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Risk and the Market's Reaction to M&A Announcements †

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Abstract: We estimate how an acquiring firm's risk changes depending on whether the market initially judges the acquisition to be neutral, strongly negative, or strongly positive for the shareholders of the acquiring firm. We found that for an average neutral acquisition, the annualized standard deviation of an acquiring firm's total return declines by 5%. In contrast, acquisitions judged negatively by the market result in a 5% increase in total risk, while acquisitions judged positively by the market feature a 30-basis-point increase in total risk. We found the median acquisition to be value creating, not value destructive. Value destruction tends to be concentrated among large firms and to be associated with extreme negative outliers. Acquiring firms with longholder CEOs are more prone to undertake acquisitions and more prone to take on risk, but are less prone to engage in value-destructive acquisitions than acquiring firms with non-longholder CEOs. In this respect, acquiring firms with non-longholder CEOs are more apt to undertake risky bad acquisitions, especially when their prior returns lie above the industry average. In addition, acquiring firms with non-longholder CEOs are less prone to take on good acquisitions that are high in risk. As a general matter, firms with longholder CEOs are less risk sensitive to changes in prior returns than firms with non-longholder CEOs.

Keywords: acquisition risk; focal-point-based risk taking; overconfidence; longholders

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1. Introduction

How is the risk profile of an acquiring firm's equity impacted differently when the market's initial reaction is strongly negative to an acquisition announcement instead of neutral or strongly positive, in so far as the shareholders of the acquiring firm are concerned? This is the primary question that we analyze in this paper. As a secondary question, we investigate the impact on an acquiring firm's risk profile when its CEO qualifies as a longholder with respect to the exercise of his or her executive options.

We explore both questions using the March–Shapira framework for describing corporate risk taking (March and Shapira 1992; Cai and Shefrin 2018). March and Shapira (1992) drew on a body of work in the psychology literature, such as Kahneman and Tversky (1979) and Lopes (1987), to develop a framework for analyzing how a firm's risk profile varies with the distance of its current position relative to a set of focal points.

Our analysis sheds light on some puzzling questions about risk preferences and longholder behavior that have emerged in the behavioral literature about mergers and acquisitions (M&A) (Schneider and Spalt 2016, 2017). The behavioral M&A literature began with Roll (1986). Roll focused on a winner's curse effect for acquirers and asked why acquiring firm managers did not adjust their behavior to prevent overpaying for targets. He suggested managerial hubris as an explanation and called the effect "the hubris hypothesis." Later literature such as Berkovitch and Narayanan (1993), Gupta et al. (1997), and Seth et al. (2000) investigated different samples to examine how synergy, agency, and hubris impact takeovers.

Hubris is a manifestation of overconfidence. Malmendier and Tate (2008) discussed two proxies for CEO overconfidence, one related to press coverage and the other to the

exercise of executive stock options. Their press coverage proxy relates to the frequency with which the media uses adjectives such as "optimistic" and "confident" to describe individual CEOs. CEOs associated with a high relative frequency count are classified as overconfident according to the press coverage measure. With respect to option exercise, Malmendier and Tate (2005) classifies CEOs as overconfident if they unnecessarily postpone the exercise of their vested options. They refer to such CEOs as longholders. Malmendier and Tate (2008) documented that overconfident CEOs overpay for targets and undertake value-destroying mergers. They reported that over the three days around announcements, acquiring firms with longholder CEOs lose on average 90 basis points, while acquiring firms with non-longholder CEOs only lose 12 basis points. See Oancea and Kamau-Mitchell (2015) for a review of CEO overconfidence in mergers and acquisitions.

Underestimating risk is one manifestation of overconfidence (Odean 1998). Schneider and Spalt (2017) analyzed target risk, which they measured as the idiosyncratic volatility of the target firm's stock returns during the three-year period preceding the acquisition announcement. If longholder CEOs underestimate risk, then one would expect firms with longholder CEOs to choose riskier targets than firms with non-longholder CEOs. However, Schneider and Spalt (2017) suggested that this is not the case. They investigated which firms become targets and which takeovers generate positive value. They established that riskier targets are more likely to be acquired than targets that are less risky, that acquisitions of riskier targets are associated with lower announcement returns to the respective acquiring firms, and that these effects appear to be attributable to what they describe as the "gambling preferences" of acquiring-firm managers.

Surprisingly, and somewhat of a puzzle, Schneider and Spalt reported that controlling for firms that have longholder CEOs not only fails to subsume the target risk effect, but strengthens the gambling preference explanation. Notably, Schneider and Spalt reported a focal point effect, namely that the "impact of target risk on synergies and announcement returns is stronger if the manager is more likely to feel being in the loss space".

To shed further light onto the role of preferences and overconfidence in acquisition risk, we extend the analysis of risk from that of the target to that of the acquirer. We analyze general risk preference effects using the March and Shapira (1992) framework as a baseline for describing how firm risk is related to the firm's performance, relative to particular focal points. We follow the literature and use the CEO longholder indicator to proxy for overconfidence.

March–Shapira effects can be described as V-shaped, where risk increases with absolute distance from the focal point and is lowest at the focal point. March and Shapira (1992) emphasized that the V shape is generally asymmetric, with a regime change gap at the focal point.[1] Cai and Shefrin (2018) applied the March–Shapira framework to investigate the relationship between firms' relative industry standings and their risk profiles and found that firms' equity returns display strong March–Shapira effects. Here, relative industry standing serves as an aspirational focal point.

The most important finding in Cai and Shefrin (2018) is that a firm's risk appetite increases with the distance between its past return and the industry average, but with a gap at the industry average. Cai and Shefrin interpreted this finding as an example of a "better than average" effect, whereby firms that are below average take on high risk in an effort to avoid being below average and firms that are above average are more conservative about risk, as they seek to remain above average. Notably, Cai and Shefrin (2018) identified the presence of March–Shapira effects in firms' decisions about operating cash flows, diversifying acquisition activity, working capital, and capital structure. With respect to the V-shaped pattern, they also found that the rate of increase is higher in absolute value below the focal point than above.

The market's initial reaction to an acquisition announcement by a public firm provides a sense of investors' reaction to the merit of an acquisition. The reaction might be strongly positive, neutral, or strongly negative, and we describe the associated acquisitions respectively as good, neutral, or bad. We investigate the degree to which an acquiring firm's

market risk profile is impacted by a negative market reaction, as opposed to a reaction that is either neutral or positive.

The primary objective of this paper is to characterize and estimate the relationship between the value impact of an acquisition announcement by a firm and the subsequent risk of its equity. We regard the associated results as providing the main contribution of the paper.

Here is a brief summary of our main findings, using a framework in which acquisition activity operates on top of a general March–Shapira baseline structure. Acquisitions impact the risk profiles of acquiring firms. We found that, on average, neutral acquisitions are associated with risk reduction, while bad acquisitions and good acquisitions are associated with risk increases. Using an industry fixed-effect model, we found that for an average neutral acquisition, the annualized standard deviation of an acquiring firm's total return falls to about 95% of its pre-announcement level, which we describe as a 5% reduction in total risk. In contrast, bad acquisitions result in a 5% increase in total risk, while good acquisitions feature a 30-basis-point increase in total risk. In the body of the paper, we discuss how the sensitivity of these estimates varies with the choice of fixed effect, with risk being idiosyncratic rather than total, and with the acquiring firm's prior return.

With respect to longholder effects, the subject of our secondary question, we compare the performance of firms with longholder CEOs to the performance of other firms. We found evidence consistent with the claims in Schneider and Spalt (2017) about firms with longholder CEOs. In this regard, we applied the March–Shapira framework to analyze the degree to which the longholder effect modulates acquiring firms' risk responses to a variety of control variables.

For the most part, we found that while firms with longholder CEOs engage in more acquisitions and take on more risk than do other firms, longholder-led firms also exhibit more muted risk responses to prior returns. At the same time, firms with longholder CEOs engage in less value destruction than firms with non-longholder CEOs, and the additional risk they undertake is actually associated with value-creating acquisitions. To place this finding in context, we note that the median acquisition in our dataset is not value destructive. Rather, most value destruction is associated with outliers involving large firms. Taken together, the findings described in this paragraph provide a mixed interpretation of the longholder effect as an indication of CEO overconfidence.

An alternative measure of overconfidence is in the spirit of what Gervais and Odean (2001) called "learning to be overconfident", and we found evidence of this feature for non-longholder CEOs. Specifically, firms led by non-longholder CEOs take on more bad acquisition risk when their prior returns have been above average than below average; however, this pattern does not apply to firms led by longholder CEOs, another indication of mixed finding.

In summary, to the best of our knowledge, this paper is the first in the M&A literature to make use of the March–Shapira framework, and it does so in three ways. The first way is by controlling for the behavioral determinants of firms' non-acquisition risk, in order to measure the incremental risk to the acquiring firm when it undertakes an acquisition. The second way involves assessing the gambling preferences of acquiring firms' managers by estimating the relationship between the incremental value of the acquisition to acquiring firms' shareholders and the incremental risk associated with the acquisition itself. The third way is by establishing that the impact of longholder behavior on acquisition risk is mixed, when it comes to interpreting longholder behavior as a proxy for overconfidence.

The remainder of this paper is organized as follows. In Section 2, we provide a series of illustrative cases, taken from different industries, in order to provide insight into the factors motivating value-destructive acquisitions. In Section 3, we describe our sample and variable construction. In Section 4, we present our findings related to incremental risk generated when an acquiring firm proceeds with a merger that the market has judged to be value destructive. In Section 5, we analyze the role of firms having longholder CEOs. We provide concluding remarks in Section 6.

2. Illustrative Examples of Value-Destructive Acquisitions

The hubris hypothesis (Roll 1986) combines an observation about the winner's curse in the acquisition activity with a psychologically based explanation rooted in overconfidence. Although Malmendier and Tate (2008) operationalized the notion of overconfidence and provided evidence in support of the hubris hypothesis, the claims in Schneider and Spalt (2017) raise questions about whether overconfidence is the main driver of value-destructive acquisitions.

In subsequent sections, we present an empirical analysis with the goal of providing additional insight into the main psychological drivers of acquisition activity. However, before proceeding to the data and associated analysis, we first describe some representative examples of value-destructive acquisitions. We do so in order to gain some intuition about the relative roles of gambling preference, goal-based focal points, and overconfidence in value-destructive acquisitions. In this regard, we randomly selected 100 cases from 2307 bad acquisitions in our data sample and developed narratives[2] and summaries of how these acquisitions unfolded. From these, we chose four representative cases.

