident CEOs are subject to more stringent oversight after the passage of SOX in 2002, which may also restrain their discretion and speed of decision-making of over-confident CEOs (Bargeron, Lehn, & Zutter, 2010; Wagner & Dittmar, 2006). We found that the passage of SOX reduces the effect of CEO overconfidence on both action time and subsequent acquisition returns within acquisition waves. We discuss the details and results of these tests in Appendix E.

DISCUSSION

Although prior work has shown that CEO overconfidence leads to negative firm outcomes, we consider a context in which CEO overconfidence shows merits: acquisition waves. The motivations and the speed requirements for acquisitions occurring in waves are different from

those in other periods. We considered whether CEO overconfidence, typically unfavorable in the general circumstances, becomes an advantage in the specific case of acquisition waves. Consistent with our hypothesis, we found that overconfident CEOs are more likely to capture preemption opportunities by acting earlier in acquisition waves. Moreover, during these acquisition waves, the returns to acquisitions undertaken by overconfident CEOs are higher than those by other CEOs. We further examined whether the relationship between CEO overconfidence and acquisition behavior is strengthened under conditions in which CEOs are supported by established acquisition routines. Drawing on organizational learning theory, we argued that firms with pre-wave acquisition experience in large and related acquisitions are more likely to develop refined routines. CEOs perceive these routines as allowing them to streamline the acquisition process under time pressure, which emboldens and enables them to make acquisitions in waves. Thus, these routines enable overconfident CEOs to act even more swiftly and strategically during acquisition waves. Consistent with this argument, we found pre-wave large and related acquisition experience amplifies the impact of CEO overconfidence on acquisition timing and subsequent returns during acquisition waves.

Theoretical Contributions

Our study makes a significant contribution to the corporate acquisition literature in the following two key aspects. First, we advance the temporal perspective of acquisitions by emphasizing the role of CEO characteristics to shape the timing of acquisitions. We identify the speed mechanism through which CEO overconfidence affects acquisition value. By showing that overconfident CEOs can generate value by acting quickly during acquisition waves, particularly in securing high-quality targets, we offer for the first time a direct explanation for acquisition wave success as driven by the CEO.

Moreover, we place the implications of our research within the broader stream of research in the early stage of acquisitions in which we study a critical timing decision—when to act during acquisition waves. While decision speed has been studied in the context of acquisition integration (e.g., Bauer & Matzler, 2014), relatively little attention to speed has been given to the earlier stage of the process. Although there has been research conducted on the pre-deal phase of acquisitions (e.g., Welch, Pavicevic, Keil, & Laamanen, 2020), we specifically offer a link between CEO personality and speed, which is critical for the early stage of an acquisition. Existing research on acquisition timing includes studies that explore preemptive acquisitions (Carow et al., 2004), early movers in acquisition waves (McNamara et al., 2008), and entry timing (Miller & Folta, 2002). While prior research has examined firm-level characteristics, such as technology intensity, size, diversification, and slack that influence the timing of acquisitions in waves (Haleblian et al., 2012), empirical studies in this area remain limited (Shi et al., 2012). Notably, no studies to date have investigated the manner in which CEO traits influence the timing of acquisitions, which is surprising given the extensive literature on the effects of CEO traits on acquisition outcomes (e.g., Chen et al., 2021; Gmamche et al., 2019; Hayward & Hambrick 1997; Malmendier & Tate, 2008; Roll, 1986). Our study advances this stream of research by shifting the focus from firm-level factors to leadership effects —specifically examining how CEO traits, particularly CEO overconfidence, affect both the timing of acquisitions and the value realized during acquisition waves.

Second, we advance the discussion on the relationship between CEO overconfidence and corporate acquisitions. Prior studies suggest that CEO overconfidence is antithetical to corporate acquisitions. For instance, Malmendier and Tate (2008) argued and found that overconfident CEOs

overestimated the synergies generated from takeover, which lead them to undertake more acquisitions than their less confident counterparts. In addition, they found a negative relationship between CEO overconfidence and acquisition returns (Malmendier & Tate, 20008). By contrast, our study demonstrated that overconfident CEOs outperformed their peers during acquisition waves. We also found in additional analysis that overconfident CEOs performed better during these waves compared to periods outside of waves. Therefore, we reveal the relationship between CEO overconfidence and acquisition returns is contingent on the acquisition context in which during acquisition waves, overconfidence, rather than being an unfavorable characteristic, becomes an advantage.

