# Can Deal Failure Be Predicted?[*]

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**Abstract**

We utilize a hand-collected measure of extreme deal failure, the impairment of acquisition goodwill, to examine whether realized value destruction is detected by the market at deal announcement. On average, acquirer announcement returns have only moderate power in forecasting the probability and poor power in forecasting the magnitude of impairment. They also poorly forecast other ex-post symptoms of deal failure – CEO turnover, poor stock and operating performance, and distressed delisting. Detection is better for large deals, large acquirers, and public target transactions. Our evidence suggests that deal failure may be largely triggered by latent factors that are unknown at deal announcement.

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Merger and acquisition (M&A) decisions are typically a firm's most important investment decision, and are large in size relative to capital expenditures, research and development, and other firm investment decisions. Merger and acquisitions also have a large impact at the aggregate level. In 2016, U.S. M&A constituted 11% of U.S. GDP with over 13,600 transactions.[1] Given the large economic significance of M&A transactions, researchers continue to assess whether and how acquisitions create or destroy value.

However, it is difficult to measure the extent of value creation generated from acquisition decisions. The ideal measure would be the ex-post financial performance of the merged entity less the counterfactual performance of the acquirer and the target had they not merged. We do not observe counterfactuals.[2] Further, because the target is typically merged into the acquiring entity, we do not directly observe the ex-post financial performance of the target or the synergies generated from the combined firms. Long-term stock and accounting performance measures can be computed for the acquirer following the transaction to gauge ex-post performance outcomes.[3] However, these measures are computed over a long window and are sensitive to benchmark selection, making it difficult to disentangle deal-specific causality from other firm, industry, and market-wide post-acquisition shocks.[4] Further, these measures are computed at the firm-level rather than at the *transaction*-level. As a result, the literature has largely focused on 'event studies' that estimate abnormal returns in a short window surrounding the acquisition announcement to measure ex-ante expectations on deal value creation or destruction.[5,6]

In this paper, we exploit a hand-collected, transaction-level measure of realized extreme deal

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[1] See Factset Flashwire US Monthly for U.S. M&A statistics and Bureau of Economic Analysis for GDP statistics (www.factset.com/mergerstat_em/monthly/US_Flashwire_Monthly.pdf and www.bea.gov).

[2] Malmendier, Moretti, and Peters (2018) use an interesting technique to measure counterfactuals – they use the loser's post-merger performance to construct the counterfactual performance of winners had they not won the contest – but this technique can only be used for close contests.

[3] See the early work of Mandelker (1974), Langetieg (1978), Asquith (1983), and Malatesta (1983).

[4] See Loughran, and Vijh (1997), Rau and Vermaelen (1998), Shleifer and Vishny (2003), Rhodes-Kropf and Viswanathan (2004), Rhodes-Kropf, Robinson, and Viswanathan (2005), Dong, Hirshleifer, Richardson, and Teoh (2006), and Savor and Lu (2009).

[5] Early papers to adopt this procedure were Dodd and Ruback (1977), Kummer and Hoffmeister (1978), Bradley (1980), Dodd (1980), Jarrell and Bradley (1980), Bradley, Desai, and Kim (1988), Asquith (1983), Eckbo (1983) and Ruback (1983).

[6] We find that between January 2007 and December 2016, 6.4% of articles published in the *Journal of Finance*, *Journal of Financial Economics*, and *Review of Financial Studies* dealt with M&A. An M&A article contains at least one of the following words in the Abstract: merger, acquisition, M&A, deals, acquirer, target, takeover, market reaction to acquisition, goodwill, or synergy. Of these M&A articles, 62.4% used measures of deal quality. Of those who used measures of deal quality, 95.6% used acquisition cumulative abnormal returns (CARs) as a measure of deal quality.

failure to examine whether extreme acquirer value destruction is detected by the market at deal announcement. Specifically, is an ex-post measure of extreme deal failure, the write-down of acquisition goodwill, forecasted by an ex-ante measure of value creation, acquirer announcement returns, at deal announcement? By observing a direct measure of extreme deal failure, we can understand whether and how much of the value destruction is known at announcement as opposed to the periods following the deal completion date. Moreover, are the factors that contribute to extreme deal failure forecasted or are they latent factors largely unknown to the market at deal announcement?

Large goodwill impairment events, for three reasons, yield a new and powerful setting to measure ex-post value destruction for the acquiring firm. First, goodwill - the excess of the purchase price less the fair value of the target's identifiable net assets - can reflect the going concern value of the target, the value of expected synergies, and overpayment. Therefore, the write-down of acquisition goodwill reflects value destruction because of any or many these factors – overvaluation of existing assets, overestimated synergies, or the inability to realize synergies due to firm, industry, or economy-wide shocks. Second, the quality of goodwill impairment data has improved in recent periods. The Statement of Financial Accounting Standards 142, passed in 2001, was implemented so that unsuccessful acquisitions would be more precisely and more timely reflected in a firm's financial statements. Following implementation, firms must conduct routine annual impairment tests and non-routine tests following 'material' events for reductions in the value of goodwill.[7] The new accounting standard also requires increased transparency for goodwill and impairment reporting at the reporting unit level rather than at the firm level, making it easier to link impairment to a particular triggering transaction. Third, prior research has documented that goodwill impairment events are value relevant: impairment announcements generate a negative market response and are leading indicators of declines in future profitability.[8] We validate these findings in our sample and find the market reaction to earnings announcements containing goodwill impairment news is negative and significant (-2.1%).

One drawback of goodwill impairment as a measure of deal failure is the potential for subjectivity – researchers have documented managerial discretion in the write-down decision, largely

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[7] In September 2011, FASB modified SFAS 142, so that formal valuations to produce comparisons of fair value and carrying value of a reporting unit are only required when certain qualitative indicators of impairment exist.
[8] For example, Henning and Stock (1997), Chen, Kohlbeck, and Warfield (2004), Bens, Heltzer, and Segal (2011), Gu and Lev (2011), and Li, Shroff, Venkataraman, and Zhang (2011).

impacting the amount and timing of the impairment.[9]  However, in this paper we focus on substantial impairments of goodwill, a setting in which strategic manipulation is less viable because extreme losses must be revealed at some point.[10]  Moreover, we do not focus on the timing of write-downs.

The impairment of goodwill is reported in the financial statements at the firm level. As a result, it is not straightforward to link the impairment to the specific target(s) that triggered the write-down. We manually read though the Notes to the 10-K to identify the specific target(s) associated with the goodwill impairment for write-downs within ten years of deal closure. Of 432 acquisitions with impairments, we are able to credibly identify the specific target(s) that impaired for 354 (or 82%) of the transactions. [11]  For 354 transactions with impairments (Impairment sample) and 1,106 transactions without impairments (Non-Impairment sample), we are able to trace goodwill balances at the transaction level from the deal completion date to ten years following.

We first document the significant magnitude of both the goodwill initially recorded and the impairment amounts. For the full sample of firms, the average portion of the purchase price allocated to goodwill is 51% and the average size of transaction-level goodwill relative to acquirer assets is 10%. Goodwill impairments are common: 24% of transactions in our sample experience an impairment event over the 2003 to 2015 period. These impairment events are substantial: the average impairment constitutes 86% of total transaction-level goodwill, 46% of the total purchase price, and 11% of acquirer assets. Overall, the aggregate impairment loss in our sample is $87 billion.

We next find that announcement period acquirer abnormal returns have modest power in forecasting the probability of impairment and poor power in predicting the magnitude of impairment. Although acquirer abnormal returns are statistically lower in the Impairment sample relative to the Non-Impairment sample for most event windows, surprisingly, abnormal returns are not largely negative for the Impairment sample. In fact, acquirer abnormal returns are positive or not statistically different from zero for 83% of transactions in the Impairment sample. Focusing on magnitude, given an acquirer abnormal dollar loss at announcement, we find actual write-downs are on average more

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[9]  See Elliott and Shaw (1988), Francis, Hanna, and Vincent (1996), Beatty and Weber (2006), Ramanna and Watts (2011), and Li and Sloan (2017).

[10]  Our sample selection requires that the impairment is at least 5% of the acquirer's assets and at least 25% of initial goodwill.

[11]  To our knowledge, we are the first to construct a comprehensive data set that includes *transaction-specific* goodwill balances and *transaction-specific* impairment outcomes in the post-SFAS 142 period. This is important as most acquirer firms have multiple targets that could potentially impair. Audited financial statements and Compustat report goodwill impairments at the firm level; and therefore assigning all transactions by the acquirer as impaired introduces significant errors.

than three times larger than predicted losses at announcement. Overall, the market is on average unable to predict impairment directionally, and conditional on predicting impairment, the market severely underestimates the impairment amount.

In multivariate tests that model the probability of an impairment event, the coefficient on acquirer abnormal return is negative and statistically significant. However, the economic significance of this variable is arguably modest. The marginal effect indicates that for every one percentage point increase in abnormal return, the probability of impairment increases by 0.34%, or increases from the unconditional probability of impairment of 24.25% to 24.58%. In regressions with the impairment amount scaled by initial goodwill as the dependent variable, the coefficient on acquirer abnormal return is not statistically different from zero, indicating announcement period abnormal returns fail to predict the magnitude of future impairments.

In a prediction model using only acquirer abnormal announcement returns as the independent variable that places transactions into ten predicted impairment probability deciles, 29% experience realized impairments in the three lowest predicted impairment probability deciles and 36% experience realized impairments in the three highest predicted impairment probability deciles. To perform a relative comparison, we run a prediction model using only deal and acquirer characteristics, also largely known ex ante at the acquisition announcement, and find improved performance: 16% actually impair in the three lowest predicted impairment probability deciles and 47% actually impair in the three highest predicted impairment probability deciles. We see little improvement when acquirer abnormal return is included in the model with deal and acquirer characteristics. In related tests that model the magnitude of the impairment, we find that the acquirer abnormal return prediction model performs even more poorly.

The results thus far indicate that, on average, the market's assessment of acquirer value destruction at announcement is only a moderate forecast of realized goodwill impairment losses. We next consider potential explanations for this result. First, the weak relation between the two measures could arise due to limitations in the use of goodwill impairment as an ex-post measure of deal failure, rather than the inability of announcement returns to detect value destruction. To further validate impairment as a robust measure of deal failure and the inability of announcement return to detect deal failure, we focus on other ex-post firm-level symptoms of deal failure: CEO turnover, poor stock and

operating performance, and distressed delisting.[12]

Focusing on the timing of CEO turnover events for the sample of Impairment firms, we find that for both the high and low predicted impairment samples created from the acquirer abnormal return model, turnover events are at least 2.5x more likely to occur in the years following the impairment rather than the deal announcement date. The labor market, therefore, regards impairment as a more important signal for managerial discipline than negative returns at deal announcement. We next examine accounting and stock performance metrics and the probability of distressed delisting in the two years prior to three years subsequent to the deal announcement. We find that industry-adjusted performance measures begin to materially diverge in the years following the deal announcement for the Impairment and Non-Impairment samples and that Impairment sample firms are more likely to experience distressed delisting, indicating Impairment sample firms encounter significant firm-level negative shocks in the years following the acquisition. However, we observe little divergence in performance and delisting outcomes subsequent to the transaction between the high and low predicted impairment samples created from the acquirer abnormal return model, indicating announcement returns are unable to detect these ex-post performance outcomes.

The lack of relation between acquirer announcement return and goodwill impairment could also arise because announcement return is a noisy measure of the market's assessment of value destruction, and contaminated by other information such as the market's assessment on the probability of deal closure, reassessment of the standalone value of the acquirer, and price pressure due to arbitrageurs.[13] Our tests are robust to an announcement return window that spans deal announcement to deal closure, when the probability of deal completion has moved towards one. Further, reassessments on the standalone value of the acquirer triggered by the bid announcement, such as signals of overvaluation and lack of investment opportunities, and arbitrager price pressure are likely to bias returns downward which would strengthen the relation between announcement return and impairment. In subsequent tests we show our results are robust to the exclusion of stock and public target deals, both settings that are likely to trigger a reevaluation of the bidding firm's assets or attract arbitrage activity.

In the final tests, we examine whether the ability of announcement returns to detect value

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[12] These outcomes are also noisy measures of deal failure, as they are measured at the firm rather than at transaction level, and could be caused by other non-transaction specific events. As a result, these tests should be interpreted as suggestive.
[13] See Schipper and Thompson (1983), Roll (1986), Asquith, Bruner, and Mullins (1983), Hietala, Kaplan, and Robinson (2003), and Mitchell, Pulvino, and Stafford (2004) for discussion on the potential issues with using bidding firm announcement returns to gauge acquisition value implications.

destruction varies across deal and firm characteristics. There is a large literature that attempts to predict which mergers destroy value using ex-ante characteristics – researchers have linked negative acquirer announcement returns to stock transactions, public target transactions, large acquirers, large transactions (on an absolute and relative basis), targets in unrelated industries, and acquirers with high valuations prior to deal announcement.[14] Further, the market's ability to assess value creation is likely related to the information environment: private targets, small acquirers, targets in unrelated industries, and high-tech deals are likely associated with heightened opacity.[15] Indeed, zooming in on these characteristics, we find improvement in the deal failure detection capability of announcement returns in certain subsets of the data. Acquirer announcement returns forecast impairments significantly better for large, public target, and large acquirer transactions than for small, private target, and small acquirer transactions, respectively. Acquirer announcement returns perform moderately better for stock, related industry, and non-high-tech transactions, and for acquirers with low pre-deal Tobin's q. The results point to the importance of the information environment of the acquirer and target – the market's ability to detect value destruction deteriorates for private targets, small acquirers, unrelated industry transactions, and high-tech transactions. Although we find improved detection in some subsets of the data, detection errors remain large in all samples.

Together, our results indicate that, while known ex-ante determinants of value destruction play a role in realized extreme deal failure, there remains a large portion of deal failure that is driven by unforecastable firm, industry, or economy-wide shocks that are revealed over time. As such, the market's assessment of value destruction at deal announcement may not be the dominant trigger of deal failure for many transactions. M&A transactions are inherently risky. While the bidding process of target selection, due diligence, and bid negotiation can be drawn out and complex, activities that occur after the merger related to the integration, execution, and realization of synergy gains are likely to be even more complicated. Our results are consistent with Hoberg and Phillips (2017) who link acquisition outcomes to integration success and conclude that "the market does not adequately price the information associated with integration risks at the time of announcement." Our results are also consistent with Malmendier, Moretti, and Peters (2018) who utilize winners and losers in closely contested transactions to gauge long-run returns to mergers. Similar to our results, their results

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14  See, e.g., Travlos (1987), Chang and Suk (1998), Fuller, Netter, and Stegemoller (2002), Bargeron, Schlingemann, Stulz, and Zutter (2008), Moeller, Schlingemann, and Stulz (2004, 2005)).
15  See Luo (2005).

indicate that acquirer announcement returns underestimate merger losses and that, on average, the market is incorrect in its initial assessment of merger outcomes.

An important implication of our results is that researchers may need to be cautious when relying on announcement returns alone to assess deal quality, especially in poor information environments for which the market may lack sufficient data to value the acquirer, the target, and the combined synergy gains. This may be why there is not a strong consensus as to whether and how mergers create value for the acquirer: the sign and magnitude of acquirer announcement returns computed by researchers has varied depending on the time period of the study, on whether percentage or dollar returns are computed, and on the methodology to tease out acquirer overvaluation information in stock-financed transactions.[16] Of course, our conclusions should be considered in conjunction with the following caveats. First, since we focus on large goodwill impairments, we only observe the lower tail of deal outcomes; such extreme failure events may not generalize to more moderate value destruction that does not result in a goodwill write-down. Second, goodwill cannot be increased to reflect underestimated value creation.

Section I of the paper describes goodwill and discusses the literature on goodwill. Section II presents a model that formalizes the link between ex-ante and ex-post measures of deal quality. Section III describes our data and sample construction. Section IV provides descriptive statistics on goodwill and goodwill impairment. Section V examines the relation between the abnormal return at merger announcement and future impairment events. Section VI examines the relation between abnormal return at merger announcement and future acquirer outcomes. Section VII describes robustness tests. Section VIII concludes.

## I.      Goodwill

Goodwill is the excess of the acquisition purchase price over the fair value of the target's identifiable net assets. As discussed in Johnson and Petrone (1998) and Henning, Lewis and Shaw (2000), "core" goodwill includes 1) a standalone going-concern element, which reflects the higher value of a collection of assets over assets held independently, and 2) a synergy element which reflects the value from combining the acquirer and target businesses. In addition to core goodwill, goodwill

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[16] See the discussion on this issue in Andrade, Mitchell and Stafford (2001), Moeller, Schlingemann, and Stulz (2004, 2005), Malmendier and Tate (2008), Savor and Lu (2009), and Malmendier, Moretti and Peters (2018).

balances may also include overvaluation (undervaluation) of the stock consideration or overpayment (underpayment) by the acquirer, and as a result, overstate (understate) the economic value of goodwill. Therefore, the write-down of acquisition goodwill destruction can arise because of any or many these factors –overvaluation of existing assets, overestimated synergies, or the inability to realize synergies due to firm, industry, or economy-wide shocks. Examples of well-known impairments include Microsoft's $7.6 billion 2014 write-off of Nokia goodwill, Hewlett-Packard's $8.8 billion 2012 write-off of Autonomy goodwill, Jones Apparel Group's $810 million 2009 write-off of Nine West and Maxwell Shoe Co. goodwill.