2.1. MGM Grand Acquires Mirage Resorts

On 23 February 2000, MGM Grand announced its intention to acquire Mirage Resorts Inc. for $17 a share. Both MGM and Mirage were large Las Vegas casinos, with flamboyant leaders, Kirk Kerkorian who owned 60% of MGM Grand and Steve Wynn who owned the Mirage. Notably, Mirage Resorts operated two of the top three cash-producing casinos on the Las Vegas Strip, Bellagio and the Mirage, with MGM Grand being second.

In a letter to Mirage describing the terms of the proposal, MGM Grand stated that "the combined entity would be the undisputed leader in our industry by any measure". The proposed acquisition required regulatory approval. In remarks to casino regulators, J. Terrence Lanni, the chair of MGM, explained his belief that the combination would feature positive synergy and that with fewer new market opportunities for legalized gambling, MGM perceived that it "had no choice but to grow by acquisition". In this regard, MGM's offer occurred at a time of increased merger activity in the casino industry.

The stock return for MGM Grand in the fiscal year was 12.6%, while the industry median was 16.4%. The three-day cumulative abnormal return (CAR) surrounding MGM Grand's acquisition announcement was −3.0%. Notably, Mirage's stock had been quite volatile during the preceding ten months, having peaked at approximately $25 per share, and then fallen to $10.625. The stock was trading at 10.875, shortly before the announcement, with MGM Grand's offer representing a 56% premium. After the announcement, Mirage's stock price rose to about $15, but not $17, suggesting that investors were uncertain about how Mirage's board would react to MGM Grand's offer.

Six days after the announcement, on 29 February, the board of Mirage Resorts communicated their judgment that MGM Grand's offer price represented an insufficient premium. Mirage's board characterized the timing of the offer as "opportunistic," pointing out that the environment at the time featured low valuations of gaming companies. On 5 March, MGM increased its offer price from $17 a share to $21 a share.

Analyst reaction to the acquisition was positive, with the general view being that MGM Grand was paying a fair price for Mirage Resorts. Analysts had been expecting consolidation activity in the face of lackluster financial performance by Los Vegas casinos. On 30 May 2000, MGM Grand formally acquired Mirage Resorts, with the combined company operating 18 properties on three continents.

2.2. General Mills Acquires Pillsbury

On 17 July 2000, food producer General Mills announced its intention to acquire Pillsbury, a division of Diageo PLC, a British firm. The transaction would almost double the size of General Mills, leading it to become the third largest food company in North America and the fifth largest in the world.

At the time, food companies were experiencing weak sales and low inflation, with large retailers exerting their market power to extract significant discounts. A key feature of this period was that mergers were leading the food industry to become more consolidated. General Mills had a 9.7% return in the fiscal year, while the median industry stock return was −16.4%.

In a press conference, General Mills Chairman and Chief Executive Steve Sanger explained his view that his firm was acquiring the Pillsbury unit in order to achieve faster sales and earnings growth. Sanger further stated that he did not believe that there was a consolidating trend in the food industry, emphasizing that purchasing Pillsbury was not a tactic for General Mills to increase scale. In this regard, he said: "I'm not a believer in size for the sake of size . . . While scale has its advantages, this transaction is for faster growth".

General Mills' expectation was that the purchase of Pillsbury would add extra growth to its targets for sales and income. Notably, Sanger was precise about his expectations, stating that his goal for annual sales growth would increase by 1%, from 6% to 7%, and, for EPS, would shift the range from 10–13% to 11–15%. Sanger added that Pillsbury would build General Mills' presence in the refrigerated section of the supermarket and in the high profit margin food service segment. The acquisition would also serve to double General Mills' international sales.

The three-day CAR associated with the announcement was −5.4%. Prior to the announcement, General Mills and Diageo engaged in a vigorous negotiation about the terms of the transaction. They agreed that General Mills would pay $5.4 billion in stock and $4.5 billion in cash. At the same time, Diageo's board was concerned about the risk that General Mills' stock would decline in the future and insisted on a contingency payment as protection against this risk. At the time, General Mills' share price was approximately $36. The terms of the contingency payment were as follows: The amount of the payment was $642 million, to be held in an escrow account until one year after the merger closed. Should the stock of General Mills trade below an average price of $38 a share, during the 20 days prior to the completion date, then Diageo would retain the payment; however, if the stock rose above $42.55 a share during that period, General Mills would receive the amount. A sliding scale applied to the division of the contingency amount for stock prices between the two trigger prices.

Analysts who were covering the food industry pointed out that the transaction would enable General Mills to gain access to Pillsbury's premium brands at a price they considered reasonable, while migrating from products that were more mature and slower growing. As for Diageo, analysts noted that the transaction would allow the firm to focus on alcoholic beverages, while receiving a good price for Pillsbury.

General Mills completed its acquisition of Pillsbury on 31 October 2001. During the subsequent eighteen months, General Mills' stock price mostly traded above $43, ending above $45.

2.3. First Data Acquires Concord

On 2 April 2003, First Data Corp. announced that it was proposing a stock-for-stock $7 billion purchase of Concord EFS Inc. First Data and Concord were competitors in the business of processing debit card transactions. The stock return for First Data in the fiscal year was 16.3%, while the industry median was 44.4%.

First Data owned 64% of NYCE, the third largest PIN debit network in the U.S., and also owned Western Union, a money-sending firm. Concord operated a network called Star, which was the largest in the country, handling about half of all debit transactions. These networks allowed a consumer to use a personal identification number, or PIN, when paying for items with a debit card. PIN networks featured lower costs than networks for transactions associated with consumer signatures rather than PINs. First Data intended to integrate its network with Concord's networks for debit card transactions and ATMs. A possible source of synergy from the deal was increased scale, and therefore pricing power, as well as greater efficiencies that would help First Data attract customers with its ability

to manage a variety of electronic payments. First Data had a 40% market share of that processing business, while Concord had 10%.

The three-day CAR associated with First Data's announcement of the Concord acquisition was −11.9%. Possible issues associated with the negative reaction by the market might have been concerns that the deal would be viewed as problematic from an antitrust perspective, that First Data was proposing to pay a 48% premium relative to Concord's market price, and that at least some analysts described Concord's recent stock price as "depressed", owing to stiff competition and high management turnover. In addition, First Data CEO Charles Fote stated that his firm was planning a stock repurchase of more than $1 billion when that became possible. Moreover, First Data's press release noted that the deal was expected to be neutral with respect to earnings per share (for 2004), prior to restructuring and integration charges.

Analyst reaction to the acquisition was generally positive. The general view was that First Card was paying a fair price and would benefit from the increased scale the acquisition would bring. Analysts also commented on the risks associated with antitrust rulings by regulators, which at the time were of some concern to investors.

On 26 February 2004, First Data completed its acquisition of Concord.

2.4. Merck Acquires Schering-Plough Corp

On 9 March 2009, pharmaceutical firm Merck & Co announced its intention to acquire Schering-Plough Corp, a competing pharmaceutical firm. The proposal featured Richard Clark, who was Merck's Chairman, President, and CEO and would lead the combined company. However, the transaction was structured as a "reverse merger" in which Schering-Plough would be renamed Merck and would continue as the surviving public corporation, with the acquiring firm being a subsidiary to be named Merck Sharp & Dohme.

In a press release at the time, Clark stated the following: "We are creating a strong, global healthcare leader built for sustainable growth and success . . . The combined company will benefit from a formidable research and development pipeline, a significantly broader portfolio of medicines and an expanded presence in key international markets, particularly in high-growth emerging markets. The efficiencies we gain will allow us to invest in strategic opportunities, while creating meaningful value for shareholders".

The stock return for Merck in the fiscal year was 26.3%, while the industry median was 28.1%. During the decade preceding Merck's acquisition of Schering-Plough, Merck had experienced the need to withdraw one of its major products, Vioxx, from the market owing to a negative side effect profile, along with lawsuits associated with patient deaths. In addition, the patent on one of its blockbuster bone drugs, Fosamax, had expired, leading to generic competition. Moreover, Merck was anticipating a similar revenue loss in the future with the expiration of the patent on its best-selling allergy and asthma drug Singulair. With these issues in mind, the merger would provide Merck with access to Schering-Plough's successful brand-name products, which featured much longer patents, as well as its pipeline of promising biotechnology drugs such as the cancer drug Keytruda, or pembrolizumab, which turned out to be extremely successful.

The three-day CAR associated with the acquisition announcement was −4.1%. As regards the deal, Merck offered to pay $23.61 per share of Schering-Plough, or $41.1 billion in total. This price represented a premium of approximately 34%, based on Schering-Plough's closing stock on 6 March 2009. Based on the average closing price of the two stocks over the 30 trading days preceding the announcement, the premium was approximately 44%. During the first full year following completion of the acquisition, Merck anticipated that the transaction would be modestly accretive to non-GAAP EPS, and significantly accretive thereafter.

Analyst reaction to the proposed acquisition focused on the drug portfolio and on the magnitude of the premium Merck paid for Schering-Plough. With respect to the drugs, the general view was that Merck's drug portfolio would be more diversified and be better

protected when some of its older products went off patent. With respect to the premium, there were mixed reactions, and some analysts suggested that the premium was too low.

Merck completed its acquisition of Schering-Plough on 3 November 2009.

2.5. Similarities and Differences across the Illustrative Cases

All four illustrative cases feature growth-related aspirations by the acquiring firms. MGM Grand's aspiration was to grow by acquisition, given the absence of new market opportunities for legalized gambling. General Mills' aspiration was to achieve faster sales and earnings growth. First Data's aspiration pertained to the growth of market share, along with increased scale, additional pricing power, and greater efficiencies. Merck's aspiration was to stem the decline in sales from its products going off patent. Of the four cases, General Mills' aspirations, as described in the financial media, appear to have been the most precise. The prior-year stock returns of three of the four acquiring firms were below industry average, with General Mills being the exception.

According to March and Shapira (1992), aspirations that feature improvements relative to the current situation will induce increased risk, relative to situations where aspirations have been met. According to Kahneman and Tversky (1979), being in the domain of losses will induce risk-seeking behavior, which can involve the acceptance of negative risk premiums. Of the four acquiring firms discussed above, Merck's situation comes closest to the case of being in the domain of losses.