In addition, we contribute to the acquisition experience literature by exploring how the interaction between specific types of acquisition experience and CEO characteristics influence the acquisition process—an area that has received scant research attention. Empirical research on the relationship between acquisition experience and acquisition returns has produced mixed results, which suggest that “important contingencies are at play and, thus, researchers need to dig deeper” to better understand the varying effects of prior acquisition experience (Barkema & Schijven, 2008b, p.595). Prior research on corporate acquisitions typically investigates acquisition experience and CEO characteristics in isolation, as such it remains unclear whether certain CEOs benefit more from established acquisition routines. We add value to this line of research by showing that routines developed from large and related acquisitions enable overconfident CEOs to move even faster during acquisition waves, which leads to enhanced acquisition returns.

Previous studies that show a positive relationship between CEO overconfidence and favorable firm outcomes tend to attribute the underlying mechanism to the benefits of overconfidence to increased risk-taking (Burkhard et al., 2023; Galasso & Simcoe, 2011; Hirshleifer et al., 2012). The

underlying mechanism of fast decision making—although attributed to overconfident CEOs—has not yet been linked to enhanced performance in prior work. Accordingly, we also contribute to the literature of CEO overconfidence by showing that CEO overconfidence can be beneficial in contexts in which action speed is critical to success.

Practical Implications

Our findings also have practical implications. Research shows overconfident managers are more likely promoted to CEO under value-maximizing corporate governance (Goel & Thakor, 2008), and that a significant proportion of CEOs exhibit traits of overconfidence (e.g., Malmendier & Tate, 2005). Considering the ubiquitousness of overconfidence among CEOs and managers, boards should explore the context in which such traits may be most effectively leveraged. Our study shows that in acquisition wave contexts in which fast decision-makings and early moves are rewarded, overconfidence becomes an advantage. More broadly, Eisenhardt (1989) and Judge and Miller (1991) assumed that fast decision-making leads to higher performance in high-velocity environments. Lieberman and Montgomery (1988, 1998) argued that early mover advantages are evident if firms have technological leadership, preemption of assets, or buyer switching costs. Accordingly, boards should consider the potential benefits of appointing overconfident CEOs or executives in these contexts. Thus, while prior research on corporate governance emphasizes the enhancing benefits of board scrutiny and oversight over CEO decisions (e.g., Banerjee, et al., 2015; Barger et al., 2010; Krause, Withers, & Semadeni, 2017), our study suggests potential drawbacks of rigid governance systems. Although boards help mitigate the risks associated with a powerful CEO operating without proper checks, they may also slow down decision-making processes. Yet, in contexts where swift action and decision-making are critical, such as during acquisition waves, board rigidity might negatively impact firm performance.

Future Research

This study suggests opportunities for future research. First, we argue that overconfident CEOs act earlier during acquisition waves because of their faster decision-making mode based on arguments from the psychology literature on overconfidence. Although we identified a condition that may influence the decision-making process and therefore explain the variation in decision-making speed, we lack data that can directly observe overconfident CEO decision-making processes. Future research could consider using experiments to examine whether overconfident individuals reach decisions more quickly to better illustrate our proposed mechanism.

Second, we focus on acquisition waves after 1992, as the ExecuComp dataset only provides CEO-level data from this point forward. However, the 1980s witnessed several significant and well-known acquisition waves, which were characterized by hostile takeovers (aggressive, unsolicited bids aimed at acquiring targets without board consent), leveraged buyouts (where acquisitions were financed using substantial debt backed by the target company's assets), and junk bond financing (a method of funding acquisitions with high-yield but high-risk debt instruments). We encourage scholars to collect CEO-level data from this earlier period to examine whether our findings remain consistent.

Third, acquisition research focusing on CEO characteristics may benefit from considering different configurations with specific types of acquisition experience. Future research may consider various types of acquisition experience and their interaction with CEO personality or cognitive characteristics, such as narcissistic tendencies (Chatterjee & Hambrick, 2007), humility (Ou, Waldman, & Perterson, 2018), or differing ideologies (Chin, Hambrick, & Treviño, 2013), to explore whether specific configurations of CEO personality traits and types of acquisition experience are associated with superior acquisition returns. With recent methodological advances

in the study of CEO personalities (Harrison, Thurgood, Boivie, & Pfarrer, 2019), future research is well-positioned to explore these interrelationships more effectively.

Finally, our study suggests overconfidence can be advantageous in the contexts in which fast decision making or early moves are rewarded. Future research may explore such contexts, particularly within the rapidly evolving field of AI technology. Early movers—firms that pioneer new AI applications or breakthroughs—likely will secure significant advantages, which include market dominance, stronger intellectual property portfolios, and earlier adoption by customers. For example, Altman publicly released ChatGPT in 2022, despite internal safety concerns, betting that rapid user adoption would prompt regulators and society to quickly adapt. Such aggressive moves enabled OpenAI to secure a dominant position and emerge as the leading face of generative AI. Similarly, Tesla’s leadership in AI-powered automotive technology stems from a series of early decisions—such as investing in custom AI chips, adopting a vision-only approach over LIDAR, and harnessing real-world data from its global fleet—even amid widespread industry skepticism. Tesla’s CEO, Elon Musk, is often characterized as overconfident, given his propensity for strong, sometimes unrealistic, claims, high-risk decision-making, and unwavering self-assurance despite external skepticism. For example, he has aggressively promoted Tesla’s Full Self-Driving technology, repeatedly promising full autonomy “next year” since 2015, despite significant regulatory and technical hurdles. Although this overconfidence has contributed to missed deadlines, Tesla’s early and ambitious investments in AI have ultimately secured its leadership position in the industry. Therefore, we encourage future research to study the ways in which overconfidence can benefit firms engaged in technologies that value speed in product delivery such as developing AI technology.