The Statement of Financial Accounting Standards (SFAS 142), effective December 15, 2001, materially altered the accounting requirements for acquisitions. The accounting rule eliminated amortization, changed the timing of impairment tests, the determination of impairment, and the unit of reporting. First, prior to SFAS 142, acquisition goodwill was amortized over a maximum of 40 years. Following SFAS 142, goodwill is no longer amortized, but is considered an asset that can stay on the firm's balance sheet indefinitely. Second, the new rule requires firms to conduct regular annual impairment tests and tests following 'material' events for reductions in the value of goodwill.[17] If the appraised value is less than the recorded value, then a goodwill "impairment" occurs and the value of goodwill is reduced on the balance sheet and an impairment expense is incurred on the income statement as a component of income from continuing operations. Prior to this rule change, SFAS 121 prescribed only non-routine impairment tests following certain triggering events that indicated that goodwill may no longer be recoverable. Third, the new standard requires goodwill assignment and impairment tests and disclosure to be conducted at the "reporting unit" level, which can be an operating segment or a component one level below an operating segment. As a result, SFAS 142 makes it easier to identity the goodwill recorded for each transaction and the source of future impairments. Fourth, SFAS 142 allows acquirers to "write-up" the target's existing assets to fair value at the time of the acquisition. Identifiable intangible assets, such as patents and customer lists are no longer included in goodwill balances. Overall, SFAS 142 was intended to increase transparency and yield goodwill balances that better reflect the underlying economic value of the acquisition.[18]

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[17] Events that trigger non-routine tests include the occurrence of net asset book values falling below market values, precipitous declines in stock price, the loss of a large customer, etc.

[18] The introduction of SFAS 142 was concurrent with SFAS 141, which eliminated the pooling-of-interests method of accounting for business combinations, which did not require the recording of goodwill. As a result, SFAS 141 also largely increased goodwill balances recorded due to acquisitions.

Under SFAS 142, the impairment amount must be determined using a fair value approach, based on a two-step impairment test. In the first step, the fair value of the reporting unit is compared to the book value; if the fair value is less than the book value, then the second step is performed. In the second step, the fair value of the unit's (non-goodwill) net assets is determined, and the fair value of goodwill is the difference between the fair value of the unit and the fair value of the unit's identifiable net assets. The impairment amount is the excess of the book value of goodwill and the newly assessed fair-value estimate of goodwill. Firms often use a weighted combination of discounted cash flow, public comparable company multiples, and precedent merger and acquisition transaction multiples valuation techniques to determine fair value.

## II. Model to Explain the Link Between Measures of Deal Quality

### A. Timing

There are three dates, t=1, t=2, and t=3. All agents are risk-neutral.

An acquirer of size A bids for a target at time t=1. If acquired, the market believes that the acquirer will create synergy, S. The synergy S could be viewed as value added from things that the combined firm can do that the individual firms cannot, plus the control value added from squeezing out inefficiencies in both firms. The market also believes that the acquirer will unlock the potential of the growth assets of the target, and these have a premium P over their book value. V=S+P are realized at t=3. The market believes that V is normally distributed with parameters $N(\mu_m, \sigma)$. The acquirer may not agree with the market's assessment of the probabilities. His probability assessment for V= S+P is drawn from $N(\mu_a, \sigma)$. The abnormal return of the acquirer at announcement, AR, which could be positive, zero or negative, is observed.

At t=2, after the merger is completed, the acquirer allocates goodwill, G, to the target. G is the difference between the value paid to the target minus the "adjusted" book value of the assets of the target. This adjustment allows for adjusting value of existing assets to current market prices and allows for valuation of assets like customer lists; the adjustment does not allow for valuation of S or P.

At t=3, if the realized V is in the range $(-\infty, V^*]$, the acquirer writes down or impairs goodwill by amount I. $V^*$ is known only to the acquirer. Since impairment can only occur if the realization of V is below the acquirer's initial expectation of goodwill, $V^* < \mu_a$.

## B. *Analysis*

At t=0, the expected value of V, from the point of view of the market, is $\mu_m$. Three mutually exclusive cases can arise.

One, the AR observed at announcement is zero. This happens if $\mu_m = \mu_a$. This means that the market believes the acquirer is paying a fair value for V, but the entire expected V, $\mu_m$, is accruing to the shareholders of the target.

Two, the AR observed at announcement is negative. This happens if $\mu_m < \mu_a$. This means that the market believes the acquisition is value destructive for the acquiring firm shareholders. Further, the entire expected V, $\mu_m$, is accruing to the shareholders of the target. The amount of expected value destruction of the acquiring firm shareholders is A*|AR|, where AR < 0.

Three, the AR observed at announcement is positive. This happens if $\mu_m > \mu_a$. This means that the market believes acquisition is adding value to the acquiring firm shareholders. A more intuitive way to think of this is that the acquirer is paying a fair value for V plus obtaining for its shareholders a piece of the expected V. The amount of V that the acquirer's shareholders get in this case is A*AR, where AR > 0.

At t=2, the acquirer allocates goodwill G. Goodwill, G, the acquirer's assessment, equals $\mu_a$. If AR at t=1 is zero, then $G = \mu_a = \mu_m$. If AR at t=1 is negative, then $G = \mu_a = \mu_m + A*|AR|$. If AR at t=1 is positive, then $G = \mu_a = \mu_m - A*AR$.

At t=3, by assumption, if the realized V is in the range $(-\infty, V^*]$, the acquirer writes down or impairs goodwill by amount I. Since impairment can only occur if the realization of V is below the acquirer's initial expectation of goodwill, $V^* < \mu_a$. This also means that impairment, I, can be decomposed into two parts: the part that came from value destruction expected at announcement (minus A*AR if AR is negative, and zero if AR is positive) and the rest.

The key research question in the paper is whether and how much of realized impairment can be explained by the market's expectation of value destruction at announcement. To be precise, the questions we ask and answer are (a) does AR predict I? and (b) how much of I is explained by A*|AR| if AR is negative?

Figure 1 provides a numerical illustration of our model.

INSERT FIGURE 1 HERE

In Figure 1, the value of the target's identifiable net assets is $13. Note that this includes the

usual current assets ($3), tangible property, plant and equipment ($6), and identifiable intangible assets like patents ($4). The acquirer purchases the target for $25. Goodwill, which is the excess of the acquisition purchase price over the fair value of the target's identifiable net assets, is therefore $25-($3+$6+$4) = $12. This is recorded at time t=2, and so $G = \mu_a = \$12$. However, at t=1, assume that the acquirer's abnormal return is negative, and so the market estimates acquiring firm value destruction, which is $A^*|AR|$. This is $4 in our example. Therefore, the market estimates that only $12 - $4 = $8 is "good" goodwill, of which $6 comes from synergies, and $2 comes from the standalone going-concern element (i.e., the excess of the target's pre-acquisition market price and fair value of assets). So $\mu_m = \mu_a - A^*|AR| = \$12 - \$4 = \$8$. At t=3, assume the firm impairs $10, and so ex-post goodwill is $12-$10=$2. This means that 40% of the impairment – $4 out of $10 – was predicted because of overpayment at the time of the announcement. The rest was unforecastable. So, in this particular example, the market got the sign right (impairment was predicted and it did happen) but severely underestimated the magnitude (impairment was much more than what was predicted).

The above simple model has many caveats. First, we assume that the market is efficient and unbiased. Second, since the goodwill balance is recorded after the deal closure, we are assuming the market can infer the size of goodwill knowing the purchase price and the fair market value of target assets. Third, we assume that the manager has little discretion in the amount and timing of impairment. Fourth, we assume that the negative abnormal return of the acquirer at announcement only measures value destruction, and does not contain other signals.

### III.    Data and Sample Construction

*A.  M&A Data*

The sample of mergers and acquisitions is from Thompson Reuters Securities Data Company (SDC) Domestic Merger and Acquisition database. Table I Panel A describes sample construction. We include transactions that satisfy the following criteria: (1) The merger or acquisition was announced on or after January 1, 2003 and completed by December 31, 2013;[19] (2) The transaction value must exceed $10 million and be at least 5% of the acquirer's market capitalization at the end of the fiscal year before the deal was announced; (3) The acquirer is a U.S. company; (4) The acquirer

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19 SFAS 142 was effective December 15, 2001 but included a transition provision that allowed adoption-year impairments to be reported as a below-the-line item on the income statement as a "cumulative effect of accounting change". We begin our sample in 2003 to exclude transition period impairments.

is a publicly traded company; (5) The status of the deal is completed; (6) The deal is not classified as a repurchase, self-tender, recapitalization, acquisition of partial or remaining interest, reverse merger, leveraged buyout, privatization, or bankruptcy acquisition; (7) The percent sought is at least 50%; (8) Both the acquirer and target are not financial firms (SIC codes 6000-6999); and (9) The bidder must have accounting data on Compustat and stock data on Center for Research in Security Prices (CRSP) in the month of the deal announcement. These requirements result in an initial sample of 2,982 deals.

Next, to ensure that the transaction was accounted for using the purchase method and resulted in the recording of goodwill, we initially screen for non-purchase acquisitions by excluding acquirers with zero or missing goodwill balances for the full period between the year prior to ten years subsequent to the transaction. This requirement reduces the sample to 2,061. The Compustat goodwill and impairment data is based on aggregate firm-level data, and so it is not directly possible to identify transaction-specific measures. To identify the amount of goodwill recorded for each transaction in our sample, we read through the Notes to Consolidated Financial Statements in the first 10-K filing following the deal effective date.[20] Following an acquisition, the Notes include an 'Acquisitions' section which presents the preliminary allocations of the aggregate purchase price based on the assets and liabilities estimated at fair values to line items such as net tangible assets, identifiable intangible assets, and goodwill.[21] We eliminate 500 transactions that are not structured using purchase accounting and transactions for which we are unable to identify the goodwill allocation amount, resulting in a sample of 1,561 transactions with initial goodwill data.

## B.  Linking Impairment to Specific Transactions

Following Bens et al. (2011), we initially screen for potential goodwill impairments by flagging instances in which the Compustat variable "Impairments of Goodwill Pretax" (item 368) is at least 5% of previous year total acquirer assets in any year between the year of the acquisition and ten years following the acquisition. This requirement ensures the impairment event has detectable valuation effects. Of the 1,561 transactions in the sample, 561 deals are associated with a firm-level impairment within ten years of the deal effective date. Since Compustat item 368 is aggregate firm level impairment, we utilize the Notes to Consolidated Financial Statements in the impairment year

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20  If transaction specific goodwill is not reported in the first 10-K following the deal effective date, we check the 10-K in the following year.
21  Examples of identifiable intangible assets are patents, customer relationships or contracts, and trademarks.

to determine whether and how much of the impairment is due to the specific transaction in our sample. We also read through news articles and press releases in FACTIVA if more information is required.

INSERT TABLE I HERE

The classification of the 561 'potentially impaired' transactions is described in Panel B of Table I. In many instances, the source and the amount of the impairment assigned to each target is straightforward. In the most uncomplicated scenarios, the targets with goodwill impairment and the amount of target-level impairment are directly listed in the Notes section of the 10-K, or the firm writes off the entirety of its goodwill balance. In other scenarios, the Notes lists the reporting unit(s) that suffered the loss. We search the 10-K, Notes, and FACTIVA in the year of the goodwill allocation to determine the reporting unit(s) to which the target's goodwill is allocated. If target goodwill is 100% of the impaired reporting unit goodwill, the amount of impairment attributable to the target is straightforward. For 294 transactions in the potentially impaired sample, we are able to link the impairment directly to the target and can determine the exact impairment amount.

In other instances, the target is listed as impaired in the Notes, but the impairment amount is unknown due to other targets also triggering the impairment. If the impairment is at the reporting unit level, we set target impairment equal to unit impairment * (target goodwill / unit goodwill). If the impairment is reported at the consolidated firm level, we set target impairment equal to total impairment * (target goodwill / total goodwill). For 46 transactions in the potentially impaired sample, we are able to link the impairment directly to the target and the impairment amount is estimated based on the relative size of target goodwill. Note we are interested in not only the magnitude, but also the probability of impairment events, and the latter will be unaffected by errors in the estimated size of the impairment.

For some transactions, there is uncertainty as to the *source* and *amount* of the impairment. If the target is in the impaired segment, and target goodwill is at least 20% of segment goodwill, we conclude that it is reasonably likely the target has impaired and include these 14 transactions in the Impairment sample. We estimate the size of the impairment using the relative size of target goodwill as described above. Therefore, of the 561 "potentially impaired" deals, we can classify 294+46+14=354 as "impaired deals".

For 106 transactions flagged as potentially impaired, we determine that the impairment is not in the target's segment or other targets have been listed as the source of the impairment. These

transactions are included in the Non-Impairment sample. For 78 transactions, we cannot link the impairment to a specific reporting unit or target goodwill is less than 20% of segment goodwill, and as such, we cannot reasonably classify the transactions as impaired or not impaired. We exclude these transactions from the sample. Finally, since we are interested in extreme value destruction, we focus only on material goodwill impairment events and exclude 23 transactions with identified goodwill impairments that are less than 25% of original goodwill.

Table 1 Panel B shows we have successfully been able to link impairment events to specific transactions: of 561 transactions flagged as potentially impaired, we can credibly classify 63% as large impaired, 19% as not impaired, 4% as small impaired (and so excluded), and we are unable to classify only 14% of transactions. Moreover, for transactions classified as impaired, for 83% (294/354) of transactions we know unambiguously the source and the amount of the impairment. To our knowledge, we are the first to construct a comprehensive data set that includes transaction-specific goodwill balances and transaction-specific impairment outcomes in the post-SFAS 142 period. Hayn and Hughes (2006) also trace initial goodwill balances and subsequent impairments at the transaction level, yet exclude 55% of transactions due to insufficient information. Overall, they focus largely on the pre-SFAS 142 period in which disclosure of initial goodwill and the source of the impairment was generally less comprehensive. Table I Panel C summarizes the final sample of 354 transactions in the Impairment sample and 1,106 transactions in the Non-Impairment sample.

## IV.     Descriptive Statistics

To validate goodwill impairment events as a signal of value destruction, we conduct an event study surrounding earnings announcement dates for which goodwill impairment news is released.[24] We utilize Compustat quarterly data to identify the *first* quarter each transaction in our Impairment sample experienced a goodwill write-down and the earnings announcement date for this quarter. Unique earnings announcement dates for an acquirer are included in the sample only once if multiple transactions experience a goodwill impairment announcement for a particular acquirer on the same earnings announcement date. We create three control samples. First, for the Non-Impairment sample, we generate 'pseudo' impairment dates three years following the deal effective date (the mean time

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24  As discussed in Francis, Hanna, and Vincent (1996), impairment announcements are rarely disclosed in isolation, and most commonly disclosed in earnings reports.

to impairment is 3 years from Table V). Our second control sample, 'Matched Control Sample 1' includes firms that announce earnings in the same quarter and have the same fiscal year-end and two-digit SIC code as the impaired firm. Our third control sample, 'Matched Control Sample 2' includes firms that announce earnings in the same quarter and have the same fiscal year-end and two-digit SIC code as the impaired firm, and are in the same market capitalization tercile as the impaired firm. For the matched control samples, since each impaired transaction can have multiple control sample matches, we average the market response to earnings announcements across all matches for a particular transaction. To avoid the estimation of market model parameters in both the pre- and post-acquisition period, we compute market adjusted returns using the Center for Research in Security Prices (CRSP) value-weighted index.

INSERT TABLE II HERE

Table II shows the results over four event windows.[25]  For the Impairment sample, cumulative abnormal returns are negative and statistically different from zero for three of the four event windows (mean CARs range from -1.9% to -2.6%). For the three control samples, the market response to earnings announcements is not statistically different from zero for most event windows. Importantly, the market response to earnings announcements containing goodwill impairment is statistically lower than the three control samples for all event windows but one. Although earnings announcements contain other information in addition to goodwill impairment news, the results are suggestive that the market considers goodwill impairment events as highly value relevant.

Table III shows the frequency of goodwill impairments by deal effective year cohort. Looking at impairments by deal effective year (rows), impairments are more common for deals completed in early sample period years between 2003 and 2006. This may partly be explained by censoring: transactions occurring in the later part of the sample may still incur future impairments within ten years of acquisition closure. Note, however, as reported in Table V, the mean time from deal closure to impairment is three years, and all sample transactions have at least three years of impairment data. Looking at the frequency of impairments by impairment announcement year (columns), not surprisingly, impairment events cluster in the financial crisis period, with most impairments occurring in 2008. There is a weak upward trend in the number of impairments through time, with an average

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25 We follow prior research (e.g., Berkman and Truong (2008)) and do not compute CAR [0,0] since earnings announcements often occur after market close. The earnings announcement date in Compustat (variable RDQ) does not contain time stamps, so it is not possible to adjust for after-hours announcements.

of 15 impairments each year between 2003 and 2007 and 32 impairments each year between 2009 and 2015. This is likely due to the annual impairment test requirement under SFAS-142. Relative to the total number of deals outstanding in our sample, on average, 4% of transactions experience an impairment event each year. Transactions may have multiple goodwill write-downs. There are 457 impairments associated with the 354 unique transactions with goodwill write-downs. Finally, and most importantly, the write-down of goodwill balances is common. Of 1,460 transactions in our sample, 24% experience at least one material impairment event. This is higher for deal effective year cohorts before 2008 (27% to 37%) because the 2008 crisis occurred after the mergers in these cohort groups.

INSERT TABLE III HERE

Table IV presents deal and industry statistics for the Impairment and Non-Impairment samples. Panel A shows that transactions with future goodwill write-downs are significantly larger relative to acquirer size, are more likely to include stock in the form of payment, and are associated with smaller acquirer firms. There are no statistically significant differences between the Impairment and Non-Impairment samples in terms of target industry relatedness, the number of bidders, unsolicited or hostile bids, and target public status.

INSERT TABLE IV HERE

Panel B shows the industry composition of the two samples. There are significantly more targets in the business equipment sector in the Impairment sample than in the Non-Impairment sample. Moreover, there are significantly fewer targets in the healthcare and utilities sectors in the Impairment sample relative to the Non-Impairment sector.

Table V shows goodwill and impairment statistics for the Impairment and Non-Impairment samples. This table makes two very important points. First, initial goodwill allocated to the total purchase consideration is economically large for both samples. Panel A of Table V shows that the mean dollar goodwill allocated to transactions that do not impair (do impair) is $409 million ($309 million). Importantly, on average, goodwill represents 51% and 54% of the purchase price and 10% and 14% of the total assets of the acquiring firm for the Non-Impairment and Impairment samples, respectively.