Based on the initial reaction from the market, all four cases qualify as bad acquisitions. Yet, analysts' reactions to all four ranged from neutral to positive.[3]

Malmendier and Tate (2008) presented evidence that the descriptions of CEOs' traits in press coverage can be informative about the presence of overconfidence. For example, in the MGM Grand case, the description of Kerk Kerkorian and Steve Wynn as "casino industry titans" and Wynn as flamboyant are suggestive of overconfident personalities. In contrast, the media coverage of Richard Clark (CEO of Merck) and Charles Fote (CEO of First Data) did not use the kind of descriptive language that was applied to Kerkorian and Wynn. In addition to press coverage, Malmendier and Tate (2008) provided a second classifier of overconfidence, the longholder criterion, based on the timing with which CEOs exercise their executive options. By this classifier, General Mills' CEO Steve Sanger was also a longholder. The longholder classifier yielded the same characterizations as the press coverage classifier for MGM Grand, Merck, and First Data.

In all four examples above, the acquiring firms' decision makers articulated goals, some more precisely than others, for what they sought to accomplish in purchasing targets. This is consistent with the idea that some risk-seeking acquisition behavior is focal point based. Notably, two of the acquisitions involved the suggestion of overconfidence on the part of the acquiring firms' decision makers. In the remainder of the paper, we explore what the data can tell us about the relative contributions of aspiration-based preferences and longholding behavior.[4]

3. Sample Selection and Variable Construction

We obtained firms with available stock return data from the Center for Research in Security Prices (CRSP) and financial statement information from Compustat from 1990 to 2015. In line with prior literature (e.g., Low 2009), we excluded financial (SIC 6000-6999) and utilities firms (SIC 4900-4999), because these firms are often subject to heavy federal regulations.

3.1. Measurement of Firm Risk

Following the prior literature (Coles et al. 2006; Low 2009; Cassell et al. 2012; Armstrong and Vashishtha 2012), our main measure of firm risk was based on the volatility of future stock returns. High-risk projects will increase the volatility of a firm's future cash flows, which in turn will make the firm's stock returns more volatile. Our first measure

is total risk (*TotRisk*), which is the annualized standard deviation of daily stock returns in fiscal year t+1.

Our second risk measure is idiosyncratic risk (*IdioRisk*), meaning firm-specific risk. Because stock returns could be driven by market fluctuations, as well as firm-specific risk factors, the total risk measure may not fully reflect firm-specific risk. To control for market fluctuations, we followed the standard procedure of decomposing total risk into systematic risk and idiosyncratic risk. To estimate the market model, we used daily stock return data 36 months prior to the beginning of the fiscal year t+1 with the CRSP value-weighted market portfolio as our proxy for the market portfolio. Using the estimated parameters, we constructed daily expected stock returns, as well as daily residual returns in fiscal year t+1. *IdioRisk* is measured as the annualized standard deviation of the residual daily stock returns. Consistent with the prior literature (Core and Guay 1999; Xu and Malkiel 2003), we took the natural logarithm of both risk measures to mitigate the concern that our inferences might be affected by the skewness in the distribution of these risk measures. All risk measures were calculated with at least 60 days of stock returns data.

3.2. Measurement of Good, Bad, and Neutral Acquisitions

We obtained a sample of completed acquisitions from Securities Data Company's (SDC) U.S. Mergers and Acquisitions database. We followed the prior literature and excluded small deals that had a deal value lower than $5 million and lower than 5% of the acquirer's market capitalization prior to the announcement date. For each firm-year observation in our sample, we examined whether the firm made any acquisitions in that fiscal year that could have a significant impact on firm value.

To measure the effect of an acquisition on the value of an acquiring firm, we obtained cumulative abnormal returns (CARs) using the standard event study method developed by Brown and Warner (1985). We used the CRSP value-weighted return as the market return and estimated the market model parameters over the 200 trading days ending two months before the merger announcement. Our choice of the estimation period was motivated by Schwert (1996), who found that on average, the target firm stock price starts to rise about two months before the initial bid announcement. Hence, our estimation procedure is likely to minimize potential bias in announcement returns due to investor anticipation or information leakage before the deal announcement. We calculated three-day CARs over the event window $(-1, +1)$ where Event Day 0 is the acquisition announcement date.

We defined an indicator variable *Bad acquisition* as one if the firm engaged in an acquisition in fiscal year t that had a three-day CAR lower than or equal to -3% and zero otherwise.[5] We chose this -3% as the cutoff point because a three percent abnormal drop in shareholder wealth is significant: for an average firm in our sample with a $2.7 billion market capitalization, shareholders lose $81 million around the deal announcement. Similarly, we defined an indicator variable *Good acquisition* as one if the firm engaged in an acquisition in fiscal year t that had a three-day CAR greater than or equal to 3% and zero otherwise. We defined an indicator variable *Neutral acquisition* as one if the firm engaged in an acquisition in fiscal year t that had a three-day CAR between -3% and 3% and zero otherwise.

3.3. Summary Statistics

Our final sample contained an unbalanced panel of 104,783 firm-year observations from 12,362 firms between fiscal year 1990 and 2015. Panel A of Table 1 provides the distribution of the sample firms across fiscal years, and our sample is evenly distributed over time. Panel B presents the Fama–French twelve industry classification; as can be seen, our sample covered a broad spectrum of industries.

Table 1. Sample distribution. Panels A and B present the distribution of sample firm-year observations by fiscal year and by firm industry classification, respectively. Our sample contains 104,783 firm-year observations from 1990 to 2015.

Panel A: By fiscal year		
Year	No. of observations	Percent
1990	3820	3.6%
1991	3838	3.7%
1992	3896	3.7%
1993	4196	4.0%
1994	4550	4.3%
1995	4763	4.5%
1996	5031	4.8%
1997	5355	5.1%
1998	5239	5.0%
1999	4970	4.7%
2000	4819	4.6%
2001	4680	4.5%
2002	4339	4.1%
2003	4090	3.9%
2004	3944	3.8%
2005	3849	3.7%
2006	3765	3.6%
2007	3633	3.5%
2008	3569	3.4%
2009	3400	3.2%
2010	3258	3.1%
2011	3220	3.1%
2012	3155	3.0%
2013	3096	3.0%
2014	3145	3.0%
2015	3163	3.0%
Total	104,783	100.0%
Panel B: By Fama–French twelve industry classification		
Fama–French industry	No. of observations	Percent
Consumer nondurables	6960	6.6%
Consumer durables	3498	3.3%
Manufacturing	14,229	13.6%
Oil, gas, and coal	5684	5.4%
Chemical products	3058	2.9%
Business equipment	24,377	23.3%
Telephone and television	4124	3.9%
Wholesale and retail	13,129	12.5%
Healthcare	13,230	12.6%
Other	16,494	15.7%
Total	104,783	100.0%

Table 2 presents the descriptive statistics of various firm characteristics. We report the full sample mean, median, and standard deviation, along with bottom and top quartiles. The average firm in our sample has a book value of $2.47 billion and a market capitalization of $2.70 billion. The sample medians are much smaller than the sample means, namely $223 million in total assets and $218 million in market capitalization. The median firm in our sample is 11 years old, and it has a market-book ratio of 1.9 and a sales growth rate of 8.2%. The mean (median) stock return over the prior fiscal year is 14.2% (2.5%); the debt-equity ratio is 58.8% (16.7%); the cash surplus is 3.0% (4.6%), respectively. Detailed definitions for each of the variables are provided in Appendix A.

Table 2. Summary statistics. This table presents the full sample summary statistics of 104,783 firm-year observations between 1990 and 2015. Variable definitions are in Appendix A.

Variables	N	Mean	Median	STD	P25	P75
Firm Characteristics						
Total assets ($mil)	104,783	2470	223	7540	50	1132
Market capitalization ($mil)	104,783	2703	218	8854	44	1133
Firm age	104,783	15.526	11.000	14.450	5.000	21.000
M/B ratio	104,783	2.874	1.923	4.522	1.095	3.438
Sales growth	104,783	0.192	0.082	0.606	−0.033	0.242
Stock return	104,783	0.142	0.025	0.709	−0.284	0.365
D/E ratio	104,783	0.588	0.167	1.268	0.014	0.539
Cash surplus	104,783	0.030	0.046	0.164	−0.019	0.111
CEO Overconfidence						
Longholder CEO	33,622	0.514	1.000	0.500	0.000	1.000
Acquisition Measures						
Bad acquisition	104,783	0.022	0.000	0.147	0.000	0.000
Good acquisition	104,783	0.034	0.000	0.181	0.000	0.000
Neutral acquisition	104,783	0.037	0.000	0.188	0.000	0.000
Risk Measures						
$TotRisk_{t+1}$	104,783	1050.356	850.123	703.299	571.310	1293.422
$TotRisk_{t+1\sim t+3}$	100,385	1068.531	872.331	681.667	597.072	1312.839
$IdioRisk_{t+1}$	104,783	1001.773	796.292	710.781	518.492	1243.306
$IdioRisk_{t+1\sim t+3}$	100,385	1020.772	814.317	694.065	539.292	1272.347
$CFVol_{t+1\sim t+3}$	87,703	0.041	0.019	0.067	0.009	0.042
Lev_{t+1}	95,811	0.227	0.189	0.216	0.027	0.352
$AssetLiq_{t+1}$	95,606	0.253	0.232	0.253	0.069	0.424
$R\&D_{t+1}$	95,976	0.204	0.001	0.948	0.000	0.068

Table 2 also reports the summary statistics of our risk measures. The mean (median) value of $TotRisk_{t+1}$ is 1050 (850), while the mean (median) value of $IdioRisk_{t+1}$ is 1002 (796). The magnitude is comparable to the levels reported in Low (2009).

In our sample of 104,783 firm-year observations from 1990 to 2015, about 9.5% of firm-year observations feature acquisition deals. There are 2.2% of the firm-year observations associated with bad acquisitions that significantly reduced shareholder value around the deal announcement; 3.4% are associated with good acquisitions, while 3.7% are associated with neutral acquisitions. This implies that of all deals in our sample, 23.7% are bad acquisitions, 36.6% are good acquisitions, and 39.8% are neutral acquisitions.

4. Results: Acquisitions and Acquiring Firm Risk

The market's reaction to an acquisition announcement by a public firm provides a sense of investors' initial reaction to the merit of the acquisition. The reaction might be positive, neutral, or negative. We focus on the degree to which the acquiring firm's market risk profile is impacted by a negative market reaction, as opposed to a reaction that is either neutral or positive.