CONCLUSION

This study revisits the role of CEO overconfidence and shows that, in the context of acquisition waves, such overconfidence can be an advantage rather than a liability. We found that overconfident CEOs are more likely to act early and capture higher acquisition returns during waves—particularly when supported by prior experience with large and related acquisitions. Refined routines associated with acquisition experience appear to enable fast, effective decision-making, under time pressure. Our findings contribute to the acquisition literature in which we highlight the importance of CEO traits to shape acquisition timing and returns. We also demonstrate the value of examining CEO characteristics and acquisition experience together, which offers a more nuanced view of the conditions under which overconfidence can benefit firm outcomes.

NOTES

1. Our findings hold when we limit our waves to rolling five- or four-year periods.
2. One of our reference points for calculating action time is the acquisition announcement date. However, the negotiation process from the initiation of an acquisition to its public announcement can take several months (Fich, Cai, & Tran, 2011), potentially introducing noise into our measure of action time. As pinpointing the exact date when a CEO initiated an acquisition is challenging and would require access to proprietary internal data, we conduct a sensitivity test to account for the negotiation process. Specifically, we noticed that in Fich et al. (2011)'s sample, the median length of the acquisition negotiation period is 76 days. Given that acquisitions of private firms are much less complex than those of public firms, we assumed that the majority negotiation periods in our sample should be less than 76 days. Accordingly, we created a counterfactual treatment group in which we adjusted the announcement dates of acquisitions made by non-overconfident CEOs, in which we moved them 76 days earlier, while keeping the announcement dates of acquisitions made by overconfident CEOs unchanged. If, under such hypothetical circumstances, overconfident CEOs still acted earlier than non-overconfident CEOs in acquisition waves, then it would suggest overconfident CEOs are systematically quicker than their non-overconfident counterparts. The untabulated results show that overconfident CEOs still acted earlier than non-overconfident CEOs, even when all non-overconfident CEOs were assumed to act 76 days in advance. This finding is consistent with our primary results.
3. The existing research presents conflicting views on whether overconfidence is a stable characteristic or a fluctuating state over time. Some studies propose that overconfidence is influenced by inherent factors like self-efficacy (Bandura, 1977), which suggests it should be treated as an unchanging individual-level trait (e.g., Brown & Sarma, 2007; Malmendier & Tate, 2005; Simon & Houghton, 2003). By contrast, other work assumes that overconfidence can vary over time, and should therefore be operationalized accordingly (e.g., Ahmed & Duellman, 2013; Campbell et al., 2011). In the main test, we operationalized CEO Overconfidence as a time-varying measure. In additional analysis, we followed Malmendier and Tate (2005) to develop an alternative measure of overconfidence, which can capture the stable trait of overconfidence. Note that 20 CEOs in our final sample were not granted stock options, we therefore

imputed CEO Overconfidence using the investment-based measure (Ahmed & Duellman, 2013; Campbell et al., 2011) for these CEOs. Our results remain robust regardless of whether these 20 CEOs are included.

4. We followed previous studies (e.g., Bruton, Oviatt, & White, 1994; Ellis et al., 2011; Fowler & Schmidt, 1989; Porri, 2004) to use a window of 4 years prior to a focal acquisition to measure acquisition experience. In our unreported analysis, we also used a window of 3 years prior to a focal acquisition and obtained consistent results.

5. In our unreported analysis, we also turned Action Time into a log form and ran OLS regression with industry-fixed effects, and the results are consistent.

6. To ensure that our results are not driven by outliers, we winsorized all variables at the 1% level.

7. Based on our theory, we propose that action time fully mediates the relationship between CEO overconfidence and acquisition returns. Empirically, when we include Action Time in the model, the coefficient of CEO Overconfidence becomes marginally significant, although not fully insignificant. This result may be due to limited sample size. Alternatively, this may suggest that there may be nuanced, micro-level factors not fully captured by our current data, which may reveal other positive effects arising from CEO overconfidence. For example, Phua, Tham, and Wei (2018) showed that overconfident CEOs induce stronger commitments from stakeholders.