INSERT TABLE V HERE

Second, goodwill impairment losses are also economically large. Panel B of Table V shows

that in aggregate, \$87 billion of \$450 billion recorded goodwill is impaired over our sample (representing almost 20% of goodwill), with an average transaction-level impairment loss of \$245 million. If impaired, on average, 86% of a transaction's initially recorded goodwill is eliminated as a result of the impairment. Moreover, the impairment loss on average represents 46% of the purchase price and 11% of the total assets of the acquiring firm. If impaired, the average time from deal closure to the first impairment for a transaction is 3.0 years, and the median transaction experiences a single impairment event. To summarize, the portion of the purchase price allocated to goodwill is large, goodwill impairment events are common, and the magnitude of impairment losses are large relative to the goodwill initially recorded and to the total assets of the firm.

## V.    Can Acquirer Abnormal Return Detect Goodwill Impairment?

The key research question in the paper is whether and how much of the impairment (known only post-merger) can be explained by the market's assessment of value destruction at the time of the announcement. To do this, we follow the model that formalizes how an ex-ante measure of deal quality (the market reaction to the announcement) is linked to an ex-post measure of deal quality (the impairment) and decompose the impairment into two parts: the part that came from expected value destruction and the rest. Specifically, we examine whether abnormal acquirer returns at deal announcement can predict the likelihood and magnitude of goodwill impairment events. To do so, we present a battery of tests.

To measure announcement returns, we estimate daily abnormal returns using the market model and a value-weighted index, defined as follows:

$$AR_{it} = R_{it} - \alpha_i - \beta_i R_{mt} \tag{1}$$

where $AR_{it}$ is the daily abnormal return for acquirer $i$ on day $t$. The market model parameters, $\alpha_i$ and $\beta_i$, are estimated from 361 to 61 trading days before the deal announcement day. $R_{mt}$ is the CRSP value-weighted index. Cumulative abnormal returns (CARs) are then computed by summing the daily abnormal returns over various event horizons. We estimate CARs for the three-day period [-1,1], the one-day period [0,0], the two-day period [0,1], the eleven-day period [-5,5] surrounding the acquisition announcement, and over the entire merger process beginning two days prior to announcement and ending two days following deal completion [Announcement-2, Close+2].

*A. Visual Tests*

Figure 2 plots the histogram of ex-ante acquirer cumulative abnormal return over a three day window surrounding the announcement date for ten buckets of returns (below -10%, -10% to -5%, -5% to -2%, -2% to -1%, -1% to 0%, 0% to 1%, 1% to 2%, 2% to 5%, 5% to 10%, and above 10%). The blue bars with vertical lines represent the percentage of transactions in the Non-Impairment sample in each bucket. The solid red bars represent the percentage of transactions in the Impairment sample in each bucket.

If the ex-ante acquirer abnormal return at deal announcement is a good predictor of the future impairment of goodwill, Impairment sample CARs will be heavily weighted in negative return buckets and bar height will decrease as we move from left to right. No such pattern is discernible. Indeed, we observe that 34% of Impairment sample CARs are in the three most negative return buckets, whereas 39% are in the three most positive return buckets. Moreover, there is no evidence that the distribution of announcement returns is strikingly different for the Impairment and Non-Impairment samples. While bar height is higher for the Impairment than Non-Impairment sample in the first and third most negative return buckets, bar height is also higher for the two most positive return buckets.

INSERT FIGURE 2 HERE

Figure 3 plots the ex-post realized impairment amount relative to the initially recorded goodwill against the ex-ante acquirer cumulative abnormal return computed over a three-day window around the announcement date for the Impairment sample. There appears to be little relation between acquirer CAR and the percentage of goodwill impaired. Indeed, the dispersion in announcement returns seems to increase as the size of the impairment grows. Overall, Figure 2 and Figure 3 provide little visual evidence that the ex-ante acquirer abnormal return is a good predictor of the probability and magnitude of a later impairment of goodwill.

INSERT FIGURE 3 HERE

*B. Univariate Tests*

Table VI shows univariate statistics of the market reaction to the deal announcement for the Impairment and Non-Impairment samples. Panel A shows the relation between acquirer announcement returns and impairment outcome, and reports mean statistics for each sample and tests

for differences between the samples. Looking at the first five rows, acquirer CAR, defined over various windows, is significantly lower for the Impairment sample relative to the Non-Impairment sample for four of five events windows. However, of five event windows, Impairment sample mean CARs are positive and significant in one, positive and insignificant in three, and negative but insignificant in one. Impairment sample mean CARs are negative and significant for no event window. Further, acquirer CARs are positive or not significantly different from zero for 83% of transactions in the Impairment sample. We next look at the percentage of transactions for which the sign of the announcement return "disagrees" with the impairment outcome: impairment occurs but the acquire CAR is non-negative (a false negative) or impairment does not occur but the acquirer CAR is negative (a false positive). For the [-1,1] window, the false negative occurs 49% of the time, whereas the false positive occurs 44% of the time. For all windows, both these numbers are all above 43%, and the false negative is always higher or equal to the false positive. This reveals that not only are prediction errors frequent, there seems to be a slight bias against predicting impairments. Looking at dollar returns rather than percentage returns, we observe little differences between the two samples, but this is likely to be partly driven by differences in market capitalization and transaction size as described in Table IV.

INSERT TABLE VI HERE

In order to focus on the predicted magnitude of impairment, and not on the predicted occurrence of impairment, let us assume that the abnormal return predicts impairment probability with 100% accuracy. In other words, assume it gets the sign right. But does it get the magnitude right? Table VI Panel B gives the answer. It shows the relation between acquirer announcement returns and the magnitude of the impairment event. All reported statistics are sample averages. We measure the 'acquirer loss at announcement' as the acquirer dollar return if this measure is negative and zero otherwise. Zooming in on the Impairment sample, we note a mean initial goodwill of $318 million and mean acquirer loss of $65 million. This means that the percentage of goodwill that is ex-ante "good" is 75% ($251/$318). This implies that expected value destruction is 25% (100%-75%) of the initial goodwill. Though 25% is economically substantial, the fascinating result is that this *proportion is roughly the same* for both the Impairment and the Non-Impairment sample (expected value destruction for the Non-Impairment sample is 100%-77%=23%).

What happens ex-post? Of the average $318 million of goodwill recorded for the Impairment

sample, $73 million of goodwill remains on average following the Impairment, implying that only 14% of goodwill is ex-post "good" which is large relative to the 75% of goodwill that was ex-ante "good". Put differently, the predicted destruction of 25% of goodwill is much smaller than the realized value destruction of 86% (100%-14%) of goodwill. These results indicate that the market severely underestimates the magnitude of impairments – actual write-downs are more than three times larger than predicted write-downs (86% versus 25%).

To further ascertain the ability of acquirer announcement returns to predict impairment outcomes, we construct 'Prediction Error' defined as the negative of acquirer dollar return at announcement scaled by dollar impairment, which reflects errors in *both* the sign of the impairment outcome and the magnitude of the impairment. When dollar returns at announcement are zero, this measure is zero. When dollar returns at announcement are negative, this measure is positive. As a matter of fact, this measure is one if expected value destruction equals impairment loss, which implies that in this case the prediction is perfect. When dollar returns at announcement are positive, this measure is negative. Panel C of Table V shows that across all five event-windows, this metric is negative indicating that, on average, expected value destruction at announcement is much less than actual impairment loss.

To conclude, the results in Panels A, B, and C of Table VI suggests that announcement period abnormal returns have only moderate power in forecasting the probability of impairment and poor power in forecasting the magnitude of impairment. We now go to more formal tests to check this.

*C. Multivariate Tests*

In Table VII Panel A, we report the results of logit regressions that model the probability of goodwill impairment. The dependent variable is set to one if the transaction experiences a goodwill impairment event within ten years of the deal effective date, and zero otherwise. We include our key variable of interest, Acquirer CAR, computed over five event windows, and report marginal effects under the regression coefficient and *p*-value. We also include other transaction and acquirer-specific control variables described in Table IV: log deal value, acquirer log market capitalization, relative size (deal value/acquirer market capitalization), stock dummy, related industry dummy, number of bidders, unsolicited dummy, hostile dummy, public target dummy, initial goodwill scaled by purchase price, and industry and deal effective year fixed effects. Note that like acquirer CAR, these control variables are also ex-ante measures that are largely known to the market at or just after the deal

announcement date.

Focusing first on our key variable of interest, we find that Acquirer CAR is negative and statistically significant in all five regressions, indicating transactions associated with lower abnormal returns have a significantly higher probability of future impairment. However, the economic significance of this variable is arguably modest. In column (1) the marginal effect indicates that for every one percentage point increase in CAR the probability of impairment increases by 0.38%, or increases from the unconditional probability of impairment of 24.25% to 24.63%. Framed differently, in column (1), a dramatic move from the highest quartile of announcement returns (+4.6% CAR) to the lowest quartile of announcement returns (-2.3% CAR) increases the probability of impairment from 24.25% to 26.58%. The coefficients on the control variables indicate that the probability of goodwill impairment is higher for larger transactions and lower for large acquirers.

INSERT TABLE VII HERE

We next examine the ability of returns surrounding the transaction announcement to predict the magnitude of future impairments, conditional on a transaction experiencing an impairment event. Table VII Panel B shows the results of an OLS regression in which 'Goodwill Impairment Amount / Initial Goodwill' is the dependent variable for the sample of 354 transactions in the Impairment sample. The independent variables are the same as those reported in Panel A. For all five event windows, the coefficient on 'Acquirer CAR' is *positive*, yet not statistically significant. Thus, the magnitude of the impairment does not seem to be related to acquirer announcement returns. The size of the impairment is negatively related to the relative size of the target and to the percentage of the purchase price allocated to goodwill. To summarize, the results reported in Table VII Panel A and Panel B indicate announcement period abnormal returns have moderate power in forecasting the probability of impairment, but fail to predict the magnitude of future impairments.

Table VIII delves deeper into the prediction properties of CAR.[26]  We focus on five prediction models. The first prediction model, "CAR Only Model", includes only acquirer CAR [-1,1] as an independent variable. For relative comparison, we create a second prediction model, "CAR Exclusion Model", which removes acquirer CAR and only includes the deal characteristics and industry controls

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26  Our multivariate tests are similar in spirit to Hayn and Hughes (2006). Using a sample of impairments largely prior to the introduction of SFAS 142 in 2001, they provide evidence that acquisition characteristics (i.e., premium paid, goodwill as a percentage of acquisition cost, mode of consideration)) are more powerful predictors of eventual goodwill impairments than post-acquisition performance measures of the acquired entity.

included in Table VII regressions. The third, "Full Model", combines acquirer CAR, deal characteristics, and industry controls. Models four and five are similar to models two and three, but also include announcement year controls. Given that we observe clustering by impairment year (as shown in Table III), we report results with and without the inclusion of year controls to ensure year fixed effects are not driving the superior predictive ability of the 'CAR Exclusion Model'.

Similar to Table VII, we focus on the probability of impairment in Table VIII Panel A and the magnitude of impairment in Table VIII Panel B. In Panel A, for all five logit models with the goodwill impairment dummy as the dependent variable, we employ parameter estimates to compute fitted values (the imputed probability of impairing within ten years of the deal effective date), then sort predicted values into ten probability deciles. We then report the percentage of transactions having realized impairment for each predicted probability decile. If the model has predictive power, then the proportion of realized impairments should increase monotonically as we move from decile 1 (low predicted probability) to decile 10 (high predicted probability). Alternatively, if the model lacks predictive power, the percentage of realized impairments should be close to 10% for all deciles.

Focusing first on column 1, we see little evidence of significant predictive power for the CAR Only Model. The proportion of realized impairments is non-monotonic as we move from decile 1 to 10. Moreover, realized impairments are close to 10% for many deciles. If we aggregate the high-predicted probability deciles (decile 8+9+10) and the low-predicted probability deciles (decile 1+2+3), the aggregate realized impairment is 36% and 29%, respectively, a minor difference of 8%. However, in column (2), the CAR Exclusion Model, the relation between predicted and realized impairment is monotonic, and the aggregate realized impairment is 47% in the high-predicted probability deciles as opposed to 16% in the low-predicted probability deciles, a large difference of 31%. In column (3), acquirer CAR is added to deal and industry controls in the Full Model. Here we see little improvement relative to the CAR Exclusion Model: the aggregate realized impairment is 48% in the high-predicted probability deciles as opposed to 14% in the low-predicted probability deciles, a difference of 34%. We see even stronger results in columns (4) and (5) when year controls are also included. In column (4), the CAR Exclusion Model, 56% of transactions actually impair in the high-predicted probability deciles, whereas only 8% actually impair in the low-predicted probability deciles. We see little improvement in column (5) when acquirer CAR is included, with 55% and 7% realized impairments in the high and low predicted probability deciles, respectively.

If the market reaction to the announcement provides additional information related to deal quality over and above the information contained in deal and firm characteristics, then the CAR Only Model should perform well – it does not – and the Full Model should outperform the CAR Exclusion Model well – it does not. So Panel A indicates that deal and industry characteristics, also largely known ex-ante at the deal announcement date, dominate acquirer CAR as predictors.

INSERT TABLE VIII HERE

Panel B of Table VIII focuses on the magnitude (rather than the probability) of write-offs for transactions in the Impairment sample and are based on the regressions shown in Panel B of Table VII. Similar to Panel A, we run five OLS regressions for all five models with 'Goodwill Impairment Amount/Initial Goodwill' as the dependent variable. We then place *predicted* percentage goodwill impairment values into below the median and above the median predicted groups and report the percentage of *realized* above median percentage goodwill impaired. We focus on medians rather than deciles due to the small sample (N=354) and due to the distribution of percent goodwill impaired (over 50% of transactions impair 100% of goodwill).

Focusing on column (1), we note the CAR Only Model is a poor predictor of the percentage of goodwill that will eventually impair. Realized above median impairment is 49% in the below median predicted group, whereas realized above median impairment is 51% in the above median predicted group. The difference is only 2%. The CAR Exclusion Model in column (2) fares better: realized above median impairment is 36% in the below median predicted group, whereas realized above median impairment is 64% in the above median predicted group. The difference is 29%. Performance is unaltered when CAR is included in column (3). To summarize, Panel A and Panel B of Table VIII show that acquirer announcement returns have moderate power in predicting the probably of goodwill impairment but poor power in predicting the size of the loss conditional on impairing. Models that include other ex-ante deal, firm, and industry variables perform better in forecasting both the likelihood and the magnitude of impairment events.

## VI. Can Acquirer Abnormal Return Detect Other Ex-Post Symptoms of Deal Failure?

Section V indicates that on average, the market's assessment of acquirer value destruction at announcement is a poor forecast of realized goodwill impairment losses. We next consider potential

explanations for this result. The weak relation between the two measures could arise due to limitations in the use of goodwill impairment as an ex-post measure of deal failure, rather than the inability of announcement returns to detect value destruction. Table II had provided event-study evidence to validate goodwill impairment events as a signal of value destruction. To further validate impairment as a robust measure of deal failure and to validate the inability of announcement return to detect deal failure, we focus on other ex-post firm-level symptoms of deal failure: CEO turnover, poor stock and operating performance, and distressed delisting.

*A. CEO Turnover*

We consider both the likelihood of CEO turnover following deal announcement and the timing of turnover for the Impairment sample. We track CEO turnover events between deal announcement and four years subsequent to the first impairment event. This analysis is conducted at the CEO-impairment level rather than the transaction level. If a single impairment event for a firm results in the write-down of multiple transactions in a given year, we retain only the transaction with the largest impairment amount. This reduces our sample from 354 to 309 transactions with impairments. We identify three types of forced CEO turnover: (1) internal turnover (fired by the board), (2) takeover turnover, and (3) bankruptcy turnover. Turnover events are identified using proxy statements, press releases, and news articles in Factiva. We follow Parrino (1997) and Lehn and Zhao (2006) in identifying turnover events. If the CEO is reported as fired, forced from his or her position, or departed due to unspecified policy differences, then the CEO is classified as experiencing an internal turnover event. If the CEO is under the age of 65 and the reason for departure is unrelated to death, poor health, or the acceptance of another position, or if it is announced the CEO is retiring yet the announcement is not at least six months before succession, then the CEO is classified as experiencing an internal turnover event. For firms that are acquired, if we are unable to find evidence that the CEO retained a role in the acquiring entity, then the CEO is classified as experiencing a takeover turnover event. Similarly, for firms that enter bankruptcy, if we are unable to find evidence the CEO retained his or her job during the bankruptcy process, then the CEO is classified as experiencing a bankruptcy turnover event.

Panel A of Table IX presents results for the full sample of 309 transactions in the Impairment sample. We find that 47% of CEOs experience a turnover event between deal announcement and four years following the impairment, indicating that close to half of the Impairment sample CEOs are

disciplined by the labor market following the acquisition. However, Lehn and Zhao (2006) find similar CEO turnover propensity for a full sample of acquisitions that may or may not experience impairment events. We next consider the timing of this turnover, to assess whether turnover results from the market's assessment of value destruction at deal announcement or results from the subsequent impairment event itself. If value destruction is anticipated at announcement, CEOs should be more likely to be fired immediately following the acquisition announcement rather then immediately following the impairment. We find that 6% of impaired firm CEOs are terminated immediately following the acquisition announcement, whereas 19% are fired immediately following the impairment event. This provides some evidence that the impairment event signal rather than the market reaction at deal announcement is more informative to labor market decisions.