Our analysis took the V-shaped March–Shapira specification from Cai and Shefrin (2018) as a baseline for describing how firm risk is determined as a function of the firm's performance relative to the industry average. As mentioned above, the V-function is asymmetric, being more steeply sloped to the left of the industry average focal point than to the right. In addition, there is a discontinuity at the focal point, with risk being higher to the immediate left of the focal point than to the right.

We measured risk in terms of stock return volatility and estimated the following multivariate model to examine the impact of different types of acquisitions on the firm's risk-taking behaviors:

$$Firm\ Risk_{i,t+1} = \alpha + \theta_1 Bad\ acquisition_{it} + \theta_2 Good\ acquisition_{it} + \theta_3 Neutral\ acquisition_{it} + \gamma Controls_{it} + \varepsilon_{it} \quad (1)$$

Notably, the March–Shapira baseline is embedded within the controls.[6]

We examined future stock return volatility in fiscal year t+1 using *Log(TotRisk)* and *Log(IdioRisk)*. We included indicators of *Bad acquisition*, *Good acquisition*, and *Neutral acquisition* to examine how different types of acquisitions impact firm risk. We followed Cassell et al. (2012) and controlled for a set of variables that have been shown to have a significant impact on firms' risk-taking behaviors. In addition to the March–Shapira variables, we controlled for firm size by using the natural logarithm of total assets since larger firms are less likely to make risky investments (Pástor and Veronesi 2003). We included the natural logarithm of firm age to control for the lifecycle of the firm, as firms might display systematic differences in their risk levels during different phases of their lifecycles. We further included the market-to-book ratio and sales growth to control for investment and growth opportunities. In addition, we controlled for leverage and cash surplus (Coles et al. 2006). In all regressions, we included a fiscal-year fixed effect to control for time series variation. We report the OLS coefficients and t-statistics adjusted for heteroskedasticity and firm clustering.

Table 3 Panel A presents the regression results for Equation (1) for the full sample. The dependent variable is $Log(TotRisk_{t+1})$ in Columns (1) and (2), where in Column (1), we control for the Fama–French 48 industry fixed effect, while in Column (2), we control for firm fixed effect. We found that the coefficient estimate of *Bad acquisition* on $Log(TotRisk_{t+1})$ is 0.054 in Column (1), significant at the 1% level. Since $Log(TotRisk_{t+1})$ is a logarithmic variable, the coefficient estimate of *Bad acquisition* measures the semi-elasticity of a firm's stock return standard deviation with respect to whether or not the firm engaged in a bad acquisition. The magnitude of the *Bad acquisition* coefficient estimate in Column (1) suggests that engaging in a bad acquisition is associated with a 5.4% increase in the annualized standard deviation of daily stock returns in the next fiscal year. In Column (2), we add a firm fixed effect to control for any time-invariant firm characteristics, and we continued to observe a positive and significant coefficient (3.1%) on *Bad acquisition*.

When we examined idiosyncratic risk $Log(IdioRisk_{t+1})$ in Columns (3) and (4), we continued to find that the coefficient estimates of *Bad acquisition* on $Log(IdioRisk_{t+1})$ were positive and significant. These findings suggest that firms take on more total risk, as well as more idiosyncratic risk after the market reacts negatively to their acquisition announcement.

We included indicators of *Good acquisition* and *Neutral acquisition* to examine how different types of acquisitions impact firm risk. The coefficient estimates of *Good acquisition* on risk measures are positive, but insignificant mostly, while we observed negative and significant coefficients of *Neutral acquisition* on risk measures, suggesting that most acquisitions reduce firm risk. The risk pattern associated with bad, neutral, and good acquisitions is roughly V-shaped, meaning that risk is lowest in the middle (neutral) portion.

One concern with our baseline finding involves the issue of endogeneity, as there might exist omitted variables that drive both the incidence of unsuccessful acquisitions and higher firm risk subsequent to the merger announcement. For example, firms might undertake riskier acquisitions because they are experiencing difficulties and expect problems in the future, with the acquisition serving as a way to circumvent these difficulties.

In the previous regressions, we included firm fixed effects to control for any time-invariant firm characteristics and continued to find significantly higher firm risks following bad acquisitions. Furthermore, following Cumming and Li (2011), we controlled for potential omitted variables by using the run-up prior to the deal announcement as a measure of deal quality. In this regard, we calculated the pre-announcement run-up for each acquirer as the cumulative abnormal return over the window of $[-40, -2]$ trading days prior to the takeover announcement, with daily abnormal returns computed using a market model with the estimation window $[-250, -70]$. We included this measure as an additional control in the baseline regressions and present the coefficients in Table 3 Panel

B.[7] Notably, the signs and magnitudes of the coefficient estimates of *Bad acquisition*, *Good acquisition*, and *Neutral acquisition* are similar to our baseline findings, confirming that the risk pattern associated with bad, neutral, and good acquisitions is roughly V-shaped.[8]

We included interaction variables to investigate whether incremental risk associated with acquisitions is V-shaped relative to the difference between past returns and the industry average. In this regard, we did not detect as strong a relationship as exists for baseline risk. In line with March and Shapira (1992), we found that for neutral acquisitions, but not for bad or good acquisitions, firms that have a prior return higher than the industry median tend to take on higher risk as a function of prior returns. However, surprisingly, we found that for bad acquisitions, firms associated with a prior return below the industry median feature a lower March–Shapira risk gap, which is pronounced for idiosyncratic risk.[9]

Table 3. Firm risk and market reaction to acquisitions. This table presents the OLS regression results for the sample of firm-year observations between 1990 and 2015. Variable definitions are in the Appendix A. All regressions control for fiscal-year fixed effects and industry/firm fixed effects whose coefficients are suppressed for brevity. t-statistics based on standard errors adjusted for heteroskedasticity (White 1980) and firm clustering are reported in parentheses. *, **, and *** denote statistical significance at the 10%, 5%, and 1% levels, respectively.

Panel A: Industry and firm fixed effects				
VARIABLES	(1)	(2)	(3)	(4)
	Log(TotRiskt+1)		Log(IdioRiskt+1)	
Bad acquisition	0.054 ***	0.031 ***	0.058 ***	0.036 ***
	(7.365)	(4.529)	(7.932)	(5.189)
Good acquisition	0.003	0.007	0.005	0.010 *
	(0.477)	(1.221)	(0.891)	(1.736)
Neutral acquisition	−0.055 ***	−0.016 ***	−0.053 ***	−0.013 **
	(−8.860)	(−2.823)	(−8.465)	(−2.330)
Stock return (if stock return < ind-median)	−0.576 ***	−0.344 ***	−0.579 ***	−0.346 ***
	(−68.871)	(−46.391)	(−68.916)	(−46.339)
Stock return (if stock return ≥ ind-median)	0.091 ***	0.047 ***	0.087 ***	0.041 ***
	(37.895)	(21.184)	(35.942)	(18.211)
D(stock return < ind-median)	0.017 ***	0.006 **	0.023 ***	0.010 ***
	(5.108)	(2.060)	(6.822)	(3.333)
Log(total assets)	−0.127 ***	−0.099 ***	−0.149 ***	−0.122 ***
	(−87.110)	(−28.288)	(−102.107)	(−34.776)
Log(firm age)	−0.073 ***	−0.060 ***	−0.078 ***	−0.036 ***
	(−22.167)	(−8.036)	(−23.712)	(−4.788)
M/B ratio	0.000	0.000	−0.001 ***	−0.001**
	(0.210)	(0.142)	(−3.685)	(−2.451)
Sales growth	0.014 ***	0.002	0.012 ***	0.001
	(6.557)	(0.786)	(5.420)	(0.396)
Debt-equity ratio	0.092 ***	0.094 ***	0.102 ***	0.103 ***
	(46.374)	(43.597)	(51.086)	(46.531)
Cash surplus	−0.447 ***	−0.304 ***	−0.447 ***	−0.301 ***
	(−38.872)	(−24.244)	(−38.463)	(−24.007)
Constant	7.249 ***	7.202 ***	7.337 ***	7.232 ***
	(163.936)	(350.829)	(162.598)	(350.788)
Fixed Effect	Year/Ind	Year/Firm	Year/Ind	Year/Firm
Observations	104,783	104,783	104,783	104,783
Adjusted R-squared	0.622	0.753	0.663	0.778
p-value for F-stat for $\theta_1 = \theta_2$	0.000	0.005	0.000	0.003
p-value for F-stat for $\theta_1 = \theta_3$	0.000	0.000	0.000	0.000
p-value for F-stat for $\theta_2 = \theta_3$	0.000	0.004	0.000	0.004

Table 3. *Cont.*

Panel B: Controlling for acquirer price run-up				
VARIABLES	(1)	(2)	(3)	(4)
	Log(TotRiskt+1)		Log(IdioRiskt+1)	
Bad acquisition	0.053 ***	0.031 ***	0.058 ***	0.035 ***
	(7.239)	(4.451)	(7.818)	(5.116)
Good acquisition	0.002	0.006	0.005	0.009 *
	(0.361)	(1.159)	(0.786)	(1.677)
Neutral acquisition	−0.056 ***	−0.016 ***	−0.053 ***	−0.013 **
	(−8.957)	(−2.887)	(−8.551)	(−2.390)
Price run-up	0.092 ***	0.048 **	0.084 ***	0.045 **
	(4.099)	(2.231)	(3.719)	(2.096)
Prior stock return (if prior stock return < ind-median)	−0.577 ***	−0.344 ***	−0.579 ***	−0.346 ***
	(−68.897)	(−46.425)	(−68.941)	(−46.370)
Prior stock return (if prior stock return ≥ ind-median)	0.091 ***	0.047 ***	0.086 ***	0.041 ***
	(37.796)	(21.129)	(35.848)	(18.159)
D(prior stock return < ind-median)	0.017 ***	0.006 **	0.023 ***	0.010 ***
	(5.108)	(2.057)	(6.823)	(3.330)
Log(total assets)	−0.127 ***	−0.099 ***	−0.149 ***	−0.122 ***
	(−87.105)	(−28.289)	(−102.102)	(−34.778)
Log(firm age)	−0.073 ***	−0.060 ***	−0.078 ***	−0.035 ***
	(−22.166)	(−8.031)	(−23.711)	(−4.783)
M/B ratio	0.000	0.000	−0.001 ***	−0.001 **
	(0.209)	(0.144)	(−3.687)	(−2.450)
Sales growth	0.014 ***	0.002	0.012 ***	0.001
	(6.584)	(0.806)	(5.444)	(0.415)
Debt-equity ratio	0.092 ***	0.094 ***	0.102 ***	0.103 ***
	(46.359)	(43.589)	(51.072)	(46.524)
Cash surplus	−0.447 ***	−0.304 ***	−0.447 ***	−0.301 ***
	(−38.869)	(−24.245)	(−38.460)	(−24.007)
Constant	7.249 ***	7.202 ***	7.337 ***	7.232 ***
	(163.943)	(350.846)	(162.599)	(350.798)
Fixed Effect	Year/Ind	Year/Firm	Year/Ind	Year/Firm
Observations	104,783	104,783	104,783	104,783
Adjusted R-squared	0.622	0.753	0.663	0.778

Shefrin (2005) discusses why firms which operate in the domain of losses might make risky, value-destructive acquisitions. Schneider and Spalt (2017) discussed this issue as well. We found evidence of a "loss effect" in our data. If a firm makes an acquisition and the prior return is negative, 27.1% are bad acquisitions, 32.6% are good acquisitions, and 37.2% are neutral acquisitions.[10] In contrast, conditional on an acquisition, and the prior return being non-negative, 20.4% are bad acquisitions, 38.1% are good acquisitions, and 39.7% are neutral acquisitions. In other words, the incidence of bad acquisitions is 32.9% higher after a negative prior return than a non-negative prior return. See Table 4.