8. Additional caveats are needed to interpret the results in Table 5. In Model 1 and Model 2, in which the interaction terms are not included, the coefficients of Pre-wave Large & Related Acquisition Experience successfully predict Action Time ($\beta = -0.102$, $p = 0.015$) and CAR ($\beta = 0.020$, $p = 0.097$). On the surface, this may suggest that experience from acquiring large and related targets helps all firms move faster and earn higher acquisition returns in waves. However, under conditions in which the interaction term between CEO Overconfidence and Pre-wave Large & Related Acquisition Experience are included in Model 3 and Model 4, the main effects of Pre-wave Large & Related Acquisition Experience disappear in both models. We further split the sample into overconfident and other CEOs and re-ran the regression analysis. Our untabulated results show Pre-wave Large & Related Acquisition Experience only marginally predict Action Time ($\beta = -0.114$, $p = 0.097$) and cannot predict CAR in the subsample of non-overconfident CEOs, which suggests such experience is most likely to work for overconfident CEOs, who initiate acquisitions more quickly and capture a larger share of acquisition gains early in the waves. By contrast, for other CEOs who act later in the waves, such experience offers limited advantage, as the majority of value creation is concentrated at the beginning of the wave (McNamara et al., 2008).

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Table 1
Description of Acquisition Waves

Acquirer SIC	Industry	Wave Date Range	Total Acquisitions Number	First Year Acquisitions Number	Peak Year Acquisitions Number	Final Year Acquisitions Number
0742	Veterinary Services for Animal Specialties	2018-2020	82	13	51	18
1389	Oil and Gas Field Services	2005-2009	110	14	38	7
2741	Miscellaneous Publishing	2004-2007	105	17	34	17
2752	Commercial Printing, Lithographic	1996-2000	115	16	37	8
3533	Oil and Gas Field Machinery and Equipment	1996-1999	64	11	27	10
3674	Semiconductors and Related Devices	1998-2002	437	59	156	65
3812	Search, Detection, Navigation, Guidance, Aeronautical	1997-2001	116	20	44	12
4841	Cable and Other Pay Television Services	1997-2001	276	32	91	36
4899	Communications Services	2002-2005	57	11	23	11
4924	Natural Gas Distribution	1997-2000	62	11	23	9
4953	Refuse Systems	1996-1999	408	57	163	60
5045	Wholesale-Computers and Peripheral Equipment and Software	1995-1998	147	23	73	29
5112	Stationery and Office Supplies	1995-1998	139	26	57	9
5113	Industrial and Personal Service Paper	1992-1996	102	12	38	3
5411	Retail-Grocery Stores	2002-2005	82	15	35	9
5511	Motor Vehicle Dealers	1996-2000	133	11	52	15
5912	Retail-Drug Stores and Proprietary Stores	1995-1999	224	26	64	26
5999	Miscellaneous Retail Stores	1999-2001	103	17	65	21
7011	Hotels and Motels	1995-1999	353	47	107	44
7359	Services-Equipment Rental and Leasing	1996-2000	207	28	81	18
7363	Help Supply Services	1995-1999	278	33	78	17
7375	Information Retrieval Services	1998-2001	1245	169	514	220
7812	Motion Picture and Video Tape Production	1999-2002	88	16	36	16
8071	Services-Medical Laboratories	2009-2012	69	12	26	12
8082	Services-Home Health Care Services	1994-1998	273	39	84	32
8721	Accounting, Auditing, and Bookkeeping Services	2000-2003	117	16	61	25
8731	Commercial Physical and Biological Research	1994-1997	69	12	28	11