INSERT TABLE IX HERE

In Panel B of Table IX, we report turnover statistics for the above median and below median predicted impairment probability using the Acquirer Only Model described in Table VIII Panel A. We use medians to ensure equal observations in each group. Overall, we observe firms in the above median predicted impairment group are more likely to experience a turnover event overall (51% vs. 43%), more likely to experience internal turnover (48% vs. 43%), more likely to experience takeover turnover (65% vs. 53%), and more likely to experience bankruptcy turnover (80% vs. 0%) relative to firms in the below median predicted impairment group. Excluding bankruptcy turnover, these differences are not statistically significant. Most importantly, we find little differences in timing when delineating between above and below median predicted impairment transactions. For the above median (below median) sample, 8% (5%) of CEOs are fired following the deal announcement and 19% (19%) following the impairment. Hence, there is only a modest and insignificant increase in the probability of turnover after the announcement for the high predicted impairment sample relative to the low predicted impairment sample (*p*-value 0.2314), and no difference between the samples in the probability of turnover after the impairment (*p*-value 0.8634).[27]

To summarize, the results in Table IX indicate that the majority of turnover events in the Impairment sample do not result from anticipated value destruction at announcement, but rather from poor performance revealed over time. Overall, the labor market seems to regard the announcement of

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27 The results are qualitatively similar if we replicate Panel B, but report turnover statistics for the above median and below median predicted 'Goodwill Impairment Amount / Initial Goodwill' using the Acquirer Only Model described in Table VII Panel B

the impairment as a more important signal for managerial discipline than negative abnormal returns at deal announcement because CEO turnover events are 2.5 times more likely to occur immediately following the impairment rather than following the deal announcement for the above median (high predicted) sample.

*B. Long-Term Accounting and Stock Performance*

If ex-post value destruction is detected at announcement, performance metrics of firms with high-predicted impairment probability (largely negative CAR transactions) should track the performance metrics of impaired firms after the merger, and performance metrics of firms with low-predicted impairment probability (largely positive CAR transactions) should track the performance metrics of non-impaired firms after the merger. We examine industry-adjusted accounting and stock performance for the two years prior to three years subsequent to deal announcement. If an acquirer is in the Impairment or Non-Impairment sample more than once in the same year, we retain the transaction with the largest deal value. This restriction reduces our sample from 1,460 to 1,363. We report the following median performance measures, adjusted by the median Fama French 48 industry value, over a six-year period surrounding the acquisition: sales growth, cost of goods sold/sales, selling, general, and administrative expenses/sales, property, plant, and equipment (PPE) growth, free cash flow/assets, return on assets (ROA), return on equity (ROE), Tobin's q, Earnings/Price, and buy-and-hold return.

Figures 4a – 4j show performance metrics graphically and Table X provides formal tests of performance outcomes for the Impairment, Non-Impairment, Below Median Predicted Impairment, and Above Median Predicted Impairment samples. First looking at the figures, we generally observe that industry-adjusted performance measures begin to materially diverge in the years following the deal announcement for the Impairment sample (shown in red) and the Non-Impairment sample (shown in blue), indicating impairment sample firms encounter significant firm-level negative shocks in the years following the acquisition. For many of the measures, the divergence begins in the year following the acquisition, but widens further two years following the acquisition. However, we observe little divergence in performance subsequent to the transaction between the Above Median Predicted Impairment (red dotted lines) and Below Median Predicted Impairment (blue dashed lines) samples. For many measures, the relation between the two samples is steady before and after the transaction and any divergence observed following the transaction is modest relative to the divergence

between the Impairment and Non-Impairment samples. Graphically, there is little evidence that the ex-post performance outcomes are different for the high and low predicted impairment samples.

INSERT FIGURES 4A-4J HERE

Table X reports median industry-adjusted statistics and tests of statistical differences between the Non-Impairment and Impairment samples and between the Below Median Predicted Impairment and Above Median Predicted Impairment samples. We observe statistically superior performance for the Non-Impairment sample relative to the Impairment sample for all three years following the acquisition announcement (T+1, T+2, T+3) for nine of ten performance measures. However, when comparing Below and Above Median Predicted Impairment samples, we observe statistical differences in all three years for none of the performance measures. We see similar results if we focus only on years T+2 and T+3. Further, the magnitude of the difference between the Non-Impairment and Impairment samples is dramatically larger than the difference between the Below and Above Median Predicted Impairment samples.

INSERT TABLE X HERE

Figure 4j shows the returns from buying the stock two years prior to the transaction and holding to three years subsequent to the transaction. Returns to the Above Median Predicted Impairment sample dip around the announcement date then modestly recover thereafter. Returns to the realized Impairment sample remain relatively flat at announcement, but begin to dramatically decline thereafter. Table X shows that one-year buy-and-hold returns are positive for the Above Median Predicted Impairment sample for all three years following the transaction announcement year. Combined, these results provide little evidence that expected value destruction is the primary driver of deal failure, but rather point to unanticipated outcomes as playing a central role in deal failure.

C. *Post-Transaction Public Market Exits*

Table XI shows univariate statistics on the number of acquirer firms that exit the public markets within ten years of the deal effective date. Public market exit data is obtained using the CRSP delisting code. Acquirers are categorized as 'Merged/Went Private' for delisting codes between 200 and 390 and 573. Acquirers are categorized as 'Delisted' for delisting codes between 500 and 600 (excluding 573 and 574) and as 'Bankrupt/Liquidated' for delisting codes between 400 and 490 and 574. Statistics are shown for the Impairment and Non-Impairment samples and for the Above Median

and Below Median Predicted Impairment samples. Percentages are based on 1,106 total transactions in the Non-Impairment sample and 354 total transactions in the Impairment sample.

As expected, Impairment samples firms are more likely to be acquired or go private, are significantly more likely to be delisted, and are significantly more likely to go through a bankruptcy or liquidation process than firms in the Non-Impairment sample. However, we observe nearly identical outcomes for the Above Median and Below Median Predicted Impairment samples, indicating that ex-ante impairment expectations have no ability to predict future public market exits.

INSERT TABLE XI HERE

## VII. Ex-Ante Characteristics Linked To Value Destruction

Our evidence suggests that, on average, the factors that contribute to deal failure may be largely latent factors that are unknown at deal announcement. In the final tests, we examine whether the ability of announcement returns to detect value destruction varies across deal and firm characteristics. There is a large literature that attempts to predict which mergers destroy value using ex-ante characteristics – researchers have linked negative acquirer announcement returns to stock transactions, public target transactions, large acquirers, large transactions (on an absolute and relative basis), targets in unrelated industries, and acquirers with high valuations prior to deal announcement. Further, the market's ability to assess value creation is likely related to the information environment: private targets, small acquirers, targets in unrelated industries, and high-tech deals are likely associated with heightened opacity.

INSERT TABLE XII HERE

In Table XII, we replicate the results of Table VIII for stock and cash, public and private target, large and small acquirers, large and small transaction sizes, large and small relative size transactions, transactions of targets in unrelated and related industries, non-high-tech and high-tech industries, and high Tobin's q and low Tobin's q acquirers. Transactions are categorized as stock-financed if the 'Consideration Structure' variable in SDC includes any amount of common stock financing. Acquirers are categorized as 'large' if the acquirer market capitalization 50 day prior to announcement is greater than $1 billion. Transactions are classified as large if the transaction size

exceeds the median deal size in the sample. Transactions are classified as large on a relative basis if the relative size of the transaction exceeds the median relative size in the sample. We consider the acquirer and target in a related industry if they have the same two-digit SIC code. Transactions are flagged as high-tech if both the acquirer and target are flagged as high-tech acquirers in SDC. Finally, high Tobin's q acquirers have above median Tobin's q relative to the sample.

In Table XII, we report the actual realized percentage of firms that impair for transactions with high predicted impairment (those in deciles 8, 9, 10) and for transactions with low predicted impairment (those in deciles 1, 2, 3) for the CAR Only Model, CAR Exclusion Model, and Full Model. We also report whether the prediction capability of the Acquirer CAR model performs better in one subsample over another.

We find that the acquirer return model performs significantly better for public targets, large acquirers, large transactions, and low Tobin's q acquirers. We find the acquirer return model performs moderately better (albeit not statistically better) for stock financed transactions, related industry transactions, and transactions in non-high-tech industries. The results point to the importance of the information environment of the acquirer and target – the market's ability to detect value destruction deteriorates for private targets, small acquirers, unrelated industry transactions, and high-tech transactions.

Although we find improved performance in subsets of the data, detection errors remain large in all samples. For all subsamples, the CAR Only Model forecasts dramatically fewer impairments than the benchmark CAR Exclusion Model, and the inclusion of CAR in the Full Model adds little benefit to model predictive power. Together, our results indicate that, while known ex-ante determinants of value destruction play a role in realized extreme deal failure, there remains a large portion of deal failure that is driven by unforecastable firm, industry, or economy-wide shocks that are revealed over time.


### VIII.  Can Combined Announcement Returns Detect Goodwill Impairment?

Thus far we have examined whether *acquirer* announcement returns can detect ex-post extreme value destruction. We now examine whether the *combined* returns of the target and acquirer, which reflect the total expected synergies created from the transaction, can predict large goodwill

impairment events.

We zoom in on the subsample of transactions for which the target is publicly traded. Table XIII reports univariate statistics similar to Table VI for the subsample of 68 Impairment and 233 Non-Impairment transactions for which the target is a public company. Target abnormal returns are statistically *lower* for the Impairment sample compared to the Non-Impairment sample in four of five event windows (e.g., the Impairment and Non-Impairment samples, respectively, have a mean Target CAR [-1,1] of 19% and 28%). Target dollar abnormal returns are also lower for the Impairment sample compared to the Non-Impairment sample, but the differences are not statistically significant. Acquirer abnormal returns for the public target sample are significantly negative for the Impairment sample and not significantly different from zero for the Non-Impairment sample; differences between the two samples are statistically significant in four of the five event windows.

We next report the combined abnormal returns and dollar gains of the merged entity. We compute combined dollar gains by summing the product of acquirer CAR and acquirer market capitalization 50 days prior to the deal announcement date and the product of target CAR and target market capitalization 50 days prior to the deal announcement date. We compute combined percentage returns by dividing combined dollar gains by the sum of acquirer and target market capitalization 50 days prior to announcement. The mean combined percentage return is positive and significantly greater than zero for four of the five event windows for the Non-Impairment sample. However, the combined returns are positive but not statistically different from zero for the Impairment sample, indicating target gains are offset by acquirer losses on a percentage return basis. On a dollar return basis, both Impairment and Non-Impairment samples have positive values that are not statistically different. Importantly, these results indicate that combined returns also largely fail to predict goodwill impairment. Although percent combined returns are statically lower for the Impairment sample than the Non-Impairment sample, Impairment sample mean returns are non-negative across all event windows. Further combined dollar returns for the Impairment sample are positive and not statistically different from the Non-Impairment sample.

Table XII had shown that acquirer announcement return detection capability is higher in public target transactions relative to private target transactions. This is also reflected in Table XIII. Unlike the full sample results for which Impairment sample acquirer CAR is positive for most event windows, mean acquirer CAR is negative and significant in the public target sample. Of course, there

is a significant portion of the Impairment sample transactions that lack negative announcement returns – 65% of Impairment sample deals have a positive or insignificantly different from zero market reaction at announcement, indicating that errors remain large in this sample. Of course, these results should be interpreted with caution due to the small sample size of public target transactions.

## IX. Robustness Tests

Our empirical approach assumes that acquirer announcement returns are an unbiased measure of value destruction expectations. Since announcement returns may be contaminated with other non-transaction specific information, this could explain the lack of relation between acquirer announcement return and goodwill impairment.

One, announcement returns may be biased due to information on the standalone value of the acquirer revealed as a result of the merger bid. For example, the market reaction to stock-financed transactions may signal valuable information to the market on bidder standalone value. As such, the market response may include information related to the revaluation of acquirer value. Since we find large prediction errors in cash-financed acquisitions in Table XII, this criticism is muted. Further, reassessments on the standalone value of the acquirer triggered by the bid announcement, such as signals of overvaluation and lack of investment opportunities, are likely to bias returns downward, which would strengthen the relation between announcement return and impairment. So this bias goes against our results.

Two, announcement returns may be moderated because the market puts a low probability on deal completion. Our tests are robust to an announcement return window that spans deal announcement to deal closure, when the probability of deal completion has moved towards one.

Three, announcement returns may also be a biased measure of expected value destruction due to price pressure from arbitrageurs during acquisitions of public targets (see, e.g., Mitchell, Pulvino, and Stafford, 2004). Since we also find large prediction errors in the private target sample in Table XII, which are less likely to attract arbitrage traders, this criticism is also muted. Moreover, arbitrage activity would likely bias acquirer returns downward, also strengthening the relation between acquirer return and impairment outcomes. So this bias also goes against our results.

Four, Table III had shown that a significant portion of impairment events occurred during the crisis, a period that likely triggered many unexpected unfavorable outcomes. In Table XII, we report

results when excluding crisis-period impairments during 2008 and 2009. The results are similar to the full sample results, indicating that the lack of predictive power of acquirer announcement returns is not driven by the massive, and arguably unanticipated, financial crisis.

Five, it is possible that goodwill impairment implies deal failure but deal failure does not imply impairment if deal failure can be masked. For example, if value gains of one target offset reductions in goodwill in another target in the same reporting unit, impairment will not occur.[28] When is it difficult to mask deal failure? For transactions for which the target is large relative to the acquirer, it is less likely the acquirer can use other businesses to hide value reductions in the target. In Table XII, we report results for both transactions of large and small relative size (deal value scaled by acquirer market capitalization). The CAR Only Model performs equally well for both the large and small relative size subsamples and continues to underperform the benchmark CAR Exclusion Model.

## X.      Conclusion

We utilize an ex-post realized measure of deal outcome, the write-down of acquisition goodwill, to define deal failure. We find the average portion of the purchase price allocated to goodwill is significant and goodwill impairment events are frequent and large in magnitude. On average, goodwill exceeds 50% of the purchase price, is impaired for 24% of acquirers, and over 80% of goodwill is eliminated at impairment.

We next find that announcement period abnormal returns have modest power in forecasting the probability of impairment and poor power in predicting the magnitude of impairment. Indeed, acquirer abnormal returns are positive or insignificant for 83% of transactions in the Impairment sample. Actual write-downs are more than three times larger than write-downs predicted from acquirer announcement returns. We find that impairment probability prediction models using deal and industry characteristics, also largely known ex-ante at the deal announcement date, dominate acquirer announcement returns as predictors. Overall, these results show the market's assessment of value destruction at the time of deal announcement can only moderately predict impairment outcomes, indicating that a large portion of deal failure is unforecastable and unrelated to value destruction expectations.

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28 The initial step of annual goodwill impairment testing is to determine the fair value of the reporting unit, which may or may not include multiple targets. If the fair value of the reporting unit is not less than the book value, an impairment will not occur. We thank Adam Kolasinsky for pointing out this issue.

We explore this further by relating ex-ante expectations to other ex-post realized outcomes that are also symptoms of deal failure. We find that 6% of impaired firm CEOs are terminated immediately following the acquisition announcement, whereas 19% are fired immediately following the impairment event. We find little differences in timing when delineating between the above median and below median predicted impairment probability samples using the acquirer abnormal return only model. Overall, the labor market seems to regard the impairment event as a more important signal for managerial discipline than expected value destruction at deal announcement.

We try to further differentiate deal failure that results from expected value destruction from deal failure due to unexpected outcomes by examining accounting and stock performance metrics two years prior to the deal to three year subsequent to the deal. We find that industry-adjusted accounting and stock performance measures begin to materially diverge in the years following the deal announcement for the Impairment and Non-Impairment samples, indicating Impairment sample firms encounter significant firm-level negative shocks in the years following the acquisition. However, we observe little divergence in performance subsequent to the transaction between the above median predicted impairment and below median predicted impairment samples. Finally, we consider public market exits related to bankruptcy, liquidation, delisting, and mergers. Again, we find Impairment sample firms are significantly more likely to experience such outcomes relative to Non-Impairment sample firms, yet find nearly mirror outcomes for the above median predicted impairment and below median predicted impairment samples.

We find improvement in the deal failure detection capability of announcement returns in certain subsets of the data. Acquirer announcement returns forecast impairments significantly better for large, public target, and large acquirer transactions than for small, private target, and small acquirer transactions, respectively. Acquirer announcement returns perform moderately better for stock, related industry, and non-high-tech transactions, and for acquirers with low pre-deal Tobin's q. Detection errors, however, still remain large in these sub-samples.

To conclude, our results indicate that, while known ex-ante determinants of value destruction play a role in realized extreme deal failure, there remains a large portion of deal failure that is driven by unforecastable firm, industry, or economy-wide shocks that are revealed over time. As such, the market's assessment of value destruction at deal announcement may not be the dominant trigger of deal failure for many transactions.

# REFERENCES

Andrade, G., Mitchell, M., Stafford, E. (2001). New evidence and perspectives on mergers. *Journal of Economic Perspectives* 15, 103-120.

Asquith, P. (1983). Merger Bids, Uncertainty, and Stockholder Returns. *Journal of Financial Economics,* 11, 51-83.

Asquith, P., Bruner, R., Mullins, D. (1983). The gains to bidding firms from merger. *Journal of Financial Economics* 11, 121-139.

Bargeron L., Schlingemann, F., Stulz, R., Zutter, C. (2008). Why do private acquirers pay so little compared to public acquirers? *Journal of Financial Economics,* 89(3), 375-390.

Beatty, A., Weber, J. (2006). Accounting discretion in fair value estimates: An examination of SFAS 142 goodwill impairments. *Journal of Accounting Research*, 44, 257–288

Bens, D.A., Heltzer, W., Segal, B. (2011). The Information Content of Goodwill Impairments and SFAS 142. *Journal of Accounting, Auditing & Finance*, 26, 527-555.

Berkman, H., Truong, C. (2008). Event Day 0? After - Hours Earnings Announcements. *Journal of Accounting Research* 47, 71-103.

Bradley, M. (1980). Interfirm Tender Offers and the Market for Corporate Control. *Journal of Business* 53, 345-76.

Bradley, M., Desai, A., Kim, E.H., (1988). Synergistic gains from corporate acquisitions and their division between the stockholders of target and acquiring firms. *Journal of Financial Economics* 21, 3-40.

Chang, S., Suk, D. (1998). Failed takeovers, methods of payment, and bidder returns. *Financial Review* 33, 77–84.

Chen, C., Kohlbeck, M., Warfield, T. (2004). Goodwill valuation effects of the initial adoption of SFAS 142. Working paper, University of Wisconsin.

Dodd, P. (1980). Merger Proposals, Management Discretion, and Stockholder Wealth. *Journal of Financial Economics* 8, 105-38.