Table 4. Likelihood ratios of three types of acquisitions. This table presents the likelihood ratios of bad acquisition, good acquisition, and neutral acquisition, respectively, based on stock returns, conditional on firms making acquisitions.

Conditional on Firms Making Acquisitions:	**(1)**	**(2)**	**(3) = (1)/(2)**
	Stock return < 0	Stock return ≥ 0	
Bad acquisition	27.13%	20.41%	1.33
Good acquisition	32.63%	38.10%	0.86
Neutral acquisition	37.22%	39.68%	0.94

As a consistency check, Table 5 shows how target risk, prior to acquisition, varies across the three types of acquisition in our sample of M&As.[11] *TotRisk_Target* is the annualized standard deviation of daily stock returns, measured during the three years prior to the acquisition announcement. *IdioRisk_Target* is the annualized standard deviation of daily residual stock returns that are measured during the three years prior to the acquisition announcement. The table suggests that target firms are significantly riskier in bad acquisition deals where the market perceived them negatively, compared to neutral acquisitions. Similarly, target firms are also significantly riskier in good acquisitions compared to neutral acquisitions. There is no significant difference between target risk measures for bad and good acquisitions.

Table 5. Target firm risk prior to acquisitions. This table presents the comparison of the target firm's risk profile prior to acquisition announcements of our sample of M&As. *TotRisk_Target* is the annualized standard deviation of daily stock returns, which are measured during the three years prior to the acquisition announcement. *IdioRisk_Target* is the annualized standard deviation of daily residual stock returns, which are measured during the three years prior to the acquisition announcement. *, **, and *** denote statistical significance at the 10%, 5%, and 1% levels, respectively.

	(1) Bad Acquisition	(2) Good Acquisition	(3) Neutral Acquisition	(1)–(2)	(1)–(3)		(2)–(3)	
NumObs	814	494	711					
TotRisk_Target	1127.60	1156.71	1036.23	−29.11	91.37	***	120.48	***
IdioRisk_Target	1082.38	1122.14	1002.41	−39.76	79.97	***	119.73	***

In order to investigate the nature of acquiring firm risk further, we examined a series of alternative risk proxies. First, we used a longer three-year window as an alternative to calculate stock return volatilities and report the regression coefficients in Table 6, Columns (1)–(4). We continued to find robust evidence that firm risk increases significantly following bad acquisitions. In addition, we show that firm risk increases with the absolute value of cumulative prior returns.

Our second alternative proxy for firm risk is the volatility of future cash flows. The higher risk associated with firms that made bad acquisitions should be reflected in their cash flows. Estimating firm risk using yearly cash flow volatility is problematic as most firms do not have long enough time series cash flow data (Shin and Stulz 2000). To address this feature of the data, we used quarterly Compustat data and calculated quarterly earnings as the sum of net income before extraordinary items (IBQ), income taxes (TXTQ), and interest and related expenses (XINTQ). Cash flow volatility (*CFVol*) was calculated as the standard deviation of quarterly earnings in the three fiscal years from t+1 to t+3.[12]

The results of cash flow volatility are reported in Columns (5) and (6) in Table 6. Consistent with our results on stock return volatility, we found that cash flow volatility is significantly higher for firms that made bad acquisitions. The coefficient estimate of *Bad acquisition* is 0.008 and significant at the 1% level in Column (5) with industry fixed effects, while the coefficient estimate of *Bad acquisition* is 0.004 and significant at the 5% level in Column (6) with firm fixed effects. These magnitudes are economically significant as the sample mean of $CFVol_{t+1\sim t+3}$ is 0.041, suggesting that firms that made bad acquisitions increase their cash flow volatility by 19.5% (=0.008/0.041) in the subsequent three fiscal years.

Managers have two primary means of increasing firm risk: They can invest in riskier investment projects, or they can take on larger financial risk. To distinguish between investment and financial risk, we constructed several proxies. We measured the riskiness of a firm's investment policies by the R&D expenditures variable *R&D*, which is defined as the ratio of R&D expenditures to total sales measured in fiscal year t+1. Compared to other investments, R&D expenditures tend to be riskier given the high degree of uncertainty related to their future payoffs (Coles et al. 2006).

Table 6. Alternative risk measures. This table presents the OLS regression results for the sample of firm-year observations between 1990 and 2015. The dependent variables in Columns (1), (2), and (3) are TotRisk, SysRisk, and IdioRisk in fiscal years t+1 to t+3. The dependent variable in Columns (4) and (5) is the standard deviation of quarterly earnings in fiscal years t+1 and t+1 to t+3. Other variable definitions are in the Appendix A. All regressions control for fiscal-year fixed effects and firm fixed effects whose coefficients are suppressed for brevity. t-statistics based on standard errors adjusted for heteroskedasticity (White 1980) and firm clustering are reported in parentheses. *, **, and *** denote statistical significance at the 10%, 5%, and 1% levels, respectively.

	(1)	(2)	(3)	(4)	(5)	(6)
VARIABLES	**Log(TotRisk$_{t+1\sim t+3}$)**		**Log(IdioRisk$_{t+1\sim t+3}$)**		**CFVol$_{t+1\sim t+3}$**	
Bad acquisition	0.048 ***	0.019 ***	0.053 ***	0.023 ***	0.008 ***	0.004 **
	(6.278)	(2.911)	(6.790)	(3.465)	(4.000)	(2.287)
Good acquisition	0.005	0.004	0.008	0.008	0.000	0.001
	(0.814)	(0.866)	(1.303)	(1.469)	(0.079)	(0.624)
Neutral acquisition	−0.043 ***	−0.008	−0.040 ***	−0.005	−0.002 ***	−0.000
	(−6.783)	(−1.596)	(−6.158)	(−0.878)	(−2.620)	(−0.013)
Stock return (if stock return < ind-median)	−0.457 ***	−0.202 ***	−0.463 ***	−0.205 ***	−0.036 ***	−0.006 ***
	(−55.836)	(−32.389)	(−55.846)	(−32.123)	(−20.009)	(−3.649)
Stock return (if stock return ≥ ind-median)	0.073 ***	0.025 ***	0.070 ***	0.020 ***	0.001 *	−0.000
	(29.919)	(12.641)	(28.370)	(10.167)	(1.953)	(−0.694)
D(stock return < ind-median)	0.028 ***	0.014 ***	0.033 ***	0.017 ***	−0.002 ***	0.000
	(8.709)	(5.685)	(9.992)	(6.512)	(−2.829)	(0.813)
Log(total assets)	−0.130 ***	−0.071 ***	−0.153 ***	−0.089 ***	−0.006 ***	0.000
	(−82.371)	(−18.206)	(−95.803)	(−22.432)	(−27.166)	(0.237)
Log(firm age)	−0.080 ***	−0.055 ***	−0.085 ***	−0.029 ***	−0.002 ***	0.004 ***
	(−22.551)	(−6.893)	(−23.618)	(−3.528)	(−4.937)	(2.984)
M/B ratio	−0.000	0.000	−0.001 ***	−0.000	0.001 ***	−0.000
	(−0.405)	(0.740)	(−3.842)	(−1.449)	(6.442)	(−0.600)
Sales growth	0.022 ***	0.005 **	0.020 ***	0.005 **	0.004 ***	0.000
	(9.464)	(2.472)	(8.695)	(2.364)	(5.379)	(0.406)
Debt-equity ratio	0.091 ***	0.072 ***	0.100 ***	0.079 ***	0.000	0.002 ***
	(39.832)	(30.530)	(43.931)	(32.591)	(0.172)	(3.782)
Cash surplus	−0.508 ***	−0.282 ***	−0.514 ***	−0.285 ***	−0.109 ***	−0.036 ***
	(−38.688)	(−21.940)	(−38.428)	(−21.767)	(−27.768)	(−8.466)
Constant	7.369 ***	7.142 ***	7.467 ***	7.156 ***	0.067 ***	0.028 ***
	(153.133)	(321.727)	(150.038)	(317.223)	(12.540)	(6.976)
Fixed Effect	Year/Ind	Year/Firm	Year/Ind	Year/Firm	Year/Ind	Year/Firm
Observations	100,385	100,385	100,385	100,385	87,703	87,703
Adjusted R-squared	0.619	0.813	0.660	0.831	0.199	0.589

To capture the riskiness of firm financial policies, we followed Cassell et al. (2012) and examined firms' capital structures and the liquidity of their assets. Our first measure of financial risk was based on the debt burden in firms' capital structures, as more levered firms are associated with higher financial risk. We defined *Lev* as the ratio of total debt to total assets in the fiscal year t+1. We also examined the asset liquidity of a company, as firms that hold more liquid assets are perceived to have a lower level of financial risk. We measured *AssetLiq* as the difference between current assets and current liabilities in fiscal year t+1, scaled by total assets at the beginning of the period.[13]

Table 7 reports the regression results. The coefficient reported in Column (1) indicates that in the year following a bad acquisition, a firm significantly increases its leverage ratio by 2.6%. The finding is also economically meaningful compared to the sample mean (median) leverage ratio of 22.7% (18.9%). Meanwhile, firms hold fewer liquid assets as the coefficient estimate in Column (3) for *Bad acquisition* on $AssetLiq_{t+1}$ is -0.036 and significant at the 1% level. Given the sample mean $AssetLiq_{t+1}$ of 0.253, this suggests that firms that made bad acquisitions reduce their holdings in liquid assets by 14.2% (=0.036/0.253). These results suggest that firms that made bad acquisitions take on more financial risk.