Table 2
Summary Statistics and Correlation Matrix

	Mea	SD	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1 Action Time	0.48	0.23	1														
2 CAR	0.00	0.09	-0.10	1													
3 CEO Overconfidence	0.54	0.50	-0.20	0.12	1												
4 Pre-wave Large & Related Acquisition	0.11	0.40	-0.08	0.03	-0.14	1											
5 Pre-wave Other Acquisition Experience	2.92	4.72	-0.07	-0.03	0.21	-0.01	1										
6 CEO Age	3.98	0.15	-0.06	-0.05	0.08	0.20	0.17	1									
7 CEO Tenure (Ln)	1.87	0.69	0.07	-0.02	0.03	0.09	-0.10	0.45	1								
8 CEO Bonus to Salary	1.13	1.38	-0.03	-0.03	0.20	-0.08	0.25	0.29	-0.10	1							
9 CEO Vested Options	5.23	5.57	0.05	0.04	0.03	-0.06	0.06	0.08	0.05	0.04	1						
1 Female CEO	0.00	0.04	0.07	-0.03	-0.04	-0.01	-0.02	-0.04	0.01	-0.01	-0.04	1					
1 CEO Duality	0.20	0.40	0.15	-0.16	-0.25	0.11	-0.15	0.06	-0.01	-0.05	-0.04	-0.02	1				
1 CEO Ownership	-0.61	2.19	-0.11	-0.10	0.09	-0.12	0.08	0.03	0.37	-0.25	-0.05	0.06	-0.19	1			
1 CEO Title Number	2.03	0.73	0.18	-0.09	-0.30	0.28	-0.36	0.14	0.13	-0.17	-0.17	-0.06	0.67	-0.18	1		
1 CEO Pay Slice	0.37	0.13	0.07	0.01	0.00	0.05	-0.04	-0.09	-0.10	-0.01	0.17	-0.03	-0.10	0.08	-0.13	1	
1 Total Assets (Ln)	7.26	1.52	0.16	-0.10	-0.24	0.29	-0.08	0.23	-0.13	0.37	-0.24	-0.08	0.29	-0.37	0.36	-0.13	1
1 R&D Spending	0.04	0.07	0.03	0.11	0.12	-0.05	-0.26	-0.03	0.09	0.05	0.08	-0.02	-0.02	-0.20	0.03	0.11	-0.01
1 Level of Diversification	-1.54	4.23	0.07	0.04	0.00	-0.42	-0.03	0.00	-0.02	0.10	0.01	0.00	0.01	0.07	-0.14	0.01	0.05
1 Free Cash Flow	0.29	0.23	-0.02	-0.12	0.10	0.04	-0.05	-0.08	-0.08	0.09	0.01	-0.02	-0.06	0.08	-0.23	0.12	0.16
1 ROA	0.08	0.10	-0.05	-0.07	0.24	-0.01	-0.07	0.07	0.01	0.29	-0.09	0.01	-0.19	0.20	-0.20	0.13	-0.01
2 Capital Intensity	0.09	0.07	-0.05	0.00	0.23	-0.19	-0.20	-0.17	0.00	-0.01	0.09	-0.03	-0.19	0.06	-0.16	0.09	-0.13
2 Intangible Assets	0.39	0.43	0.05	0.00	0.06	0.04	0.20	-0.45	-0.14	-0.10	-0.09	0.02	-0.16	0.12	-0.30	0.06	-0.10
2 Asset Turnover	1.59	1.24	-0.11	-0.01	0.00	-0.11	-0.14	-0.44	-0.15	-0.21	-0.18	0.04	-0.20	0.34	-0.21	0.07	-0.17
2 Debts to Assets Ratio	0.31	0.30	-0.03	-0.07	0.07	-0.06	0.06	-0.28	0.00	-0.34	-0.13	-0.04	-0.08	0.44	-0.07	0.02	-0.02
2 Sales Growth	0.44	0.64	-0.01	0.10	0.23	-0.16	0.02	-0.58	-0.14	-0.16	-0.11	-0.01	-0.37	0.25	-0.36	0.14	-0.29
2 Diversified Acquisition	0.60	0.49	0.08	-0.06	-0.10	-0.01	0.01	0.09	-0.06	0.10	-0.06	0.03	0.15	0.05	0.07	-0.02	0.12
2 Stock Payment	0.16	0.37	-0.09	0.06	0.08	0.00	-0.09	-0.16	0.00	-0.07	0.08	-0.02	-0.07	-0.05	-0.04	0.11	-0.13
2 Public Target	0.08	0.26	-0.02	-0.08	-0.05	0.06	0.00	0.06	0.00	0.08	0.05	-0.01	-0.02	-0.01	0.03	-0.01	0.11
2 Tender Offer	0.02	0.13	0.06	-0.06	-0.05	0.05	0.02	0.09	0.01	0.14	-0.01	-0.01	0.05	-0.02	0.03	-0.02	0.12
2 Market to Book Ratio	4.76	4.68	-0.07	0.07	0.44	-0.14	-0.12	-0.39	-0.11	0.02	-0.13	-0.02	-0.18	0.05	-0.30	0.14	-0.22
			16	17	18	19	20	21	22	23	24	25	26	27	28	29	
1 R&D Spending			1														
1 Level of Diversification			0.07	1													
1 Free Cash Flow			-0.19	0.00	1												
1 ROA			0.05	-0.03	0.41	1											
2 Capital Intensity			0.15	-0.03	0.28	0.31	1										
2 Intangible Assets			-0.32	0.01	0.18	-0.06	-0.11	1									
2 Asset Turnover			-0.24	0.15	0.34	0.17	-0.01	0.50	1								
2 Debts to Assets Ratio			-0.36	0.11	0.17	-0.11	0.03	0.53	0.37	1							
2 Sales Growth			-0.02	0.12	0.28	0.15	0.20	0.61	0.60	0.44	1						
2 Diversified Acquisition			-0.02	0.11	0.02	0.01	-0.21	-0.05	0.00	-0.02	-0.13	1					
2 Stock Payment			0.29	0.01	-0.12	-0.04	0.11	-0.09	-0.04	-0.06	0.10	-0.12	1				
2 Public Target			0.07	0.02	0.03	0.06	0.05	-0.09	-0.04	-0.08	-0.03	0.00	0.39	1			
2 Tender Offer			0.04	0.05	-0.01	0.02	-0.03	-0.04	-0.05	-0.08	-0.08	0.03	0.04	0.47	1		
2 Market to Book Ratio			0.36	0.03	0.24	0.29	0.24	0.38	0.30	0.20	0.51	-0.07	0.19	-0.03	-0.04	1	