Dodd, P., Ruback, R. (1977). Tender Offers and Stockholder Returns: An Empirical Analysis. *Journal of Financial Economics* 5: 351-374.

Dong, M., Hirshleifer, D., Richardson, S., Teoh, S.W. (2006). Does Investor Misvaluation Drive the Takeover Market? *Journal of Finance* 61, 725-762.

Eckbo, E. (1983). Horizontal Mergers, Collusion, and Stockholder Wealth. *Journal of Financial Economics* 11: 241-273.

Elliott, J., Shaw, W. (1988). Write-offs as accounting procedures to manage perceptions. *Journal of Accounting Research*, 40, 91–119.

Francis, J., Hanna, D., Vincent, L. (1996). Causes and effects of discretionary asset write-offs. *Journal of Accounting Research*, 34, 117–134.

Fuller, K., Netter, J., Stegemoller, M., (2002). What do returns to acquiring firms tell us? Evidence from firms that make many acquisitions. *Journal of Finance* 57, 1763–1794.

Gu, F., Lev, B. (2011). Overpriced shares, ill-advised acquisitions, and goodwill impairment. *The Accounting Review* 86(6), 1995-2022.

Harford, J., Li. K. (2007). Decoupling CEO Wealth and Firm Performance: The Case of Acquiring CEOs. *Journal of Finance* 62, 917-949.

Harford, J., Humphry-Jenner, M., Powell, R. (2012). The Sources of Value Destruction in Acquisitions by Entrenched Managers. *Journal of Financial Economics* 106, 229-446.

Hayn, C., Hughes, P. (2006). Leading indicators of goodwill impairment. *Journal of Accounting Auditing & Finance*, 21, 223–266.

Henning, S., Stock, T. (1997). The value-relevance of goodwill write-offs. Working paper, Southern Methodist University.

Henning, S., Lewis, B., Shaw, W. (2000). Valuation of the components of purchased goodwill. *Journal of Accounting Research*, 38, 375–386.

Hietala, P., Kaplan, S., Robinson, D. (2003). What Is the Price of Hubris? Using Takeover Battles to Infer Overpayments and Synergies. *Financial Management* 32, 5-31.

Hoberg, G., Phillips, G.M. (2017) Product Integration and Merger Success. Working paper, University of Southern California and Dartmouth.

Jarrell, G., Bradley, M. (1980). The Economic Effects of Federal and State Regulations of Cash Tender Offers. *Journal of Law and Economics* 23: 371-407.

Jensen, M.C. (1986). Agency costs of free cash flow, corporate finance, and takeovers. *American Economic Review* 76, 323–329.

Johnson, L. T., Petrone, K.R. (1998). Is Goodwill an Asset? *Accounting Horizons*, 293-303.

Kau, J., Linck, J., Rubin, P. (2008). Do managers listen to the market? *Journal of Corporate Finance*

14, 347–362.

Kummer, D. and R. Hoffmeister. (1978). Valuation Consequences of Cash Tender Offers. *Journal of Finance* 33, 505-16.

Langetieg, T. (1978). An Application of a Three-factor Performance Index to Measure Stockholders Gains from Merger. *Journal of Financial Economics* 6, 365-384.

Lehn, K., Zhao,M.,(2006).CEO turnover after acquisitions: are bad bidders fired? *Journal of Finance* 61, 1759-1811.

Li, Z., P. Shroff, R. Venkataraman, and I. Zhang. (2011). Causes and Consequences of Goodwill Impairment Losses. *Review of Accounting* Studies 16, 745-778.

Li, K., Sloan, R. (2017). Has Goodwill Accounting Gone Bad? *Review of Accounting Studies*, forthcoming,

Loughran, T., Vijh, A., 1997, "Do Long-Term Shareholders Benefit From Corporate Acquisitions?" *Journal of Finance* 52, 1965-1790.

Luo, Y. (2005). Do Insiders Learn from Outsiders? Evidence from Mergers and Acquisitions. *Journal of Finance* 60, 1951-1982.

Malatesta, Paul H. (1983). "The Wealth Effect of Merger Activity and the Objective Functions of Merging Firms." *Journal of Financial Economics* 11: pp 155-181.

Malmendier, U., Tate, G. (2008).Who makes acquisitions? CEO overconfidence and the market's reaction. *Journal of Financial Economics* 89, 20–43.

Malmendier, U., Moretti, E., Peters, F. (2018).  Winning by Losing: Evidence on the Long-Run Effects of Mergers. *Review of Financial Studies,* forthcoming.

Mandelker, G., (1974), Risk and return: The case of merging firms, *Journal of Financial Economics* 1 303-336

Masulis, R., Wang, C., Xie. F. (2007). Corporate Governance and Acquirer Returns. *Journal of Finance 62, 1851-1889.*

Mitchell, M.L., Lehn, K., (1990). Do bad bidders become good targets? *Journal of Political Economy* 98, 372–398.

Mitchell, M.L., Pulvino, T., Stafford, E. (2004). Price Pressure around Mergers. *Journal of Finance 59(1), 31-63.*

Moeller, S., Schlingemann,F., Stulz, R.,(2004).Firm size and the gains from acquisitions. *Journal of*

*Financial Economics* 73,201–228.

Moeller, S., Schlingemann, F., Stulz, R. (2005). Wealth destruction on a massive scale? A study of acquiring-firm returns in the recent merger wave. *Journal of Finance* 60, 757–782.

Morck, R., Shleifer, A., Vishny, R. (1990). Do managerial objectives drive bad acquisitions? *Journal of Finance*, 45, 31–48.

Parrino, R. (1997).CEO turnover and outside succession: a cross-sectional analysis. *Journal of Financial Economics* 46, 165–197.

Ramanna, K., & Watts, R. (2010). Evidence on the use of unverifiable estimates in required goodwill impairment. *Review of Accounting Studies* 17, 749-780.

Rau, R., Vermaelen, T. (1998). Glamour, value and the post-acquisition performance of acquiring firms. *Journal of Financial Economics* 49, 223-253.

Rhodes-Kropf, M., Viswanathan, S. (2004). Market valuation and merger waves. *Journal of Finance* 59, 2685-2718.

Rhodes-Kropf, M., Robinson. D., Viswanathan, S., (2004). Valuation waves and merger activity: The empirical evidence. *Journal of Financial Economics* 77, 561-603.

Roll, R. (1986). The hubris hypothesis of corporate takeovers. *Journal of Business*, 59, 197–216.

Ruback, Richard S. (1983). Assessing Competition in the Market for Corporate Acquisitions. *Journal of Financial Economics* 11: pp 141-53.

Schipper, K., Thompson, R. (1983). The Impact of Merger-Related Regulations Using Exact Distributions of Test Statistics. *Journal of Accounting Research* 23, 408-415,

Shleifer, A., Vishny, R. (2003). Stock market driven acquisitions. *Journal of Financial Economics* 70, 295-311

Savor, P.G., Lu, Q. (2009). Do stock mergers create value for acquirers? *Journal of Finance* 64, 1061-1097.

Travlos, N., (1987). Corporate takeover bids, method of payment, and bidding firms' stock returns. *Journal of Finance* 52, 943–963.

**Figure 1: Example Allocation of Goodwill at Deal Completion Date**

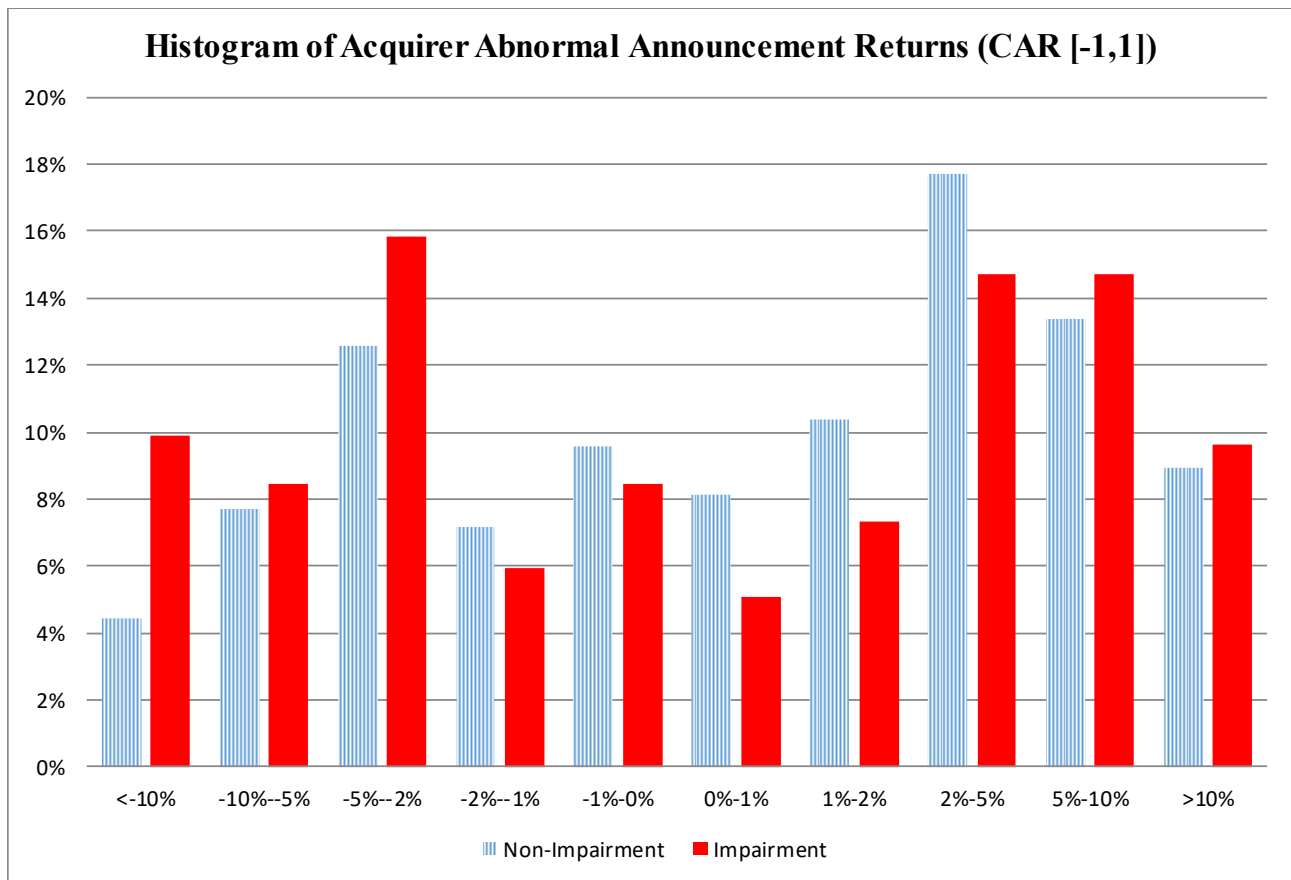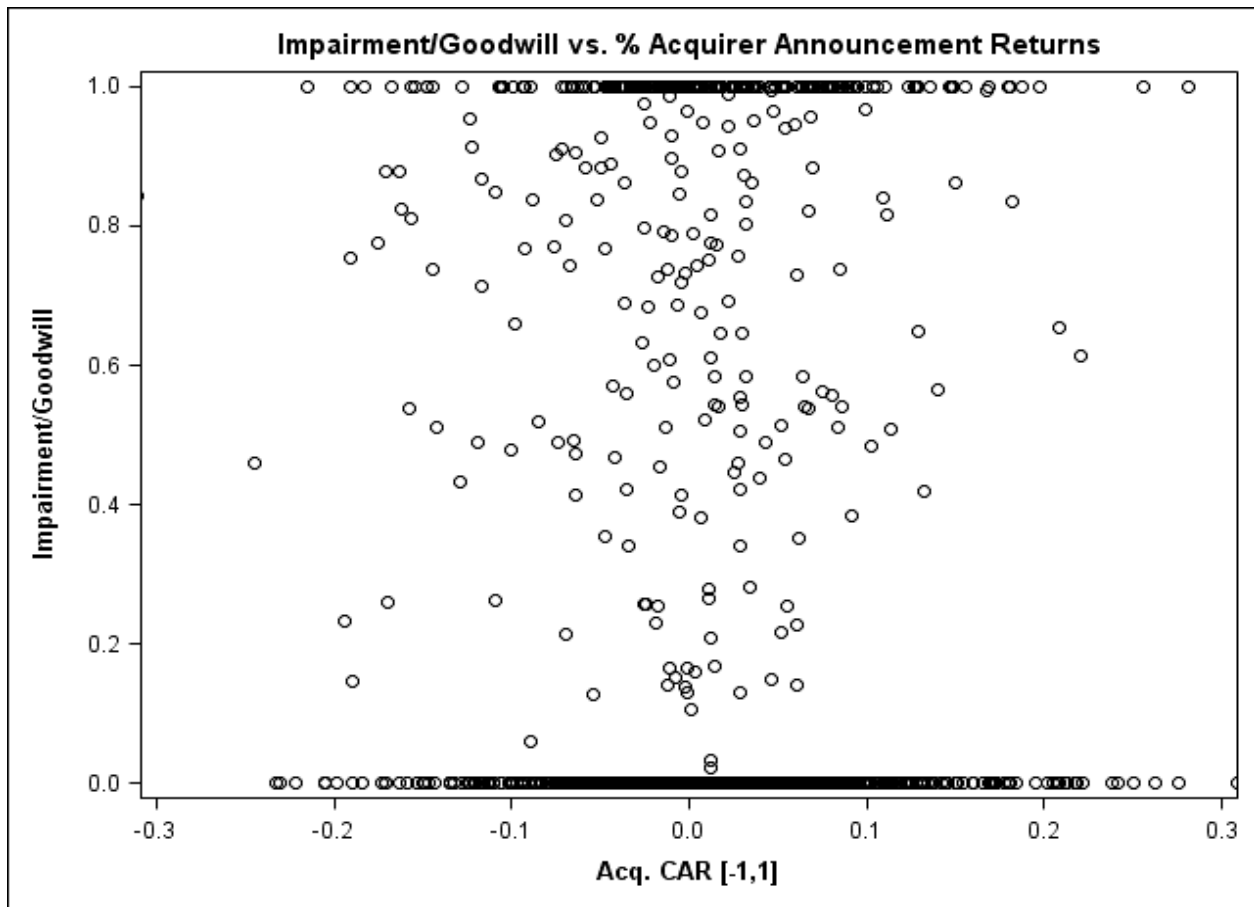| | |
|---|---|
| Current assets - $3 | |
| Tangible assets (PP&E) - $6 | |
| Identifiable Intangibles (patents) - $4 | |
| Goodwill (the residual) - $12 | Going-Concern - $2 |
| | Synergies - $6 |
| | Overpayment/Overvaluation of Consideration - $4 |

**Figure 2**



Histogram of Acquirer Abnormal Announcement Returns (CAR [-1,1])

**Figure 3**

# Figures 4A – 4J

## ROE



## TOBINS Q



## E/P



## Industry-Adjusted Buy-And-Hold Returns by Month Since Announcement
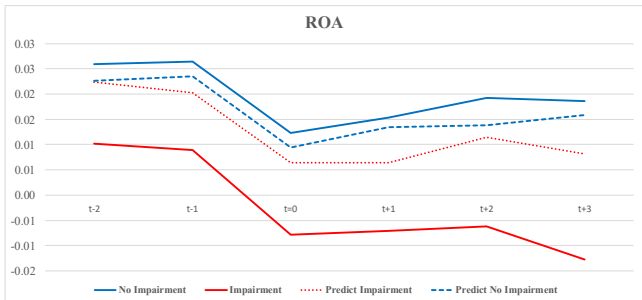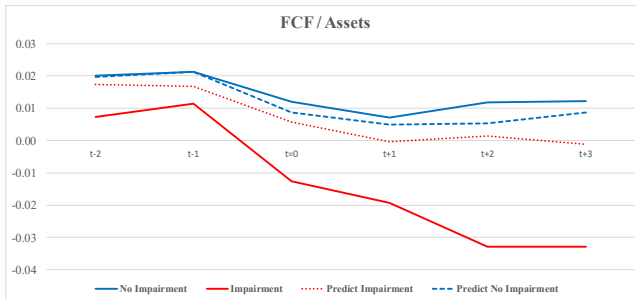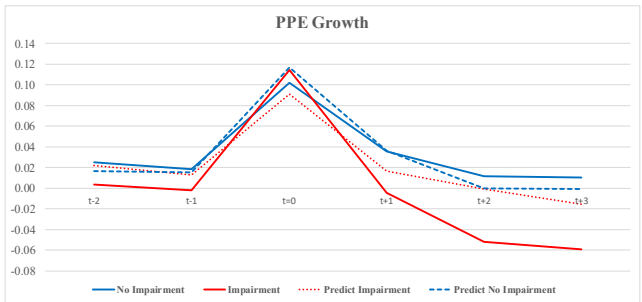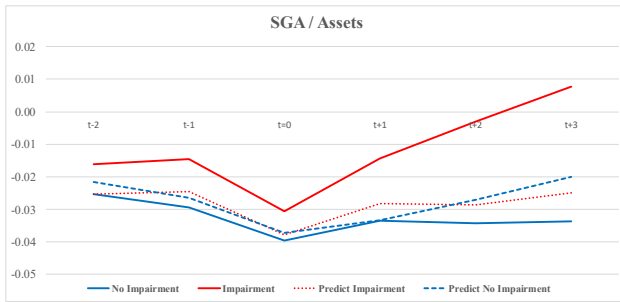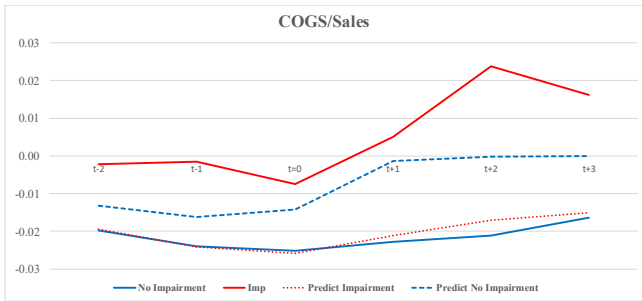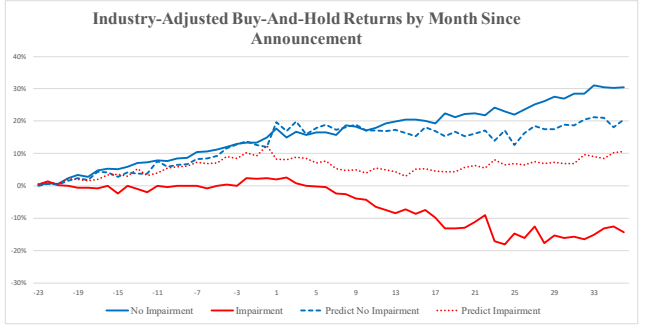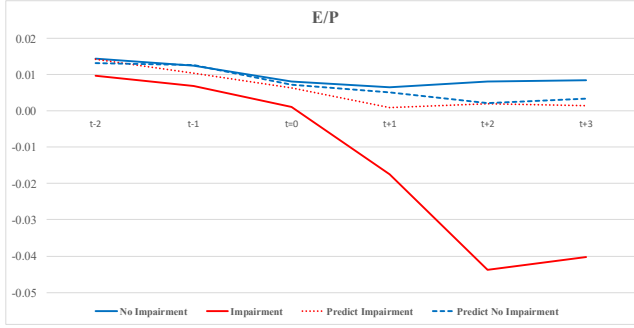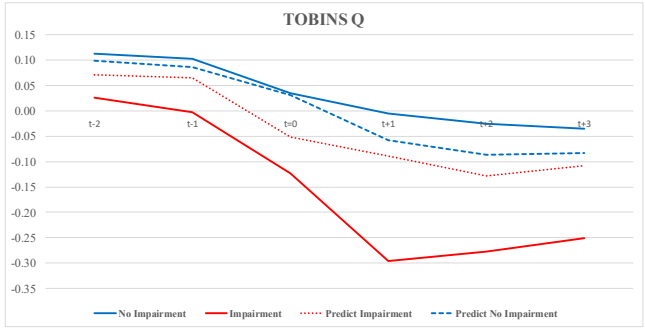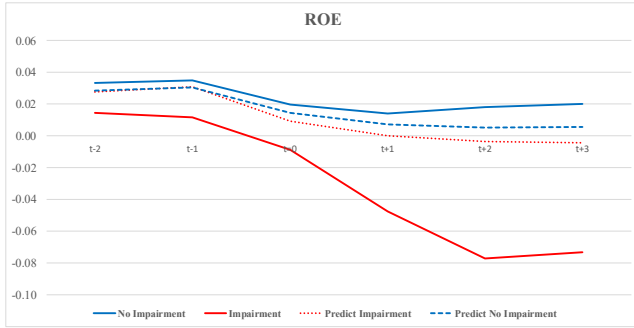
**Table I**

