Can Deal Failure Be Predicted?*

by

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August 2018

Abstract

We utilize a transaction-level measure of realized deal failure – impairment of acquisition goodwill – to examine whether acquirer value destruction is detected by the market at deal announcement. On average, acquirer announcement returns have 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, public target, and large acquirer transactions. Our evidence suggests that deal failure may be largely triggered by latent factors that are unknown at announcement.

JEL Classification: G34, G14, G32, G02
Keywords: Mergers, Acquisitions, Acquirer Abnormal Return, Target Abnormal Return, value destruction, overpayment, goodwill impairment

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We thank Hank Bessembinder, Nickolay Gantchev, Douglas Hanna, Pab Jotikasthira, James Linck, Darius Miller, Adam Kolasinski, Mattia Landoni, Rik Sen, Wayne Shaw, Jared Stanfield, Rex Thompson, Kumar Venkataraman, seminar participants at Hong Kong University of Science and Technology, Southern Methodist University, and Texas Tech University, and participants at the Asian Bureau of Finance and Economic Research (ABFER) Conference and Midwest Finance Association conference for helpful comments. Any remaining errors are our own.

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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 (we find that 95% of research articles in top journals between 2007 and 2016 that measured M&A value creation used the event study methodology).[5,6]

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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, e.g., the early work of Mandelker (1974), Langetieg (1978), Asquith (1983), and Malatesta (1983).

[4] See discussion of this issue in 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), Savor and Lu (2009), and Bessembinder and Zhang (2013).

[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* focused on M&A (contained 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% computed measures of deal value creation; of this subset, 95.6% computed announcement cumulative abnormal returns (CARs) to measure deal quality.

In this paper, we exploit a hand-collected, transaction-level measure of *realized* deal failure to examine whether extreme acquirer value destruction is detected by the market at deal announcement. We link this ex-post measure of extreme deal failure, the write-down of acquisition goodwill, to the popular ex-ante measure of value creation, the stock market reaction to the acquisition announcement. Our approach allows us to understand whether and how much of the value destruction is known at the announcement date in contrast to the periods following the deal completion date. 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 of 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 years. The Statement of Financial Accounting Standards 142, passed in 2001, was implemented with the intent 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 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 (-2.9%).

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

[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] See, e.g., 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] 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 501 acquisitions with impairments, we are able to credibly identify the specific target(s) that impaired for 405 (or 81%) of the transactions.[11] For 405 transactions with impairments (Impairment sample) and 1,553 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 11%. Goodwill impairments are common: 21% of transactions in our sample experience an impairment event over the 2003 to 2017 period. These impairment events are substantial: the average impairment constitutes 86% of total transaction-level goodwill, 45% of the total purchase price, and 11% of acquirer assets. Overall, the aggregate impairment loss in our sample is $102 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 many event windows, surprisingly, mean abnormal returns are not largely negative for the Impairment sample. In fact, mean acquirer abnormal returns are positive and significant for most event windows and more than 50% of transactions have positive returns in the Impairment sample. Focusing on magnitude, conditional on negative acquirer abnormal returns at

[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 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 could introduce significant errors. In our sample, for 30% of firm-level impairments, the acquirer has multiple targets that could have triggered the impairment; 56% of this sample have at least one target that did not impair.

announcement, we find actual write-downs are on average almost two times larger than predicted losses at announcement. On average, the market is 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 reduction in abnormal return, the probability of impairment increases by 0.26%, or increases the unconditional probability of impairment from 20.68% to 20.95%. Zooming in on Impairment sample transactions associated with a negative market response, in regressions with the impairment amount scaled by initial goodwill as the dependent variable, the coefficient on acquirer dollar loss scaled by initial goodwill is not statistically different from zero, indicating announcement period abnormal returns fail to predict the magnitude of future impairments.

In an in-sample 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 35% 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 date, and find improved performance: 17% and 46% impair in the three lowest and three highest predicted impairment probability deciles, respectively. We see little improvement when abnormal return is included in the model with deal and acquirer characteristics. The out-of-sample prediction performance of acquirer return is even weaker.