Note: 624 observations. Correlations ≥ 0.01 or ≤ -0.01 are significant at the 0.05 level.

Table 3
Regression Results of Testing Baseline Hypothesis and Hypothesis 1

Dependent Variables:	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8
	Action Time	CAR	CAR	Action Time	CAR	CAR	Action Time	CAR
CEO Overconfidence				-0.123*** (0.021)	0.014* (0.007)		-0.096*** (0.030)	0.023** (0.011)
Action Time			-0.029** (0.014)			-0.039*** (0.015)		
Pre-wave All Acquisition Experience	0.000 (0.004)	-0.002 (0.001)				-0.002 (0.001)	-0.000 (0.004)	-0.002 (0.001)
CEO Age (Ln)	-0.282** (0.143)	0.004 (0.051)				-0.007 (0.051)	-0.205 (0.148)	-0.016 (0.053)
CEO Tenure (Ln)	0.067*** (0.022)	0.000 (0.007)				0.003 (0.007)	0.058** (0.023)	0.002 (0.007)
CEO Bonus to Salary Ratio	-0.019 (0.012)	-0.001 (0.004)				-0.002 (0.004)	-0.012 (0.011)	-0.003 (0.004)
CEO Vested Option	0.007*** (0.002)	0.000 (0.001)				0.001 (0.001)	0.007*** (0.002)	0.000 (0.001)
Female CEO	0.670*** (0.087)	-0.077*** (0.028)				-0.051* (0.030)	0.639*** (0.086)	-0.069** (0.028)
CEO Duality	-0.036 (0.059)	-0.009 (0.018)				-0.010 (0.018)	-0.023 (0.061)	-0.013 (0.018)
CEO Ownership	-0.010 (0.008)	-0.004 (0.004)				-0.005 (0.004)	-0.011 (0.008)	-0.004 (0.004)
CEO Title Number	0.087** (0.039)	-0.009 (0.012)				-0.006 (0.012)	0.091** (0.043)	-0.008 (0.012)
CEO Pay Slice	0.254*** (0.079)	-0.015 (0.037)				-0.005 (0.037)	0.222*** (0.078)	-0.008 (0.037)
Total Assets (Ln)	0.044*** (0.015)	0.000 (0.005)				0.002 (0.005)	0.033** (0.015)	0.003 (0.005)
R&D Spending	-0.553 (0.351)	-0.139 (0.153)				-0.160 (0.151)	-0.698** (0.338)	-0.097 (0.156)
Level of Diversification	0.006** (0.003)	0.001 (0.001)				0.001 (0.001)	0.005** (0.003)	0.001 (0.001)
Free Cash Flow	-0.100 (0.099)	-0.046* (0.027)				-0.049* (0.027)	-0.095 (0.095)	-0.045* (0.027)
ROA	-0.032 (0.155)	-0.045 (0.067)				-0.046 (0.066)	-0.067 (0.152)	-0.036 (0.066)
Capital Intensity	-0.124 (0.210)	-0.086 (0.079)				-0.091 (0.077)	-0.121 (0.206)	-0.087 (0.079)
Intangible Assets	0.066* (0.040)	-0.015 (0.023)				-0.012 (0.022)	0.037 (0.041)	-0.006 (0.023)
Asset Turnover	-0.021 (0.023)	-0.001 (0.013)				-0.002 (0.013)	-0.025 (0.023)	-0.001 (0.013)
Debts to Assets Ratio	-0.098 (0.061)	-0.028 (0.027)				-0.032 (0.027)	-0.044 (0.059)	-0.041 (0.028)