**Sample Description**

As described in Panel A, the sample of merger and acquisition deals is from SDC and includes transactions announced on or after January 2003 and completed by December 2013 with a transaction value that exceeds $10 million and is least 5% of the acquirer's market capitalization at the end of the fiscal year before the deal was announced. The percent sought must be at least 50%. Repurchases, self-tenders, recapitalizations, acquisitions of partial or remaining interest, reverse mergers, leveraged buyouts, privatizations, and bankruptcy acquisitions are excluded. Acquirers must be a U.S. company and publicly traded, must not be a financial firm, and must match to both Compustat and CRSP. The final sample consists of 2,982 acquisition deals. For each deal, we search Compustat over the ten years following deal completion for non-blank goodwill impairment which is at least 5% of firm assets in the year prior. Panel B describes the classification of the 'potentially impaired' transactions. For the sample of 561 potentially impaired targets, we read through the 10-K Notes and Factiva to identify (if possible) the target(s) that triggered the firm-level impairment. * indicates the exact impairment amount is unknown; the total amount allocated to the deal is based on target goodwill relative to total segment goodwill. ** indicates the exact impairment amount is unknown; the total amount allocated to the deal is based on target goodwill relative to total firm goodwill. Panel C shows the final Impairment sample consists of 354 transactions. The final Non-Impairment sample consists of 1,106 transactions.

| Panel A: Sample Construction | |
|---|---|
| # Deals | 2,982 |
| Less: Deals with zero or blank firm-level goodwill in Compustat | 921 |
| Less: Deals without deal-level goodwill data in the 10-K/Deals not structured under Purchase Accounting | 500 |
| Total | 1,561 |
| | |
| # Transactions without acquiring firm-level impairment within 10 years of deal effective date | 1,000 |
| # Transactions "potentially impaired" with acquiring firm-level impairment within 10 years of deal effective date | 561 |

| Panel B: Classification of 'Potentially Impaired' Transactions | |
|---|---|
| DEALS CLASSIFIED IN GOODWILL IMPAIRMENT SAMPLE | |
| Impairment linked directly to target and exact impairment amount can be identified | 294 |
| Impairment linked directly to target, other targets in segment also linked* | 7 |
| Impairment linked directly to target, other targets in firm also linked** | 39 |
| Target is in impaired segment, target goodwill >= 20% of segment goodwill* | 14 |
| Total | 354 |
| *% of deals potentially impaired* | *63%* |
| | |
| DEALS CLASSIFIED IN NO GOODWILL IMPAIRMENT SAMPLE | |
| Impairment is not in target's segment or 10-K specifies other target as source of impairment | 106 |
| Total | 106 |
| *% of deals potentially impaired* | *19%* |
| | |
| DEALS EXLCUDED FROM SAMPLE: CANNOT CLASSIFY AS IMPAIRED OR NOT IMPAIRED | |
| Target is in impaired segment, but target goodwill is < 20% of segment goodwill | 14 |
| Impairment cannot be directly linked to a target(s) or segment | 64 |
| Total | 78 |
| *% of deals potentially impaired* | *14%* |
| | |
| DEALS EXLCUDED FROM SAMPLE: IMMATERIAL IMPAIRMENTS | |
| Impairment linked to target, but impairment < 25% of original goodwill | 23 |
| Total | 23 |
| *% of deals potentially impaired* | *4%* |

| Panel C: Final Sample Summary | |
|---|---|
| Impairment Sample | 354 |
| Non-Impairment Sample | 1,106 |

**Table II**

**Market Reaction to Earnings Announcements Containing Goodwill Impairment News**

This table reports the mean cumulated abnormal returns (CAR) surrounding quarterly earning announcement dates. For the Impairment sample, we focus on the first earnings announcement for which a goodwill impairment is announced for a particular transaction. Unique earnings announcement dates for an acquirer are included in the sample only once if multiple transactions experience a goodwill impairment announcement for a particular acquirer on the same earnings announcement date. For the Non-Impairment sample, we generate 'pseudo' impairment dates three years (the mean time to impair) following the deal close date. We also create two matched samples of control firms that did not announce impairment news. 'Matched Control Sample 1' includes firms that announce earnings in the same quarter and have the same fiscal year-end and two-digit SIC code as the impaired firm. 'Matched Control Sample 2' includes firms that announce earnings in the same quarter and have the same fiscal year-end and two-digit SIC code and are in the same market capitalization tercile as the impaired firm. CARs are based on market adjusted returns using the Center for Research in Security Prices (CRSP) value-weighted index. The event period is listed in brackets. Difference refers to the differences between the Impairment and control samples. Tests for differences are based on the $t$-test. ***, **, and * stand for statistical significance at the 1%, 5%, and 10% level, respectively. 'ns' denotes mean CARs or differences that are not statistically different from zero.

| Event period | Impairment Sample (1) | | Non-Impairment Sample (2) | | Matched Control Sample 1 (Earnings Date, SIC) (3) | | Matched Control Sample 2 (Earnings Date, SIC, Market Capitalization) (4) | | Difference (1)-(2) | $p$-value | (1)-(3) | $p$-value | (1)-(4) | $p$-value |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CAR [-1,1] | -2.1% | *** | 0.0% | ns | 0.2% | ns | -0.1% | ns | -2.1% | ** | -2.3% | *** | -2.0% | ** |
| CAR [0,1] | -2.3% | *** | -0.1% | ns | 0.0% | ns | -0.3% | ns | -2.3% | *** | -2.3% | *** | -2.0% | *** |
| CAR [-5,5] | -1.9% | ns | -0.2% | ns | 0.3% | ns | 0.5% | ns | -1.7% | ns | -2.2% | * | -2.4% | * |
| CAR [-10,10] | -2.6% | * | -0.1% | ns | 0.9% | *** | 1.4% | *** | -2.5% | * | -3.5% | ** | -4.0% | *** |

**Table III**
**Impairments By Year**

This table shows the number of goodwill impairments by year for each deal effective year cohort. The impairment samples are based on goodwill impairments between the deal effective year and ten years beyond. The impairment sample includes 354 targets which experience 457 impairment events. The number of deals outstanding that could potentially impair each year includes deals that are completed and the deal completion year is not more than ten years prior.

| Deal Effective Year Cohort | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | # Impair-ments | # Unique Deals Impaired | % of Deals Impaired in Deal Effective Year Cohort |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | # of Deal Impairments | | | | | | | | | | |
| 2003 | 1 | 3 | 5 | 7 | 2 | 15 | 8 | 1 | 1 | 0 | 0 | 0 | 0 | 43 | 35 | 33% |
| 2004 | 0 | 4 | 10 | 9 | 7 | 30 | 11 | 4 | 2 | 0 | 2 | 1 | 0 | 80 | 58 | 37% |
| 2005 | 0 | 0 | 2 | 6 | 9 | 28 | 9 | 3 | 3 | 3 | 2 | 0 | 1 | 66 | 53 | 37% |
| 2006 | 0 | 0 | 0 | 2 | 7 | 35 | 16 | 4 | 8 | 4 | 5 | 2 | 0 | 83 | 62 | 31% |
| 2007 | 0 | 0 | 0 | 0 | 3 | 33 | 22 | 10 | 5 | 7 | 3 | 2 | 1 | 86 | 66 | 34% |
| 2008 | 0 | 0 | 0 | 0 | 0 | 15 | 5 | 3 | 3 | 6 | 3 | 2 | 0 | 37 | 31 | 27% |
| 2009 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 3 | 5 | 2 | 1 | 0 | 0 | 13 | 9 | 14% |
| 2010 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 3 | 3 | 3 | 2 | 0 | 12 | 10 | 8% |
| 2011 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 8 | 7 | 4 | 1 | 21 | 16 | 14% |
| 2012 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 5 | 2 | 1 | 8 | 7 | 5% |
| 2013 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 5 | 2 | 8 | 7 | 6% |
| Total | 1 | 7 | 17 | 24 | 28 | 156 | 73 | 29 | 31 | 33 | 32 | 20 | 6 | 457 | 354 | |
| % of Total Deals Outstanding | 1% | 3% | 4% | 4% | 4% | 17% | 7% | 3% | 3% | 2% | 2% | 1% | 1% | | | |

| | |
|---|---|
| Unique Deals that Impair | 354 |
| Unique Deals Do Not Impair | 1,106 |
| % Impairment | 24% |

## Table IV
## Deal Statistics

This table shows average deal and target industry statistics for the Impairment and Non-Impairment samples. Panel A shows deal statistics and Panel B shows the distribution of target industry based on the Fama & French twelve industry classification. $t$-Tests for differences in means between the Impairment and Non-Impairment samples are shown in the third column.

| | Impairment Sample (N=354) | Non-Impairment Sample (N=1,106) | Difference Test |
|---|---|---|---|
| Panel A: Deal Statistics | | | |
| Deal Value ($M) | 650 | 877 | 0.2205 |
| Acquirer Market Capitalization ($M) | 1,594 | 4,152 | <.0001 |
| Relative Size (Deal Value / Market Cap) | 0.42 | 0.32 | 0.0020 |
| Stock Deal Dummy | 0.32 | 0.25 | 0.0133 |
| Related Industry Dummy | 0.60 | 0.64 | 0.2555 |
| # of Bidders | 1.01 | 1.01 | 0.7975 |
| Unsolicited | 0.02 | 0.01 | 0.5751 |
| Hostile | 0.01 | 0.01 | 0.3817 |
| Public Target Dummy | 0.20 | 0.21 | 0.5978 |
| Panel B: Distribution of Impairments by Target Industry | | | |
| Business equipment | 44% | 34% | 0.0012 |
| Chemicals | 2% | 2% | 0.6679 |
| Consumer durables | 2% | 2% | 0.9051 |
| Energy | 3% | 4% | 0.1366 |
| Healthcare | 8% | 13% | 0.0023 |
| Manufacturing | 12% | 12% | 0.8573 |
| Consumer nondurables | 8% | 6% | 0.1333 |
| Other | 9% | 11% | 0.1839 |
| Shops | 9% | 8% | 0.5298 |
| Telecommunications | 4% | 5% | 0.4067 |
| Utilities | 1% | 3% | 0.0036 |

## Table V
## Goodwill and Impairment Statistics

This table reports goodwill and impairment summary statistics for each transaction in the Impairment and Non-Impairment samples. Panel A shows initial goodwill summary statistics for the Non-Impairment and Impairment sample. Panel B shows impairment statistics for the Impairment sample. realized goodwill based on the impairment or no impairment outcome. 'Q1' and 'Q3' denote quartile 1 and quartile 3, respectively. All dollar statistics are in millions.

| Panel A: Initial Transaction-Level Goodwill Statistics | | | | | |
|---|---|---|---|---|---|
| | Mean | Q1 | Median | Q3 | Total |
| *Non-Impairment Sample (N=1,106)* | | | | | |
| $ Goodwill | 408.6 | 21.1 | 63.2 | 241.6 | 451,912 |
| Goodwill/Purchase Price | 51% | 33% | 52% | 68% | |
| Goodwill/Total Assets | 10% | 3% | 7% | 13% | |
| | | | | | |
| *Impairment Sample (N=354)* | | | | | |
| $ Goodwill | 317.9 | 15.8 | 40.5 | 129.8 | 112,541 |
| Goodwill/Purchase Price | 54% | 37% | 56% | 70% | |
| Goodwill/Total Assets | 14% | 5% | 10% | 18% | |
| Panel B: Transaction-Level Impairment Statistics | | | | | |
| Impairment $ Loss | -245.3 | -98.6 | -38.3 | -14.4 | -86,843 |
| Impairment/Goodwill | 86% | 76% | 100% | 100% | |
| Impairment/Purchase Price | 46% | 30% | 44% | 61% | |
| Impairment/Total Assets | 11% | 4% | 8% | 15% | |
| | | | | | |
| Time to Impair (Years from Close) | 3.0 | 1.7 | 2.7 | 4.1 | |
| # of Impairments | 1.3 | 1.0 | 1.0 | 1.0 | 457 |

**Table VI**
**Market Reaction to Deal Announcement**

This table reports the mean cumulated abnormal returns (CAR) surrounding the acquisition announcement date for the Impairment and No Impairment samples. CARs are calculated using the market model and Center for Research in Security Prices (CRSP) value-weighted index. The event period is listed in brackets. Difference refers to the differences between the Impairment and No Impairment samples. Tests for differences are based on the $t$-test. Panel A reports acquirer announcement returns for the Impairment and No Impairment samples. Panel B reports statistics on the relation between acquirer announcement return and the magnitude of the impairment loss. 'Acquirer $ Return' is computed by multiplying 'Acquirer CAR' by the acquirer market capitalization 50 days prior to announcement. '% CAR [-1,1] and Impair Sign Disagree ' is the percentage of transactions for which the CAR is non-negative and goodwill is imapired or CAR is negative and goodwill is not impaired. 'Acquirer $ Loss' is set equal to 'Acquirer $ Return' if negative and zero otherwise. If 'Acquirer $ Return' is positive, then '% Predicted' is set to zero, if 'Acquirer $ Loss / Impairment' exceeds one, then '% Predicted' is set to one. ***, **, and * stand for statistical significance at the 1%, 5%, and 10% level, respectively. 'ns' denotes mean CARs that are not statistically different from zero. 'GW' denotes 'goodwill'.

| Event period | Impairment Sample (N=354) (1) | | Non-Impairment Sample (N=1,106) (2) | | Difference (1)-(2) | $t$-test |
|---|---|---|---|---|---|---|
| Panel A: Acquirer Announcement Return and Impairment Outcome | | | | | | |
| Acquirer CAR [-1,1] | 0.5% | ns | 1.7% | *** | -1.2% | 0.0412 |
| Acquirer CAR [0,0] | 0.0% | ns | 1.2% | *** | -1.2% | 0.0099 |
| Acquirer CAR [0,1] | 0.4% | ns | 1.6% | *** | -1.3% | 0.0309 |
| Acquirer CAR [-5,5] | 1.3% | ** | 1.6% | *** | -0.3% | 0.6963 |
| Acquirer CAR [Announcement-2, Close+2] | -1.1% | ns | 0.9% | ns | -1.9% | 0.0989 |
| % Acq. CAR [-1,1] Positive and Significant | 21.5% | | 24.1% | | -3% | 0.2925 |
| % Acq. CAR [-1,1] Insignificant | 61.3% | | 63.0% | | -2% | 0.5628 |
| % Acq. CAR [-1,1] Negative and Significant | 17.2% | | 12.8% | | 4% | 0.0512 |
| % CAR [-1,1] and Impairment Sign Disagree | 49% | | 44% | | 5% | 0.1134 |
| Acquirer $ Return at Announcement [-1, 1] | -44.1 | | -19.3 | | -24.8 | 0.5013 |
| Acquirer $ Return at Announcement [0, 0] | -21.9 | | -23.9 | | 2.0 | 0.9221 |
| Acquirer $ Return at Announcement [0, 1] | -39.7 | | -25.8 | | -14.0 | 0.6707 |
| Acquirer $ Return at Announcement [-5, 5] | -46.3 | | -22.4 | | -23.9 | 0.5265 |
| Acquirer $ Returnat Announcement [Ann.-2, Close+2] | -81.6 | | -173.2 | | 91.5 | 0.3356 |
| Panel B: Acquirer Announcement Return and Magnitude of Impairment | | | | | | |
| $ Goodwill [GW] | 317.9 | | 408.6 | | -90.7 | 0.2652 |
| Acquirer $ Loss at Announcement (Acquirer $ Return if <0, 0 otherwise) * | -65.3 | | -100.5 | | 35.2 | 0.3116 |
| $ Goodwill - Acquirer $ Loss * | 251.4 | | 323.8 | | -72.4 | 0.2532 |
| % Goodwill Ex-ante "Good" ((GW - Acq. Loss)/GW) * | 75% | | 77% | | -1% | 0.5575 |
| Impairment $ Loss | -245.3 | | 0.0 | | -245.3 | <.0001 |
| Goodwill Ex-post "Good" (GW $ - Impairment $) | 72.6 | | 408.6 | | -336.0 | <.0001 |
| % Goodwill Ex-post "Good" ((GW $ - Impairment $)/GW $) | 14% | | 100% | | -86% | <.0001 |
| Panel C: Acquirer Announcement Return and Prediction Error | | | | | | |
| Prediction Error ((-1*Acq. $ Return)/Imp.) [-1,1] | -0.31 | | | | | |
| Prediction Error ((-1*Acq. $ Return)/Imp.) [0,0] | -0.09 | | | | | |
| Prediction Error ((-1*Acq. $ Return)/Imp.) [0,1] | -0.27 | | | | | |
| Prediction Error ((-1*Acq. $ Return)/Imp.) [-5,5] | -0.98 | | | | | |
| Prediction Error ((-1*Acq. $ Return)/Imp.) [Ann.-2, Close+2] | -0.63 | | | | | |