Table 7. Financial and investment risk. This table presents the OLS regression results for the sample of firm-year observations between 1990 and 2015. The dependent variable in Column (1) and (2) is financial leverage in fiscal year t+1. The dependent variable in Column (3) and (4) is the asset liquidity measure in fiscal year t+1. The dependent variable in Column (5) and (6) is R&D expense/sales in fiscal year t+1. Other variable definitions are in the Appendix A. All regressions control for fiscal-year fixed effects and firm fixed effects whose coefficients are suppressed for brevity. t-statistics based on standard errors adjusted for heteroskedasticity (White 1980) and firm clustering are reported in parentheses. *, **, and *** denote statistical significance at the 10%, 5%, and 1% levels, respectively.

VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)
	$Leverage_{t+1}$		$AssetLiq_{t+1}$		$R\&D_{t+1}$	
Bad acquisition	0.026 ***	0.010 ***	−0.036 ***	−0.025 ***	0.509	0.912
	(6.690)	(3.131)	(−7.674)	(−6.960)	(0.526)	(0.786)
Good acquisition	0.044 ***	0.020 ***	−0.043 ***	−0.028 ***	0.036	0.081
	(13.626)	(7.725)	(−12.277)	(−10.064)	(0.112)	(0.169)
Neutral acquisition	0.040 ***	0.013 ***	−0.036 ***	−0.019 ***	−0.132	−0.120
	(13.493)	(5.441)	(−11.447)	(−8.404)	(−0.743)	(−0.418)
Stock return (if stock return < ind-median)	0.051 ***	0.012 ***	0.018 ***	0.011 ***	−0.730	0.160
	(13.084)	(3.892)	(3.373)	(2.693)	(−0.467)	(0.085)
Stock return (if stock return ≥ ind-median)	−0.000	−0.002 *	0.015 ***	0.011 ***	0.274	0.167
	(−0.050)	(−1.785)	(9.419)	(8.817)	(0.890)	(0.465)
D(stock return < ind-median)	−0.000	0.001	0.008 ***	0.002	−0.037	0.107
	(−0.267)	(0.838)	(4.440)	(1.481)	(−0.115)	(0.291)
Log(total assets)	0.018 ***	0.023 ***	−0.030 ***	−0.020 ***	−0.254 *	0.183
	(25.630)	(11.705)	(−30.010)	(−8.973)	(−1.761)	(0.319)
Log(firm age)	−0.010 ***	0.015 ***	−0.006 ***	−0.041 ***	−0.714 *	−0.777
	(−6.229)	(4.057)	(−2.955)	(−10.764)	(−1.955)	(−0.787)
M/B ratio	0.001 **	0.000	−0.001 ***	−0.000	−0.015	0.041
	(2.166)	(0.712)	(−4.942)	(−0.213)	(−0.278)	(0.453)
Sales growth	0.007 ***	0.003 ***	0.000	−0.000	−2.022 *	−2.538 **
	(5.525)	(2.804)	(0.272)	(−0.042)	(−1.846)	(−2.045)
Debt-equity ratio	0.092 ***	0.047 ***	−0.036 ***	−0.021 ***	−0.218 ***	−0.019
	(66.121)	(36.663)	(−26.600)	(−17.956)	(−2.689)	(−0.179)
Cash surplus	−0.210 ***	−0.149 ***	0.230 ***	0.106 ***	−7.983 ***	0.973
	(−26.395)	(−18.654)	(22.504)	(10.954)	(−3.184)	(0.263)
Constant	0.156 ***	0.062 ***	0.355 ***	0.468 ***	4.374**	4.929
	(7.989)	(5.671)	(16.622)	(40.280)	(2.147)	(1.127)
Fixed Effect	Year/Ind	Year/Firm	Year/Ind	Year/Firm	Year/Ind	Year/Firm
Observations	95,811	95,811	95,606	95,606	95,976	95,976
Adjusted R-squared	0.402	0.703	0.338	0.703	0.007	0.166

We also examined firms' investment policies subsequent to a bad acquisition. We measured a firm's investment in risky projects by the variable *R&D*, as research and development projects are perceived to be more uncertain and riskier, compared to other investment choices such as capital expenditures. Columns (5) and (6) report the relevant regression results. We found that in the fiscal year immediately following bad acquisitions, the R&D-to-sales ratio does not increase significantly, suggesting that after bad acquisitions, firms do not increase the risk levels in their investment policies. It might be more difficult to implement the changes in real investments, while it is relatively quick and easy to modify financial policies to increase firm risk.

5. Analyzing the Combined Effects of Longholder and Aspiration-Based Risk Preferences

In this section, we analyze the effect of incorporating a longholder variable into the empirical analysis. The variable *Longholder CEO* indicates that the CEO of a firm qualifies as a longholder and is defined to take a value of one if a CEO postpones the exercise of vested options that are at least 67% in the money and zero otherwise.

We used the ExecuComp database to construct *Longholder CEO*. If a CEO is identified as overconfident by this measure, she/he remains so for the rest of the sample period. As we did not have detailed data on a CEOs' options holdings and exercise prices for each option grant, we followed Campbell et al. (2011) and Hirshleifer et al. (2012) to calculate the average moneyness of the CEO's option portfolio for each year.[14] As shown

in Campbell et al. (2011), this measure of overconfidence generates results similar to those in Malmendier and Tate (2005).

Our data consisted of three subsamples:

1. Firms whose CEOs we can identify as longholders;
2. Firms whose CEOs we can identify as not being longholders;
3. Firms whose CEOs we cannot identify as longholders or non-longholders due to the lack of compensation data (not included in ExecuComp).

The first two groups consist of larger firms, which are part of the S&P1500.

Firms with longholder CEOs are more active in acquisitions, compared with firms with non-longholder CEOs. Specifically, while the percentage of longholders in our full sample of longholders and non-longholders is 51.4%, in the subsample consisting solely of acquisitions, the percentage is 54.0%. Of interest in this regard is the percentage breakdown of firms with longholder CEOs in the three types of acquisitions, which are: 52.7% for bad acquisitions, 52.7% for neutral acquisitions, and 56.9% for good acquisitions. In other words, although firms with longholder CEOs play a disproportionate role in all three types of acquisitions, it is good acquisitions where these firms are especially active.

There is a fundamental question of whether acquisitions on average are initially value destructive for acquiring firms' shareholders and, if so, whether firms with CEO longholders are the main contributors to this value destruction. See Malmendier et al. (2018).[15] With respect to the first part of the question, the answer is mixed and depends on how value is measured. If we measure value by CAR, then acquisitions generally create value: the mean CAR is 1.95%, and the median CAR is and 0.98%, both positive. If we measure value in terms of dollars, the product of CAR and market value of equity, then acquisitions destroy value with respect to the mean ($−10.5M), but create value with respect to the median and ($1.3M).

The sharp difference between mean and median dollar value creation reflects the effects of skewness and outliers. The skewness of the distribution for value creation is −3.9. A few very large bad acquisitions play a disproportionate role.

The general pattern described above holds for both firms with CEO longholders and firms with non-longholders. Both groups feature positive average CARs associated with acquisition announcements, measured by both the mean and median. For dollar-based value creation, both groups feature negative means and positive medians. Importantly though, firms with longholder CEOs outperform firms with non-longholder CEOs, no matter which measures we use, although the differences are not statistically significant. This pattern does not support the position that the longholder effect, reflecting overconfidence, drives the winner's curse in M&A.[16]

Over 60% of the subsample involving acquisitions relates to firms that cannot be classified as either having longholder CEOs or non-longholder CEOs. For this 60% subsample, both CAR and value creation are significantly positive, which again reflects the fact that value destruction occurs mostly for large S&P1500 firms.

With the above discussion as the context, consider the difference in the risk profiles of acquiring firms between those with longholder CEOs and non-longholder CEOs. Panel A of Table 8 presents the regression results with the additional *Longholder CEO* control variable. We found that *Longholder CEO* appears positive and significant in Columns (1) and (2), but not Columns (3) and (4), suggesting that longholder CEOs take on between 1% and 1.5% more total firm risk, but not more idiosyncratic risk. Notably, we continued to observe positive and significant coefficients on *Bad acquisition* and the V-shaped pattern of aspiration-based risk taking related to past returns.

Table 8. Firms with longholder CEOS. This table presents the OLS regression results for the sample of firm-year observations between 1990 and 2015. Variable definitions are in the Appendix A. All regressions control for fiscal-year fixed effects and industry/firm fixed effects whose coefficients are suppressed for brevity. t-statistics based on standard errors adjusted for heteroskedasticity (White 1980) and firm clustering are reported in parentheses. *, **, and *** denote statistical significance at the 10%, 5%, and 1% levels, respectively.