Sales Growth	0.053 (0.038)	0.033** (0.015)				0.035** (0.015)	0.063* (0.037)	0.029* (0.015)
Diversified Acquisition	0.036* (0.020)	0.003 (0.008)				0.004 (0.008)	0.036* (0.020)	0.003 (0.008)
Stock Payment	-0.058* (0.031)	0.004 (0.012)				0.002 (0.012)	-0.058* (0.031)	0.003 (0.012)
Public Target	-0.012 (0.045)	-0.031* (0.018)				-0.031* (0.017)	-0.016 (0.043)	-0.029* (0.018)
Tender Offer	0.111 (0.071)	-0.011 (0.027)				-0.006 (0.026)	0.101 (0.065)	-0.008 (0.026)
Market to Book Ratio	0.004 (0.003)	0.001 (0.002)				0.001 (0.002)	0.010*** (0.003)	-0.000 (0.002)
Inverse Miller's Ratio	-0.033 (0.029)	0.009 (0.011)	0.007 (0.009)	-0.103*** (0.023)	0.012 (0.010)	0.008 (0.011)	-0.075** (0.030)	0.019 (0.012)
Constant	1.042* (0.599)	0.026 (0.196)	-0.003 (0.015)	0.729*** (0.051)	-0.034** (0.016)	0.067 (0.195)	0.911 (0.598)	0.062 (0.198)
(Pseudo) R-squared	0.298	0.119	0.068	5.227	0.068	0.127	10.829	0.126
Observations	624	624	624	624	624	624	624	624

Note: Standard errors in parentheses; * p<0.1, ** p<0.05, *** p<0.01; Industry fixed effects are included.

Table 4
Regression Results of Testing Hypothesis 2

	Model 1
Dependent Variable:	CAR
CEO Overconfidence	0.020* (0.011)
Action Time	-0.034** (0.015)
Pre-wave All Acquisition Experience	-0.002 (0.001)
CEO Age (Ln)	-0.023 (0.052)
CEO Tenure (Ln)	0.004 (0.007)
CEO Bonus to Salary Ratio	-0.003 (0.004)
CEO Vested Option	0.001 (0.001)
Female CEO	-0.048 (0.030)
CEO Duality	-0.014 (0.018)
CEO Ownership	-0.004 (0.004)
CEO Title Number	-0.006 (0.012)
CEO Pay Slice	-0.001 (0.037)
Total Assets (Ln)	0.004 (0.005)
R&D Spending	-0.122 (0.155)
Level of Diversification	0.001 (0.001)
Free Cash Flow	-0.048* (0.027)
ROA	-0.038 (0.065)
Capital Intensity	-0.091 (0.077)
Intangible Assets	-0.005 (0.023)
Asset Turnover	-0.002 (0.013)
Debts to Assets Ratio	-0.042 (0.027)
Sales Growth	0.032** (0.015)
Diversified Acquisition	0.004 (0.008)
Stock Payment	0.002 (0.012)
Public Target	-0.030* (0.017)
Tender Offer	-0.005 (0.026)
Market to Book Ratio	0.000 (0.002)
Inverse Miller's Ratio	0.017 (0.012)
Constant	0.092 (0.196)
R-squared	0.132
Observations	624

Note: Standard errors in parentheses; * p<0.1, ** p<0.05, *** p<0.01; Industry fixed effects are included.