*Acquirer $ Return is CAR [-1, 1] x market capitalization 50 days prior to announcement)*

**Table VII**

**Probability and Magnitude of Goodwill Impairments and Acquirer Announcement Returns**

This table reports regressions with goodwill impairment outcomes as the dependent variable and acquirer cumulative abnormal returns (CARS) over various windows surrounding the deal announcement as the key independent variable of interest. Panel A reports the results of logit regressions that model the probability of goodwill impairment. For the key variable of interest, acquirer CAR, the marginal effects of a 1 percentage point increase in acquirer CAR on the probability of goodwill impairment are reported in italics under the p-values. Panel B focuses on the sample of acquisitions with a goodwill impairment and reports the results of OLS regressions with 'Goodwill Impairment Amount / Initial Goodwill' as the dependent variable. Both panels report regressions with five different event windows to estimate acquirer cumulative abnormal returns. All regressions include deal characteristics and industry and deal effective year fixed effects. $p$-Values are reported in parentheses under coefficients. ***, **, and * stand for statistical significance at the 1%, 5%, and 10% level, respectively.

| | Panel A: Probability of Impairment | | | | |
|---|---|---|---|---|---|
| Dependent Variable | Goodwill Impairment Dummy | | | | |
| | (1) | (2) | (3) | (4) | (5) |
| CAR Window | [-1,1] | [0,0] | [0,1] | [-5,5] | [Ann.-2, Close+2] |
| Acquirer CAR | -2.49*** | -4.28*** | -2.52*** | -1.07* | -1.31*** |
| | (0.006) | (0.002) | (0.008) | (0.086) | (0.000) |
| | *-0.38%* | *-0.66%* | *-0.39%* | *-0.17%* | *-0.20%* |
| Log Deal Value ($B) | 0.35*** | 0.35*** | 0.35*** | 0.36*** | 0.41*** |
| | (0.004) | (0.003) | (0.004) | (0.003) | (0.000) |
| Log Acquirer Market Cap ($B) | -0.67*** | -0.68*** | -0.67*** | -0.68*** | -0.74*** |
| | (0.000) | (0.000) | (0.000) | (0.000) | (0.000) |
| Relative Size | -0.03 | -0.04 | -0.03 | -0.07 | -0.16 |
| | (0.898) | (0.843) | (0.861) | (0.706) | (0.236) |
| Stock Dummy | 0.23 | 0.21 | 0.22 | 0.23 | 0.20 |
| | (0.137) | (0.169) | (0.150) | (0.139) | (0.194) |
| Related Dummy | -0.21 | -0.20 | -0.21 | -0.22 | -0.22 |
| | (0.143) | (0.155) | (0.145) | (0.115) | (0.131) |
| # of Bidders | -0.30 | -0.25 | -0.29 | -0.29 | -0.20 |
| | (0.540) | (0.608) | (0.548) | (0.548) | (0.707) |
| Unsolicited | 0.70 | 0.68 | 0.68 | 0.63 | 0.66 |
| | (0.315) | (0.347) | (0.335) | (0.365) | (0.369) |
| Hostile | 0.45 | 0.50 | 0.48 | 0.46 | 0.44 |
| | (0.476) | (0.423) | (0.451) | (0.462) | (0.495) |
| Public Target | -0.07 | -0.04 | -0.06 | -0.00 | -0.02 |
| | (0.751) | (0.833) | (0.786) | (0.987) | (0.927) |
| Goodwill/Purchase Price | 0.36 | 0.40 | 0.38 | 0.36 | 0.32 |
| | (0.257) | (0.212) | (0.234) | (0.255) | (0.326) |
| Constant | -0.51 | -0.60 | -0.52 | -0.48 | -0.36 |
| | (0.425) | (0.355) | (0.423) | (0.458) | (0.583) |
| Observations | 1,457 | 1,457 | 1,457 | 1,457 | 1,456 |
| Pseudo R2 | 0.156 | 0.158 | 0.156 | 0.153 | 0.158 |
| Year and Industry Controls | YES | YES | YES | YES | YES |

| Dependent Variable | Panel B: Magnitude of Impairment (Goodwill Impairment Sample) | | | | |
| --- | --- | --- | --- | --- | --- |
| | Goodwill Impairment Amount / Initial Goodwill | | | | |
| | (1) | (2) | (3) | (4) | (5) |
| CAR Window | [-1,1] | [0,0] | [0,1] | [-5,5] | [Ann.-2, Close+2] |
| Acquirer CAR | 0.08 | 0.00 | 0.05 | 0.14 | 0.07 |
| | (0.507) | (0.985) | (0.683) | (0.133) | (0.204) |
| Log Deal Value ($B) | -0.03 | -0.03 | -0.03 | -0.03 | -0.04* |
| | (0.122) | (0.122) | (0.121) | (0.105) | (0.093) |
| Log Acquirer Market Cap ($B) | 0.02 | 0.02 | 0.02 | 0.03 | 0.03 |
| | (0.187) | (0.188) | (0.187) | (0.145) | (0.139) |
| Relative Size | -0.03 | -0.03 | -0.03 | -0.02 | -0.02 |
| | (0.511) | (0.507) | (0.513) | (0.543) | (0.579) |
| Stock Dummy | 0.03 | 0.03 | 0.03 | 0.04 | 0.04 |
| | (0.143) | (0.146) | (0.143) | (0.123) | (0.132) |
| Related Dummy | 0.03 | 0.03 | 0.03 | 0.03 | 0.03 |
| | (0.203) | (0.201) | (0.203) | (0.174) | (0.185) |
| # of Bidders | 0.11* | 0.11* | 0.11* | 0.11* | 0.10 |
| | (0.096) | (0.095) | (0.096) | (0.080) | (0.120) |
| Unsolicited | -0.03 | -0.02 | -0.02 | -0.03 | -0.03 |
| | (0.838) | (0.871) | (0.856) | (0.798) | (0.786) |
| Hostile | 0.13** | 0.13** | 0.13** | 0.12** | 0.12* |
| | (0.035) | (0.037) | (0.037) | (0.046) | (0.056) |
| Public Target | -0.05 | -0.05 | -0.05 | -0.05 | -0.05 |
| | (0.187) | (0.139) | (0.169) | (0.192) | (0.161) |
| Goodwill/Purchase Price | -0.27*** | -0.27*** | -0.27*** | -0.26*** | -0.26*** |
| | (0.000) | (0.000) | (0.000) | (0.000) | (0.000) |
| Constant | 0.89*** | 0.89*** | 0.89*** | 0.88*** | 0.89*** |
| | (0.000) | (0.000) | (0.000) | (0.000) | (0.000) |
| Observations | 354 | 354 | 354 | 354 | 353 |
| Adjusted R2 | 0.160 | 0.160 | 0.160 | 0.166 | 0.163 |
| Year and Industry Controls | YES | YES | YES | YES | YES |

**Table VIII**
**Prediction of Goodwill Impairment Using Acquirer Announcement Returns**

Panel A shows the percentage of the realized Impairment sample that falls into each predicted probability of impairment decile using five models. Panel B shows the percentage of the realized High Goodwill Impairment Amount / Initial Goodwill sample that falls into the predicted below or above median sample using five models. Transactions are categorized as realized High Goodwill Impairment Amount / Initial Goodwill if above the realized median. Model 1, 'CAR Only Model', includes only acquirer CAR [-1,1] as an independent variable. Model 2, 'CAR Exclusion Model', removes acquirer CAR and only includes the deal characteristics and industry controls included in Table VI regressions. Model 3, 'Full Model', combines acquirer CAR, deal characteristics, and industry controls. Models 4 and 5 are similar to models 2 and 3 but also include announcement year controls.

| Panel A: Predictive Ability of Acquirer CAR on Probability of Goodwill Impairment | | | | | |
|---|---|---|---|---|---|
| | % of Realized Impairment Sample in Each Decile | | | | |
| | (1) | (2) | (3) | (4) | (5) |
| | CAR Only Model | CAR Exclusion Model | Full Model | CAR Exclusion Model | Full Model |
| Decile of model's predicted probability of impairment | Acquirer CAR | Deal/Firm Characteristics and Industry Controls | Acquirer CAR, Deal/Firm Characteristics, and Industry Controls | Deal/Firm Characteristics, Industry, and Announcement Year Controls | Acquirer CAR, Deal/Firm Characteristics, Industry, and Announcement Year Controls |
| 1: Low Probability | 10% | 3% | 3% | 2% | 2% |
| 2 | 12% | 6% | 5% | 3% | 3% |
| 3 | 6% | 7% | 6% | 4% | 3% |
| 4 | 10% | 9% | 10% | 5% | 6% |
| 5 | 8% | 9% | 10% | 9% | 8% |
| 6 | 7% | 10% | 9% | 10% | 11% |
| 7 | 10% | 10% | 9% | 12% | 13% |
| 8 | 10% | 12% | 14% | 16% | 14% |
| 9 | 11% | 17% | 15% | 19% | 20% |
| 10: High Probability | 15% | 18% | 19% | 21% | 21% |
| Total | 100% | 100% | 100% | 100% | 100% |
| Decile 8+9+10 (High Predicted) | 36% | 47% | 48% | 56% | 55% |
| Decile 1+2+3 (Low Predicted) | 29% | 16% | 14% | 8% | 7% |
| Difference | 8% | 31% | 34% | 47% | 48% |

| Panel B: Predictive Ability of Acquirer CAR on Magnitude of Goodwill Impairment | | | | | |
|---|---|---|---|---|---|
| Median of model's predicted Goodwill Impairment Amount / Initial Goodwill | % of Realized Above Median (High Goodwill Impairment Amount / Initial Goodwill) In Each Category | | | | |
| Below Median | 49% | 36% | 36% | 35% | 35% |
| Above Median (High Predicted) | 51% | 64% | 64% | 65% | 65% |
| Total | 100% | 100% | 100% | 100% | 100% |
| Difference | 2% | 29% | 29% | 31% | 31% |

**Table IX**
**Chief Executive Officer (CEO) Turnover for Impairment Sample**

This table reports univariate statistics for CEO turnover for the sample of firms experiencing a goodwill impairment. 'Total Sample' is a dummy variable equal to one for CEOs who were subject to any form of forced turnover and zero for CEOs not experiencing a turnover event. 'Internal Turnover' is a dummy variable that takes the value of one for CEOs who experienced a forced internal turnover event (fired by the board) and zero for CEOs not experiencing a turnover event and with firms not subject to takeover or bankruptcy. 'Firms Subject to Takeover' is a dummy variable that takes a value of one for CEOs whose firm was acquired and the CEO did not retain the CEO or a senior role. 'Firms Subject to Bankruptcy' is a dummy variable that takes a value of one for CEOs who were replaced after entering bankruptcy proceedings and zero otherwise. Statistics for turnover events are shows for three periods: 1) turnover events occurring within the deal announcement year and four years following the goodwill impairment, 2) turnover events occurring in the year of or the year following the deal effective year, 3) turnover events occurring in the year of or the year following the year of the goodwill impairment. Panel A shows statistics for the Negative Market Reaction and Positive Market Reaction to deal samples (% acquirer CAR less than or equal to -1% and greater than -1% respectively). Panel B shows statistics for the % Goodwill Ex-Ante "Good" (goodwill - acquirer $ CAR)/goodwill) lower than and great than 50% samples.

| Panel A: Full Sample Results | | |
|---|---|---|
| | N=309 | |
| | % Turnover | # Turnover |
| % Turnover Within Deal Announcement Year and Impairment Year + 4 | | |
| Total Sample | 47% | 146 |
| Firms Subject to Internal Turnover | 46% | 123 |
| Firms Subject to Takeovers | 59% | 20 |
| Firms Subject to Bankruptcy | 57% | 4 |
| | | |
| % Turnover Year of or Year After Deal Effective Year (Total Sample) | 6% | 19 |
| % Turnover Year of or Year After Impairment Year (Total Sample) | 19% | 59 |

| Panel B: Above Median vs. Below Median Predicted Impairment in Acquirer CAR Only Model | | | | | | |
|---|---|---|---|---|---|---|
| | Above Median | | Below Median | | Difference | |
| | N=154 | | N=155 | | | |
| | % Turnover | # Turnover | % Turnover | # Turnover | Mean | Chi-square test |
| % Turnover Within Deal Announcement Year and Impairment Year + 4 | | | | | | |
| Total Sample | 51% | 79 | 43% | 67 | 8% | 0.1559 |
| Firms Subject to Internal Turnover | 48% | 64 | 43% | 59 | 5% | 0.4029 |
| Firms Subject to Takeovers | 65% | 11 | 53% | 9 | 12% | 0.4923 |
| Firms Subject to Bankruptcy | 80% | 4 | 0% | 0 | 80% | 0.0736 |
| | | | | | | |
| % Turnover Year of or Year After Deal Effective Year (Total Sample) | 8% | 12 | 5% | 7 | 3% | 0.2314 |
| % Turnover Year of or Year After Impairment Year (Total Sample) | 19% | 30 | 19% | 29 | 1% | 0.8634 |

**Table X**
**Long-Term Accounting and Stock Performance**

This table reports industry adjusted accounting and stock performance for the two years prior to deal announcement to three years subsequent to deal announcement. If an acquirer is in the Impairment or Non-Impairment sample more than once in the same year, we retain the transaction with the largest deal value. This restriction reduces our sample from 1,460 to 1,363. We report the following median performance measures, adjusted by the median Fama French 48 industry value, over a six-year period surrounding the acquisition: sales growth, cost of goods sold / sales, selling, general, and administrative expenses / sales, property, plant, and equipment (PPE) growth, free cash flow / assets, return on assets (ROA), return on equity (ROE), Tobin's q, Earnings / Price, and buy-and-hold return. Tests for differences between the Impairment and Non-Impairment samples are based on the *t*-test. \*\*\*, \*\*, and \* stand for statistical significance at the 1%, 5%, and 10% level, respectively. 'ns' denotes mean CARs that are not statistically different from zero.