Panel A: full sample of longholder and non-longholder CEOs				
VARIABLES	(1)	(2)	(3)	(4)
	Log(TotRiskt+1)		Log(IdioRiskt+1)	
Longholder CEO	0.010 *	0.014 **	0.001	0.006
	(1.919)	(2.400)	(0.157)	(1.089)
Bad acquisition	0.061 ***	0.040 ***	0.066 ***	0.043 ***
	(6.328)	(4.469)	(6.717)	(4.627)
Good acquisition	0.019 **	0.020 **	0.020**	0.018 **
	(2.213)	(2.463)	(2.309)	(2.211)
Neutral acquisition	−0.037 ***	−0.007	−0.037 ***	−0.007
	(−5.006)	(−1.112)	(−4.764)	(−1.041)
Stock return (if stock return < ind-median)	−0.545 ***	−0.328 ***	−0.555 ***	−0.329 ***
	(−38.365)	(−26.319)	(−37.039)	(−25.195)
Stock return (if stock return ≥ ind-median)	0.148 ***	0.094 ***	0.140 ***	0.082 ***
	(35.438)	(24.252)	(32.598)	(20.939)
D(stock return < ind-median)	0.029 ***	0.013 ***	0.036 ***	0.018 ***
	(6.351)	(3.285)	(7.490)	(4.318)
Log(total assets)	−0.093 ***	−0.089 ***	−0.118 ***	−0.114 ***
	(−39.747)	(−14.582)	(−46.365)	(−18.501)
Log(firm age)	−0.057 ***	−0.070 ***	−0.063 ***	−0.054 ***
	(−12.651)	(−7.042)	(−12.974)	(−5.261)
M/B ratio	0.000	0.002 ***	−0.001	0.001
	(0.424)	(3.233)	(−1.292)	(1.368)
Sales growth	0.070 ***	0.035 ***	0.062 ***	0.031 ***
	(12.588)	(6.088)	(10.905)	(5.111)
Debt-equity ratio	0.096 ***	0.104 ***	0.114 ***	0.120 ***
	(21.464)	(25.171)	(24.414)	(26.717)
Cash surplus	−0.501 ***	−0.438 ***	−0.535 ***	−0.466 ***
	(−17.641)	(−15.493)	(−18.101)	(−15.870)
Constant	6.864 ***	7.171 ***	7.029 ***	7.159 ***
	(120.055)	(141.791)	(126.152)	(137.329)
Fixed Effect	Year/Ind	Year/Firm	Year/Ind	Year/Firm
Observations	33,622	33,622	33,622	33,622
Adjusted R-squared	0.615	0.724	0.629	0.738
p-value for F-stat for $\theta_1 = \theta_2$	0.001	0.085	0.001	0.044
p-value for F-stat for $\theta_1 = \theta_3$	0.000	0.000	0.000	0.000
p-value for F-stat for $\theta_2 = \theta_3$	0.000	0.009	0.000	0.017
Panel B: Longholder CEOs				
VARIABLES	(1)	(2)	(3)	(4)
	Log(TotRiskt+1)		Log(IdioRiskt+1)	
Bad acquisition	0.059 ***	0.032 ***	0.068 ***	0.036 ***
	(4.549)	(2.643)	(5.126)	(2.855)
Good acquisition	0.025 **	0.025 **	0.026 **	0.024 **
	(2.184)	(2.398)	(2.236)	(2.178)
Neutral acquisition	−0.029 ***	−0.004	−0.027 **	−0.004
	(−2.804)	(−0.412)	(−2.524)	(−0.395)
Stock return (if stock return < ind-median)	−0.480 ***	−0.249 ***	−0.485 ***	−0.246 ***
	(−26.638)	(−15.110)	(−25.768)	(−14.526)
Stock return (if stock return ≥ ind-median)	0.142 ***	0.080 ***	0.134 ***	0.069 ***
	(26.362)	(16.121)	(24.362)	(13.886)
D(stock return < ind-median)	0.028 ***	0.007	0.035 ***	0.012 **
	(4.613)	(1.179)	(5.471)	(2.007)
Log(total assets)	−0.090 ***	−0.061 ***	−0.115 ***	−0.084 ***
	(−30.389)	(−7.273)	(−36.750)	(−10.358)
Log(firm age)	−0.055 ***	−0.089 ***	−0.063 ***	−0.061 ***
	(−9.057)	(−4.203)	(−10.001)	(−2.965)
M/B ratio	0.001 *	0.002 ***	0.000	0.001 *
	(1.802)	(3.367)	(0.228)	(1.681)

Table 8. *Cont.*

Panel B: Longholder CEOs				
VARIABLES	(1)	(2)	(3)	(4)
	Log(TotRiskt+1)		Log(IdioRiskt+1)	
Sales growth	0.079 ***	0.028 ***	0.074 ***	0.026 ***
	(9.724)	(3.327)	(8.976)	(3.132)
Debt-equity ratio	0.098 ***	0.092 ***	0.117 ***	0.110 ***
	(19.783)	(16.060)	(22.115)	(18.315)
Cash surplus	−0.386 ***	−0.346 ***	−0.409 ***	−0.378 ***
	(−10.193)	(−8.951)	(−10.387)	(−9.479)
Constant	6.827 ***	7.010 ***	7.008 ***	6.935 ***
	(94.741)	(82.233)	(94.533)	(84.717)
Fixed Effect	Year/Ind	Year/Firm	Year/Ind	Year/Firm
Observations	17,284	17,284	17,284	17,284
Adjusted R-squared	0.613	0.744	0.632	0.759
p-value for F-stat for $\theta_1 = \theta_2$	0.053	0.668	0.018	0.477
p-value for F-stat for $\theta_1 = \theta_3$	0.000	0.021	0.000	0.015
p-value for F-stat for $\theta_2 = \theta_3$	0.001	0.039	0.001	0.059
Panel C: Non-longholder CEOs				
VARIABLES	(1)	(2)	(3)	(4)
	Log(TotRiskt+1)		Log(IdioRiskt+1)	
Bad acquisition	0.064 ***	0.042 ***	0.065 ***	0.043 ***
	(4.549)	(2.914)	(4.474)	(2.850)
Good acquisition	0.011	0.005	0.013	0.005
	(0.844)	(0.378)	(0.972)	(0.349)
Neutral acquisition	−0.049 ***	−0.006	−0.050 ***	−0.006
	(−4.591)	(−0.632)	(−4.499)	(−0.591)
Stock return (if stock return < ind-median)	−0.602 ***	−0.341 ***	−0.615 ***	−0.342 ***
	(−29.605)	(−18.377)	(−28.479)	(−17.368)
Stock return (if stock return ≥ ind-median)	0.146 ***	0.091 ***	0.140 ***	0.080 ***
	(23.483)	(13.542)	(21.418)	(11.342)
D(stock return < ind-median)	0.027 ***	0.020 ***	0.034 ***	0.025 ***
	(4.122)	(3.166)	(4.969)	(3.753)
Log(total assets)	−0.096 ***	−0.104 ***	−0.119 ***	−0.127 ***
	(−31.182)	(−11.322)	(−35.765)	(−13.097)
Log(firm age)	−0.057 ***	−0.064 ***	−0.061 ***	−0.055 ***
	(−10.298)	(−5.504)	(−10.168)	(−4.383)
M/B ratio	−0.002 *	0.001	−0.002 ***	0.000
	(−1.788)	(1.259)	(−2.639)	(0.325)
Sales growth	0.057 ***	0.034 ***	0.047 ***	0.027 ***
	(7.775)	(4.247)	(6.002)	(3.167)
Debt-equity ratio	0.094 ***	0.106 ***	0.109 ***	0.120 ***
	(16.700)	(18.921)	(18.939)	(19.505)
Cash surplus	−0.609 ***	−0.461 ***	−0.654 ***	−0.488 ***
	(−16.896)	(−11.397)	(−17.028)	(−11.637)
Constant	7.061 ***	7.301 ***	7.137 ***	7.301 ***
	(97.865)	(97.133)	(106.004)	(89.858)
Fixed Effect				
Observations	16,338	16,338	16,338	16,338
Adjusted R-squared	0.624	0.740	0.634	0.749
p-value for F-stat for $\theta_1 = \theta_2$	0.004	0.048	0.007	0.051
p-value for F-stat for $\theta_1 = \theta_3$	0.000	0.004	0.000	0.005
p-value for F-stat for $\theta_2 = \theta_3$	0.000	0.487	0.000	0.511

The estimation model underlying Panel A of Table 8 implicitly treats longholder CEOs and non-longholder CEOs as having the same coefficients, and therefore responding the same at the margin with respect to risk. To relax this assumption, and test for differential

behavior patterns, especially for the type of acquisition, we removed the longholder dummy variable and re-estimated the model separately for longholders and non-longholders. We present the results in Panels B and C of Table 8.

In Panels B and C, we partition the full sample into subsamples of firms with longholder CEOs and with non-longholder CEOs. As a general matter, we found the V-shaped aspiration-based risk-taking pattern in both subsamples, conforming to March–Shapira model. If anything, the V-shaped pattern is more pronounced for non-longholder CEOs than longholder CEOs.

We also extended the analysis associated with Table 8 by adding variables that interact type of acquisition with the four March–Shapira variables. The most striking feature from including these interaction variables in the subsample regressions pertains to the magnitude of the March–Shapira gap for non-longholders. Although the gap is generally positive, meaning that risk is higher when prior returns lie below the industry average rather than above, the gap becomes negative for acquiring firms with non-longholder CEOs who engage in bad acquisitions.[17] As we noted in the previous section, the finding about a lower gap for bad acquisitions is somewhat puzzling, and we now see that the general effect is essentially driven by the behavior of acquiring firms headed by non-longholder CEOs.[18]

Schneider and Spalt (2017) stated that there is "little reason to assume CEOs would be particularly overconfident in . . . underperforming firms." This suggests that the gap reversal might be due to overconfidence on the part of non-longholder CEOs whose firms have experienced above-average performance in the prior year, relative to their industries. While for both subsamples, firm risk is positively and significantly higher in firms that have engaged in bad acquisitions, non-longholder CEOs take on more bad acquisition risk than longholders.[19]

Where the two subsamples differ most is with good acquisitions. Acquiring firms with non-longholder CEOs do not take on additional risk for their firms when involved in good acquisitions. However, firms with longholder-CEOs do, by 2.5%, with respect to both total risk and systematic risk.

We view the above results as being consistent with the finding reported by Schneider and Spalt (2017) that controlling for firms that have longholder CEOs fails to subsume the target risk effect. We would add that some firms with non-longholder CEOs appear either to exhibit extreme risk-seeking behavior or to misjudge risk perhaps because of overconfidence, or both.

6. Conclusions

In this paper, we estimated how an acquiring firm's risk changes depending on whether the market initially judges the acquisition to be neutral, negative, or positive for the shareholders of the acquiring firm. We found that for an average neutral acquisition, the annualized standard deviation of an acquiring firm's total return declines by 5%. In contrast, bad acquisitions result in a 5% increase in total risk, while good acquisitions feature a 30-basis-point increase in total risk.

To estimate incremental acquisition risk, we used the March and Shapira (1992) focal point framework to control for a firm's baseline risk. March and Shapira postulated that firm risk is related to a firm's situation, which we took to be the prior return of its stock, through a V-shaped function. In this framework, overall firm risk is lowest for firms whose prior returns are at or just above the industry average. Overall risk increases with the absolute value of the distance between the firm's prior return and the industry average. As a result, risk seeking, or gambling behavior, is associated with the firm's prior return either being well below or well above the industry average.