Table 5
Regression Results of Testing Hypothesis 3

	Model 1	Model 2	Model 3	Model 4
Dependent Variables:	Action Time	CAR	Action Time	CAR
CEO Overconfidence (a)	-0.090*** (0.029)	0.022** (0.011)	-0.080*** (0.030)	0.018* (0.011)
Pre-wave Large Related Acquisition Experience (b)	-0.102** (0.042)	0.020* (0.012)	-0.066 (0.049)	0.009 (0.012)
Pre-wave Other Acquisition Experience	0.001 (0.004)	-0.002 (0.001)	0.002 (0.004)	-0.002 (0.001)
(a) x (b)			-0.154** (0.078)	0.051** (0.024)
CEO Age (Ln)	-0.201 (0.145)	-0.017 (0.052)	-0.218 (0.145)	-0.012 (0.052)
CEO Tenure (Ln)	0.067*** (0.023)	0.000 (0.007)	0.082*** (0.025)	-0.004 (0.007)
CEO Bonus to Salary Ratio	-0.020* (0.011)	-0.001 (0.004)	-0.021* (0.011)	-0.001 (0.004)
CEO Vested Option	0.007*** (0.002)	0.000 (0.001)	0.007*** (0.002)	0.000 (0.001)
Female CEO	0.648*** (0.085)	-0.072** (0.028)	0.674*** (0.087)	-0.080*** (0.029)
CEO Duality	-0.008 (0.060)	-0.016 (0.018)	-0.013 (0.060)	-0.015 (0.018)
CEO Ownership	-0.013* (0.008)	-0.004 (0.004)	-0.014* (0.008)	-0.003 (0.004)
CEO Title Number	0.083** (0.042)	-0.007 (0.012)	0.089** (0.041)	-0.009 (0.012)
CEO Pay Slice	0.242*** (0.076)	-0.013 (0.037)	0.234*** (0.077)	-0.010 (0.037)
Total Assets (Ln)	0.043*** (0.015)	0.000 (0.005)	0.046*** (0.015)	-0.001 (0.005)
R&D Spending	-0.687** (0.331)	-0.099 (0.155)	-0.622* (0.329)	-0.121 (0.153)
Level of Diversification	0.003 (0.003)	0.002* (0.001)	0.002 (0.003)	0.002* (0.001)
Free Cash Flow	-0.069 (0.095)	-0.051* (0.027)	-0.088 (0.096)	-0.044 (0.028)
ROA	0.006 (0.152)	-0.052 (0.066)	0.050 (0.153)	-0.067 (0.066)
Capital Intensity	-0.196 (0.213)	-0.071 (0.078)	-0.222 (0.213)	-0.062 (0.078)
Intangible Assets	0.054 (0.042)	-0.010 (0.023)	0.058 (0.041)	-0.011 (0.023)
Asset Turnover	-0.024 (0.023)	-0.001 (0.013)	-0.017 (0.024)	-0.003 (0.013)
Debts to Assets Ratio	-0.077 (0.059)	-0.033 (0.028)	-0.068 (0.060)	-0.036 (0.028)
Sales Growth	0.062* (0.036)	0.030** (0.015)	0.050 (0.037)	0.034** (0.014)
Diversified Acquisition	0.039** (0.020)	0.002 (0.008)	0.044** (0.019)	0.000 (0.008)
Stock Payment	-0.051* (0.030)	0.002 (0.012)	-0.052* (0.030)	0.002 (0.012)
Public Target	-0.020 (0.042)	-0.028 (0.018)	-0.014 (0.041)	-0.030* (0.017)
Tender Offer	0.107 (0.066)	-0.010 (0.026)	0.085 (0.063)	-0.003 (0.026)
Market to Book Ratio	0.008** (0.004)	0.000 (0.002)	0.006* (0.004)	0.001 (0.002)
Inverse Miller's Ratio	-0.058* (0.030)	0.016 (0.012)	-0.047 (0.031)	0.012 (0.012)

Constant	0.781 (0.586)	0.092 (0.196)	0.774 (0.586)	0.094 (0.196)
(Pseudo) R-squared	11.317	0.131	11.590	0.136
Observations	624	624	624	624

Note: Standard errors in parentheses; * p<0.1, ** p<0.05, *** p<0.01; Industry fixed effects are included.

Figure 1

Moderating Effect on Action Time

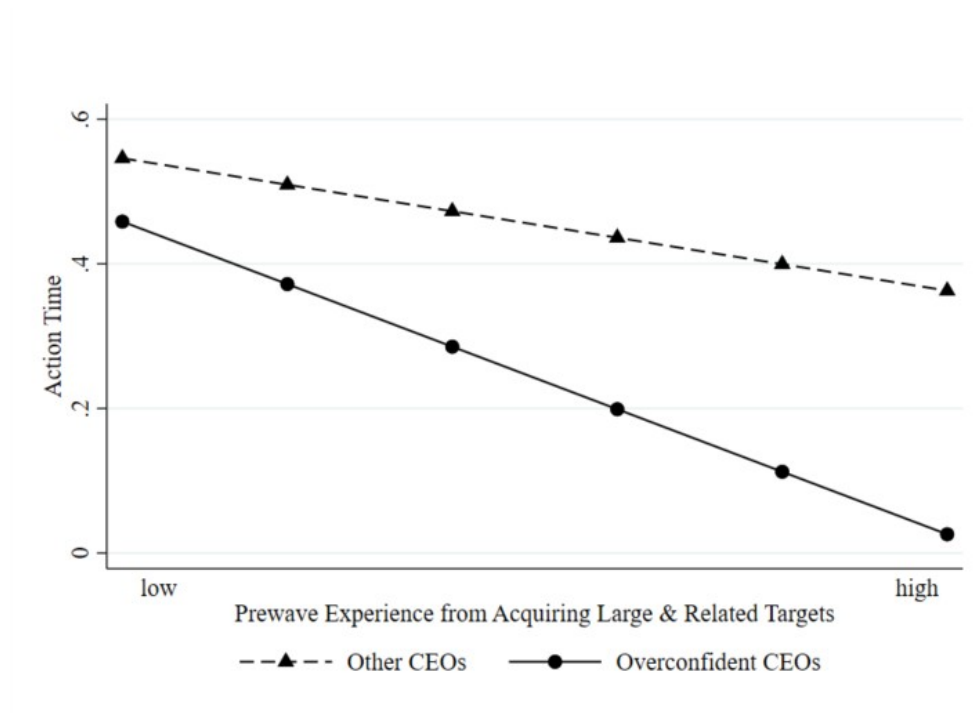


Figure 2

Moderating Effect on CAR