| Year Relative to Deal Announcement | Non-Impairment Sample | Impairment Sample | Difference | | Below Median Predicted Impairment | Above Median Predicted Impairment | Difference | |
|---|---|---|---|---|---|---|---|---|
| Industry-Adjusted Sales Growth | | | | | | | | |
| T-2 | 2.1% | 1.3% | 0.8% | | 2.1% | 1.5% | 0.6% | |
| T-1 | 2.3% | -0.4% | 2.7% | \*\* | 1.7% | 1.5% | 0.2% | |
| T=0 | 4.7% | 8.4% | -3.6% | | 6.2% | 4.1% | 2.1% | \*\*\* |
| T+1 | 8.8% | 10.4% | -1.7% | | 12.1% | 6.1% | 6.0% | |
| T+2 | 1.3% | -4.7% | 6.1% | \*\*\* | 0.7% | -1.1% | 1.8% | |
| T+3 | 0.2% | -5.9% | 6.1% | \*\*\* | -1.0% | -2.2% | 1.2% | \*\* |
| Industry-Adjusted COGS / Sales | | | | | | | | |
| T-2 | -2.0% | -0.2% | -1.8% | \* | -1.3% | -1.9% | 0.6% | |
| T-1 | -2.4% | -0.2% | -2.2% | \* | -1.6% | -2.4% | 0.8% | |
| T=0 | -2.5% | -0.7% | -1.8% | | -1.4% | -2.6% | 1.2% | |
| T+1 | -2.3% | 0.5% | -2.8% | \*\*\* | -0.1% | -2.1% | 2.0% | \*\* |
| T+2 | -2.1% | 2.4% | -4.5% | \*\*\* | 0.0% | -1.7% | 1.7% | |
| T+3 | -1.6% | 1.6% | -3.2% | \*\*\* | 0.0% | -1.5% | 1.5% | |
| Industry-Adjusted SGA / Assets | | | | | | | | |
| T-2 | -2.5% | -1.6% | -0.9% | | -2.2% | -2.5% | 0.4% | |
| T-1 | -2.9% | -1.4% | -1.5% | | -2.6% | -2.5% | -0.2% | |
| T=0 | -4.0% | -3.1% | -0.9% | | -3.7% | -3.8% | 0.1% | |
| T+1 | -3.4% | -1.4% | -1.9% | \*\*\* | -3.3% | -2.8% | -0.5% | |
| T+2 | -3.4% | -0.3% | -3.1% | \*\*\* | -2.7% | -2.9% | 0.1% | |
| T+3 | -3.4% | 0.8% | -4.1% | \*\*\* | -2.0% | -2.5% | 0.5% | |
| Industry-Adjusted PPE Growth | | | | | | | | |
| T-2 | 2.5% | 0.4% | 2.2% | \*\* | 1.6% | 2.2% | -0.5% | |
| T-1 | 1.8% | -0.2% | 2.1% | \*\* | 1.5% | 1.3% | 0.2% | |
| T=0 | 10.2% | 11.4% | -1.2% | | 11.7% | 9.1% | 2.6% | \* |
| T+1 | 3.5% | -0.5% | 4.0% | \*\*\* | 3.6% | 1.6% | 1.9% | \*\* |
| T+2 | 1.1% | -5.2% | 6.4% | \*\*\* | 0.0% | -0.1% | 0.1% | |
| T+3 | 1.0% | -5.9% | 6.9% | \*\*\* | -0.1% | -1.5% | 1.5% | \*\* |
| Industry-Adjusted FCF / Assets | | | | | | | | |
| T-2 | 2.0% | 0.7% | 1.3% | \*\*\* | 2.0% | 1.7% | 0.3% | |
| T-1 | 2.1% | 1.1% | 1.0% | \*\*\* | 2.1% | 1.7% | 0.5% | |
| T=0 | 1.2% | -1.3% | 2.5% | \*\*\* | 0.9% | 0.6% | 0.3% | \* |
| T+1 | 0.7% | -1.9% | 2.6% | \*\*\* | 0.5% | 0.0% | 0.5% | \* |
| T+2 | 1.2% | -3.3% | 4.5% | \*\*\* | 0.5% | 0.1% | 0.4% | |
| T+3 | 1.2% | -3.3% | 4.5% | \*\*\* | 0.9% | -0.1% | 1.0% | |

| Year Relative to Deal Announcement | Non-Impairment Sample | Impairment Sample | Difference | | Below Median Predicted Impairment | Above Median Predicted Impairment | Difference | |
|---|---|---|---|---|---|---|---|---|
| | | | Industry-Adjusted ROA | | | | | |
| T-2 | 2.6% | 1.0% | 1.6% | *** | 2.3% | 2.2% | 0.0% | |
| T-1 | 2.6% | 0.9% | 1.7% | *** | 2.4% | 2.0% | 0.3% | |
| T=0 | 1.2% | -0.8% | 2.0% | *** | 0.9% | 0.6% | 0.3% | |
| T+1 | 1.5% | -0.7% | 2.2% | *** | 1.3% | 0.6% | 0.7% | ** |
| T+2 | 1.9% | -0.6% | 2.5% | *** | 1.4% | 1.1% | 0.2% | |
| T+3 | 1.9% | -1.3% | 3.1% | *** | 1.6% | 0.8% | 0.8% | * |
| | | | Industry-Adjusted ROE | | | | | |
| T-2 | 3.3% | 1.4% | 1.9% | *** | 2.9% | 2.8% | 0.1% | |
| T-1 | 3.5% | 1.2% | 2.3% | *** | 3.0% | 3.1% | 0.0% | |
| T=0 | 2.0% | -0.9% | 2.9% | *** | 1.5% | 0.9% | 0.5% | ** |
| T+1 | 1.4% | -4.8% | 6.1% | *** | 0.7% | 0.0% | 0.7% | ** |
| T+2 | 1.8% | -7.7% | 9.5% | *** | 0.5% | -0.4% | 0.9% | |
| T+3 | 2.0% | -7.3% | 9.3% | *** | 0.6% | -0.5% | 1.0% | * |
| | | | Industry-Adjusted Tobin's q | | | | | |
| T-2 | 11.3% | 2.5% | 8.7% | ** | 9.9% | 7.1% | 2.8% | |
| T-1 | 10.2% | -0.3% | 10.5% | *** | 8.6% | 6.5% | 2.1% | |
| T=0 | 3.5% | -12.3% | 15.9% | *** | 3.1% | -5.1% | 8.2% | ** |
| T+1 | -0.5% | -29.6% | 29.1% | *** | -5.8% | -8.9% | 3.1% | |
| T+2 | -2.5% | -27.7% | 25.2% | *** | -8.7% | -12.8% | 4.1% | |
| T+3 | -3.5% | -25.0% | 21.6% | *** | -8.3% | -10.8% | 2.5% | |
| | | | Industry-Adjusted Earnings / Price | | | | | |
| T-2 | 1.4% | 1.0% | 0.5% | | 1.3% | 1.4% | -0.1% | |
| T-1 | 1.2% | 0.7% | 0.6% | *** | 1.3% | 1.0% | 0.2% | |
| T=0 | 0.8% | 0.1% | 0.7% | *** | 0.7% | 0.6% | 0.1% | ** |
| T+1 | 0.7% | -1.7% | 2.4% | *** | 0.5% | 0.1% | 0.4% | |
| T+2 | 0.8% | -4.4% | 5.2% | *** | 0.2% | 0.2% | 0.0% | |
| T+3 | 0.8% | -4.0% | 4.9% | *** | 0.3% | 0.1% | 0.2% | * |
| | | | Industry-Adjusted Buy-and-Hold 1-Year Returns | | | | | |
| T-2 | 6.8% | -1.6% | 8.4% | *** | 4.2% | 3.1% | 1.1% | |
| T-1 | 6.0% | 1.2% | 4.9% | ** | 5.4% | 4.5% | 0.9% | |
| T=0 | 1.3% | -12.5% | 13.8% | *** | 2.9% | -3.8% | 6.7% | *** |
| T+1 | 3.1% | -10.6% | 13.7% | *** | 0.0% | 0.6% | -0.6% | |
| T+2 | 5.0% | -8.3% | 13.3% | *** | 0.6% | 2.4% | -1.8% | |
| T+3 | 3.3% | -6.3% | 9.6% | *** | 0.1% | 3.4% | -3.3% | |

**Table XI**
**Post-Transaction Public Market Exits**

This table shows univariate statistics on the number of acquirer firms that exit the public markets within ten years of the deal effective date. Public market exit data is obtained using the CRSP delisting code. Acquirers are categorized as 'Merged/Went Private' for delisting codes between 200 and 390 and 573. Acquirers are categorized as 'Delisted' for delisting codes between 500 and 600 (excluding 573 and 574) and as 'Bankrupt/Liquidated' for delisting codes between 400 and 490 and 574. Statistics are shown for the Impairment and Non-Impairment samples and for the Above Median and Below Median Predicted Impairment samples using the acquirer only model described in Table VII. Percentages are based on 1,106 total transactions in the Non-Impairment sample and 354 total transactions in the Impairment sample. ***, **, and * indicate statistically significant differences between samples at the 1%, 5%, and 10% level, respectively. 'ns' denotes not significant.

| | Non-Impairment Sample | | Impairment Sample | | Difference | | Below Median Predicted | | Above Median Predicted | | Difference | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | # | % | # | % | | | # | % | # | % | | |
| Merged/Went Private | 263 | 23.8% | 96 | 27.1% | 3.3% | ns | 179 | 24.6% | 180 | 24.6% | 0.0% | ns |
| Delisted | 25 | 2.3% | 31 | 8.8% | 6.5% | *** | 29 | 4.0% | 27 | 3.7% | -0.3% | ns |
| Bankrupt/Liquidated | 2 | 0.2% | 8 | 2.3% | 2.1% | *** | 4 | 0.5% | 6 | 0.8% | 0.3% | ns |

Table XII
**Prediction of Goodwill Impairment Using Acquirer Announcement Returns: Subsample Analysis**

This table shows the percentage of the realized Impairment sample that falls into the top and bottom three predicted probability of impairment deciles using five models. 'High Predicted' includes transactions in the highest predicted probability deciles 8, 9, 10 and 'Low Predicted' includes transactions in the lowest predicted probability deciles 1, 2, 3. Model 1, 'CAR Only Model', includes only acquirer CAR [-1,1] as an independent variable. Model 2, 'CAR Exclusion Model', removes acquirer CAR and only includes the deal characteristics and industry controls included in Table VI regressions. Model 3, 'Full Model', combines acquirer CAR, deal characteristics, and industry controls. Results are reported for eighteen subsamples: stock, cash, public and private target transactions, large and small acquirers, large and small transactions, large and small relative transaction size, unrelated and related industry transactions, non- and high-tech transactions, high and low Tobin's q acquirers, and non-crisis and crisis impairments. Section VIII describes the construction of these subsamples.

| | % of Realized Impairment Sample in Each Decile | | | | | |
|---|---|---|---|---|---|---|
| | (1) | (2) | (3) | (1) | (2) | (3) |
| | CAR Only Model | CAR Exclusion Model | Full Model | CAR Only Model | CAR Exclusion Model | Full Model |
| Decile of model's predicted probability of impairment | Acquirer CAR | Deal/Firm Characteristics and Industry Controls | Acquirer CAR, Deal/Firm Characteristics, and Industry Controls | Acquirer CAR | Deal/Firm Characteristics and Industry Controls | CAR, Deal/Firm Characteristics, and Industry |
| | Stock Transactions | | | Cash Transactions | | |
| Decile 8+9+10 (High Predicted) | 37% | 44% | 49% | 34% | 43% | 43% |
| Decile 1+2+3 (Low Predicted) | 28% | 10% | 11% | 29% | 15% | 16% |
| Difference | 9% | 34% | 38% | 5% | 28% | 28% |
| Test for Difference b/t Stock and Cash for Acquirer CAR Model | ns | | | | | |
| | Public Target Transactions | | | Private Target Transactions | | |
| Decile 8+9+10 (High Predicted) | 43% | 59% | 60% | 35% | 47% | 47% |
| Decile 1+2+3 (Low Predicted) | 20% | 9% | 9% | 31% | 14% | 13% |
| Difference | 23% | 50% | 51% | 4% | 33% | 34% |
| Test for Difference b/t Public and Private for Acquirer CAR Model | *** | | | | | |
| | Large Acquirers | | | Small Acquirers | | |
| Decile 8+9+10 (High Predicted) | 43% | 57% | 61% | 35% | 40% | 42% |
| Decile 1+2+3 (Low Predicted) | 25% | 8% | 7% | 31% | 18% | 18% |
| Difference | 18% | 48% | 54% | 4% | 22% | 24% |
| Test for Difference b/t Large and Small for Acquirer CAR Model | ** | | | | | |
| | Large Transactions | | | Small Transactions | | |
| Decile 8+9+10 (High Predicted) | 42% | 51% | 57% | 33% | 44% | 44% |
| Decile 1+2+3 (Low Predicted) | 22% | 9% | 9% | 33% | 14% | 14% |
| Difference | 20% | 42% | 47% | 0% | 30% | 29% |
| Test for Difference b/t Large and Small for Acquirer CAR Model | *** | | | | | |
| | Large Relative Size Transactions | | | Small Relative Size Transactions | | |
| Decile 8+9+10 (High Predicted) | 35% | 41% | 44% | 38% | 52% | 50% |
| Decile 1+2+3 (Low Predicted) | 28% | 16% | 15% | 31% | 14% | 12% |
| Difference | 7% | 24% | 29% | 7% | 39% | 37% |
| Test for Difference b/t Large and Small for Acquirer CAR Model | ns | | | | | |

| Decile of model's predicted probability of impairment | % of Realized Impairment Sample in Each Decile | | | | | |
|---|---|---|---|---|---|---|
| | (1) CAR Only Model | (2) CAR Exclusion Model | (3) Full Model | (1) CAR Only Model | (2) CAR Exclusion Model | (3) Full Model |
| | Acquirer CAR | Deal/Firm Characteristics and Industry Controls | Acquirer CAR, Deal/Firm Characteristics, and Industry Controls | Acquirer CAR | Deal/Firm Characteristics and Industry Controls | CAR, Deal/Firm Characteristics, and Industry |
| | Unrelated Industry | | | Related Industry | | |
| Decile 8+9+10 (High Predicted) | 35% | 44% | 45% | 38% | 49% | 49% |
| Decile 1+2+3 (Low Predicted) | 30% | 16% | 13% | 28% | 14% | 15% |
| Difference | 4% | 28% | 33% | 11% | 35% | 35% |
| Test for Difference b/t Unrelated and Related for Acquirer CAR Model | ns | | | | | |
| | Non-High-Tech Industry | | | High-Tech Industry | | |
| Decile 8+9+10 (High Predicted) | 39% | 49% | 44% | 34% | 44% | 43% |
| Decile 1+2+3 (Low Predicted) | 31% | 18% | 19% | 30% | 15% | 16% |
| Difference | 9% | 31% | 25% | 4% | 29% | 27% |
| Test for Difference b/t Non and High-Tech for Acquirer CAR Model | ns | | | | | |
| | High Tobin's q | | | Low Tobin's q | | |
| Decile 8+9+10 (High Predicted) | 37% | 52% | 52% | 36% | 45% | 49% |
| Decile 1+2+3 (Low Predicted) | 30% | 12% | 12% | 28% | 16% | 14% |
| Difference | 7% | 41% | 41% | 8% | 29% | 35% |
| Test for Difference b/t High and Low M/B-Tech for Acquirer CAR Model | * | | | | | |
| | Excluding Crisis Impairments | | | Crisis Impairments | | |
| Decile 8+9+10 (High Predicted) | 37% | 53% | 51% | 37% | 49% | 52% |
| Decile 1+2+3 (Low Predicted) | 31% | 13% | 11% | 26% | 12% | 11% |
| | 7% | 40% | 40% | 11% | 37% | 41% |

## Table XIII
## Market Reaction to Deal Announcement - Public Targets

This table reports the mean cumulated abnormal returns (CAR) surrounding the acquisition announcement date for the subsample of transactions with a publicly traded target. CARs are calculated using the market model and Center for Research in Security Prices (CRSP) value-weighted index. The event period is listed in brackets. Difference refers to the differences between the Impairment and Non-Impairment samples. Tests for differences are based on the $t$-test. 'Acquirer $ Return' is computed by multiplying 'Acquirer CAR' by the acquirer market capitalization 50 days prior to announcement. 'Target $ Return' is computed by multiplying 'Target CAR' by the acquirer market capitalization 50 days prior to announcement. 'Combined $ Return' is the sum of 'Acquirer $ Return' and 'Target $ Return'. 'Combined % Return' is 'Combined $ Return' scaled by the sum of acquirer and target market capitalization 50 days prior to announcement. ***, **, and * stand for statistical significance at the 1%, 5%, and 10% level, respectively. 'ns' denotes mean CARs that are not statistically different from zero.

| | Impairment Sample (N=68) | | Non-Impairment Sample (N=233) | | Difference | |
|---|---|---|---|---|---|---|
| | (1) | | (2) | | (1)-(2) | $t$-test |
| Target CAR [-1,1] | 19% | *** | 28% | *** | -9% | 0.0001 |
| Target CAR [0,1] | 11% | *** | 21% | *** | -10% | <.0001 |
| Target CAR [0,0] | 19% | *** | 27% | *** | -8% | 0.0003 |
| Target CAR [-5,5] | 20% | *** | 29% | *** | -10% | 0.0001 |
| Target Deal Period CAR [Ann.-2, Close+2] | 24% | *** | 30% | *** | -6% | 0.2256 |
| Target $ Return at Announcement [-1, 1] | 287.6 | | 338.0 | | -50.3 | 0.5993 |
| Target $ Return at Announcement [0, 0] | 239.1 | | 241.1 | | -2.0 | 0.9837 |
| Target $ Return at Announcement [0, 1] | 299.5 | | 302.4 | | -2.9 | 0.9757 |
| Target $ Return at Announcement [-5, 5] | 322.2 | | 348.8 | | -26.5 | 0.8022 |
| Target $ Return at Announcement [Ann.-2, Close+2] | 268.0 | | 323.6 | | -55.6 | 0.6539 |
| Acquirer CAR [-1,1] | -4% | *** | 0% | ns | -4% | 0.0002 |
| Acquirer CAR [0,0] | -2% | ** | 0% | ns | -2% | 0.0203 |
| Acquirer CAR [0,1] | -4% | *** | 0% | ns | -4% | 0.0003 |
| Acquirer CAR [-5,5] | -3% | *** | 0% | ns | -3% | 0.0120 |
| Acquirer CAR [Ann.-2, Close+2] | -5% | * | -2% | ns | -3% | 0.3836 |
| % Acq. CAR [-1,1] Positive and Significant | 10% | | 24% | | -14% | 0.0028 |
| % Acq. CAR [-1,1] Insignificant | 54% | | 51% | | 4% | 0.5869 |
| % Acq. CAR [-1,1] Negative and Significant | 35% | | 25% | | 10% | 0.1122 |
| Acquirer $ Return at Announcement [-1, 1] | -227.0 | | -142.3 | | -84.6 | 0.6216 |
| Acquirer $ Return at Announcement [0, 0] | -108.5 | | -129.0 | | 20.5 | 0.8191 |
| Acquirer $ Return at Announcement [0, 1] | -202.8 | | -138.9 | | -63.9 | 0.6714 |
| Acquirer $ Return at Announcement [-5, 5] | -233.7 | | -174.4 | | -59.3 | 0.7144 |
| Acquirer $ Return at Announcement [Ann.-2, Close+2] | -368.1 | | -1,008.4 | | 640.3 | 0.1266 |
| Combined % Return [-1,1] | 1% | ns | 4% | *** | -3% | 0.0129 |
| Combined % Return [-5,5] | 1% | ns | 3% | *** | -2% | 0.0670 |
| Combined % Return [-1,1] | 2% | ns | 4% | *** | -2% | 0.0273 |
| Combined % Return [-5,5] | 2% | * | 4% | *** | -2% | 0.0941 |
| Combined % Return [Ann.-2, Close+2] | 3% | ns | 2% | ns | 1% | 0.7601 |
| Combined $ Return [-1,1] | 60.7 | | 195.6 | | -135.0 | 0.3866 |
| Combined $ Return [0,0] | 130.6 | | 112.1 | | 18.5 | 0.8709 |
| Combined $ Return [0,1] | 96.7 | | 163.6 | | -66.8 | 0.6290 |
| Combined $ Return [-5,5] | 88.6 | | 174.4 | | -85.8 | 0.5500 |
| Combined $ Return [Ann.-2, Close+2] | -100.1 | | -684.7 | | 584.6 | 0.1683 |