Schneider and Spalt (2017) presented evidence suggesting that the longholder effect does not explain why acquiring firms choose risky targets. This finding is surprising, given the literature on the hubris hypothesis (Roll 1986) and the longholder effect (Malmendier and Tate 2008). With respect to this literature, we report several findings.

Based on our data, at the announcement date, the median acquisition is value creating, not value destructive for shareholders of acquiring firms; however, the mean acquisition is value destructive. Value destruction tends to be concentrated among large firms and to be associated with very negative outliers.

We found that firms with longholder CEOs, although more prone to engage in acquisition activity and take on more risk, are less prone to engage in value-destructive acquisitions than firms with non-longholder CEOs. There are at least two ways in which firms with non-longholder CEOs differ from firms with longholder CEOs. First, acquiring firms with non-longholder CEOs are more apt to undertake risky bad acquisitions, especially when their prior returns lie above the industry average. Second, acquiring firms with non-longholder CEOs are less prone to take on risky good acquisitions. Specifically, whereas acquiring firms with non-longholder CEOs do not take on additional risk for their firms when involved in good acquisitions, firms with longholder CEOs do, by 2.5%, with respect to both total risk and systematic risk.

Overall, these findings suggest that longholder CEOs are more confident, and justifiably so, than non-longholder CEOs in their ability to acquire target firms. In this regard, our findings suggest that firms with longholder CEOs are less susceptible to particular behavioral effects than firms with non-longholder CEOs.[20]

Generally, the risks assumed by firms with longholder CEOs are distinctly less sensitive to prior returns than are the risks assumed by firms with non-longholder CEOs. Specifically, firms with non-longholder CEOs act as if they are overconfident, by taking on more risk with respect to bad acquisitions, after experiencing prior returns that are above average, relative to prior returns that are below average. In contrast, firms with longholder-CEOs do not. This particular point is more in line with an overconfidence story than an aspiration-based risk-seeking story.

All in all, the above results clarify some of the nuances around the argument advanced by Schneider and Spalt (2017) that a preference for gambling, rather than overconfidence bias, constitutes the major risk driver for acquiring firms.

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Appendix A. Variable Definitions

Table A1. Definition of Variables.

Variables	Definitions	Data Source
Firm Characteristics		
Total assets	Total assets in millions	Compustat
Market capitalization	Market value of equity in millions.	Compustat
Firm age	Firm age.	Compustat
M/B ratio	The ratio of market value of equity to the book value of assets.	Compustat
Sales growth	The percentage change in total sales from the previous year.	Compustat
Stock return	The stock return over the fiscal year.	CRSP

Table A1. *Cont.*

Variables	Definitions	Data Source
D/E ratio	The ratio of total debt to the market value of equity.	Compustat
Cash surplus	Net cash flow from operations minus depreciation expense plus research and development expenditures, scaled by total assets.	Compustat
CEO Overconfidence		
Longholder CEO	Equals one if a CEO postpones the exercise of vested options that are at least 67% in the money and zero otherwise (Malmendier and Tate 2005, 2008).	ExecuComp
Acquisition Measures		
Bad acquisition	Indicator variable: 1 for firm-years engaged in acquisitions in fiscal year t where ACAR <= −3%, 0 otherwise.	SDC/CRSP
Good acquisition	Indicator variable: 1 for firm-years engaged in acquisitions in fiscal year t where ACAR >= 3%, 0 otherwise.	SDC/CRSP
Neutral acquisition	Indicator variable: 1 for firm-years engaged in acquisitions in fiscal year t where −3%<ACAR < 3%, 0 otherwise.	SDC/CRSP
Risk Measures		
$TotRisk_{t+1}$	The annualized standard deviation of daily stock returns in fiscal year t+1.	CRSP
$IdioRisk_{t+1}$	The annualized standard deviation of daily residual stock returns in fiscal year t+1.	CRSP
$TotRisk_{t+1\sim t+3}$	The annualized standard deviation of daily stock returns in fiscal years t+1 to t+3.	CRSP
$IdioRisk_{t+1\sim t+3}$	The annualized standard deviation of daily residual stock returns in fiscal years t+1 to t+3.	CRSP
$CFVol_{t+1\sim t+3}$	The standard deviation of quarterly earnings in the fiscal years t+1 to t+3.	Compustat
$AssetLiq_{t+1}$	Current assets minus current liabilities, scaled by total assets, in fiscal year t+1.	Compustat
Lev_{t+1}	The ratio of total debt to total assets in fiscal year t+1.	Compustat
$R\&D_{t+1}$	The ratio of R&D expenditures to total sales in fiscal year t+1.	Compustat

Notes

1 By gap, we mean the left arm of the V is raised, and does not join the right arm of the V.

2 Narratives were developed based on information obtained from Factiva.

3 The four cases described in this section were drawn from 34 narratives which were developed and reviewed in detail by three research assistants. Of these, one third featured negative comments from analysts about the acquisition and were consistent with the market's judgment of a bad acquisition. The four cases discussed in this section fell into the two thirds of narratives, in which analyst reaction is neutral to positive.

4 To be clear, there are several reasons why acquiring firm decision makers might proceed with a deal, despite a strong negative judgment by the market. One reason is that the acquiring firm exhibits risk-seeking behavior, knowingly, because its decision makers hold high aspirations relative to their current position, and in addition have strong needs for success (Lopes 1987). Aspiration-based risk-seeking behavior is especially pronounced when decision makers view themselves as being in the domain of losses (Kahneman and Tversky 1979). A second reason is that these decision makers hold private material information indicating that the deal is truly value creating. A third reason involves the acquiring firm's decision makers exhibiting a combination of excessive optimism (Weinstein 1980) and overconfidence (Oskamp 1965; Svenson 1981) which leads them to believe erroneously that the deal generates positive value when it does not. If, in addition, the acquiring firm's decision makers place excessive weight on their own judgments relative to the judgment of the market, then they also exhibit motivated reasoning (Kunda 1990).

5 Our findings are robustness if we use alternative cutoff values such as −2% or −4%.

6 By gap, we mean the left arm of the V is raised, and does not join the right arm of the V.

7 For firms that do not engage in acquisitions, we set the value of the run-up variable to be zero. Our results are robust in the following sense. If we instead measure run-up for firms with no acquisitions using the cumulative abnormal returns of [−40, −2] with event date being the fiscal year end prior to the period of our estimation of firm risk.

8 An alternative measure for deal quality that might alleviate the endogeneity problem would be the M&A rumor data (Alperovych et al. 2016, 2021). Unfortunately, we lack access to rumor data which would be necessary to perform this analysis.

9 We do not include a table displaying the results for regressions featuring the interaction variables. For interaction effects that are statistically significant, the magnitudes associated with the interaction effects for type of acquisition are approximately 10% of the variables that are interacted with type of merger.

10 These are not mutually exclusive as some firms may engage in multiple acquisitions in a given year.

[11] Schneider and Spalt (2017) focus on target risk.

[12] We acknowledge that even with quarterly earnings data, we still have very limited time-series quarterly earnings to estimate the cash flow volatility. Our measure of $CFVol_{t+1\sim t+3}$ is calculated based on twelve quarterly earnings numbers. Therefore, throughout the analyses, we focus on daily stock return volatility as our main measure of firm risk and use this cash flow volatility measure as a robustness check.

[13] For robustness, we also calculate these three measures (*R&D/Sales*, *Lev*, *AssetLiq*) over the fiscal years t+1 to t+3 by taking the annual average to examine whether firms take on more financial risk or investment risk.

[14] First, for each CEO-year, we calculate the average realizable value per option by dividing the total realizable value of the options by the number of options held by the CEO. The strike price is calculated as the fiscal year-end stock price minus the average realizable value. The average moneyness of the options is then calculated as the stock price divided by the estimated strike price minus one. As we are only interested in options that the CEO can exercise, we include only the vested options held by the CEO.

[15] Roll (1986) discussed several measures for assessing whether M&A is value creating or value destructive. Our focus is narrower, namely the value implications for acquiring firms' shareholders in the three-day window around the announcement of the acquisition.

[16] Malmendier and Tate (2008) use Fortune 500 firms from 1980 to 1994, while our sample is drawn from Compustat for the period 1990 to 2015. This might be relevant for why they find that firms with longholder CEOs underperform firms with non-longholder CEOs.

[17] The effect is also present for firms with longholder CEOs, but is much smaller and holds only with respect to idiosyncratic risk.

[18] For the heading structure of Table 8, with respect to firms headed by non-longholder CEOs, the coefficients associated with the variable that interacts bad acquisition and the dummy variable D(return < ind-median) are as follows: -0.104***, -0.069**, -0.120***, -0.095***. The coefficients for D(return < ind-median) are respectively 0.031***, 0.023***, 0.038***, 0.028***. With one exception, the corresponding coefficients of this interaction variable, for firms headed by longholder CEOs are not statistically significant. The exception is the third coefficient, which pertains to idiosyncratic risk. Its value is -0.071** and is matched with a dummy variable coefficient whose value is 0.039 ***. Notice that the dummy coefficients are virtually identical for firms headed by both types of CEOs; however, the interaction variable coefficient for non-longholders is almost double that of longholders. For reasons of space, we do not report the full table with all interaction variable coefficients, most of which are not statistically significant.

[19] We analyzed the issue of losses, defined as negative returns, by computing how the values reported in Table 4 differ across the three subsamples. We find little difference across subsamples, suggesting that the bad acquisition gap effect for non-longholders more likely stems from overconfidence than from being in the domain of losses. In addition, we added CEO tenure as an explanatory variable in the Table 8 regressions (Yim 2013). We found significant coefficients only for firms headed by non-longholders, using year and industry fixed effects, with longer tenure associated with lower risk. We do not include the additional regression results, as the other findings are not significantly impacted.

[20] Given the evidence presented by Malmendier and Tate (2008), there remains the question of why firms with longholder CEOs do not appear to behave as if they were more overconfident than firms with non-longholder CEOs. In our view, this is an open question, and we can only offer speculative comments as to explanations. One possibility is status quo bias with respect to option exercise. Perhaps some CEOs delay exercising their options until the expiration date out of inertia, not because of overconfidence. CEOs who exhibit status quo bias, and recognize it as such, might feel the need to be more prudent about risk with respect to long-term outcomes, than they would if they exercised their options earlier. Because of narrow framing, some people might exhibit status quo bias with respect to some of their decision (such as option exercise) but not others (such as acquisition of a target).

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