We next 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, targets in unrelated industries, and acquirers with high valuations prior to deal announcement.[12] Further, the market's ability to assess value creation is likely related to the information environment: private

[12] See, e.g., Travlos (1987), Lang, Stulz, and Walkling (1989), Morck, Shleifer, and Vishny (1990), Servaes (1991), Chang (1998), Chang and Suk (1998), Andrade, Mitchell, and Stafford (2001), Fuller, Netter, and Stegemoller (2002), Moeller, Schlingemann, and Stulz (2004, 2005), Officer (2007), Bargeron, Schlingemann, Stulz, and Zutter (2008), Bayazitova, Kahl, and Valkanov (2012), and Harford, Humphery-Jenner, and Powell (2012).

targets, small acquirers, targets in unrelated industries, and high-tech deals are likely associated with heightened opacity.[12] 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 substantially better for large, public target, and large acquirer transactions than for small, private target, and small acquirer transactions, respectively. Acquirer announcement returns perform weakly better for non-high-tech industry transactions. The results point to the importance of the information environment of the acquirer and target in the market's ability to detect value destruction at the announcement date. Although we find this improved detection in some subsets of the data, detection errors still remain large in all samples.

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. 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.[13]

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 date 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

[12] See Luo (2005).

[13] These symptoms are also noisy measures of deal failure, as they are measured at the firm rather than at the transaction level and could be caused by other non-transaction-specific events. As a result, these tests should be interpreted as suggestive.

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.

In robustness tests, we find little relation between *combined* target and acquirer announcement returns and goodwill impairment outcomes for the sample of transactions with a public target. Further, our main results remain robust to excluding financial crisis period impairments and consideration of other non-transaction-related information that may contaminate announcement returns 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.

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. So our evidence suggests that deal failure may be largely triggered by latent factors that are unknown at deal announcement. 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 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. This may be why there is not a strong consensus as to whether mergers create value for the average 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.[15] Of course, our conclusions should be

[15] 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).

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.

The paper is organized as follows. Section I describes goodwill accounting. Section II presents a model that formalizes the link between the ex-ante and ex-post measures of deal value creation. Section III describes our data and sample construction. Section IV provides descriptive statistics on goodwill and impairment. Section V examines the relation between the abnormal return at merger announcement and future impairment events. Section VI examines the relation between merger announcement returns and other ex-post symptoms of deal failure. 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 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 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, and Jones Apparel Group's $810 million 2009 write-off of Nine West and Maxwell Shoe 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.[16] 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.[17]

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 Value Destruction

A. Timing

[16] 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.

[17] 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.

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 the 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=1, the expected value of V, from the point of view of the market, is μ_m. Three mutually exclusive cases can arise.

One, the AR observed at announcement is zero. This means that the market believes the acquirer is paying a fair value for V, but the entire expected V, μ_m, is accruing to the shareholders of the target.

Two, the AR observed at announcement is negative. This means that the market believes the acquisition is value destructive for the acquiring firm shareholders. Further, the entire expected V, μ_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 means that the market believes the 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, μ_m. The amount of expected value addition to the acquiring firm shareholders is A*AR, where AR > 0.

At t=2, the acquirer allocates goodwill. Goodwill, G, the acquirer's assessment, equals μ_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. This means that impairment, I, can be decomposed into two parts: the part that came from value destruction expected at announcement (A*|AR| if AR is negative, and zero if AR is zero or 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 forecasts value destruction to the acquiring firm, which is A*|AR|. This is $4 in our example. Therefore, the market estimates that only $12 - $4 = $8 is ex-ante "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;[14] (2) The transaction value exceeds $10 million and is 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 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 has 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 2,981 deals.

Next, we exclude 258 transactions associated with acquirers lacking firm-level goodwill in Compustat for the full period between the year prior to ten years subsequent to the transaction. This requirement reduces the sample to 2,723. 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.[15] Following an acquisition, the Notes include an 'Acquisitions' section which presents the preliminary

[14] 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.

[15] 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.

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.[16] We eliminate 646 transactions that are not structured using purchase accounting and transactions for which we are unable to identify the deal-level goodwill allocation amount, resulting in a sample of 2,077 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 2,077 transactions in the sample, 655 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 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 655 '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 333 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

[16] Examples of identifiable intangible assets are patents, customer relationships or contracts, and trademarks.

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 55 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 17 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 655 "potentially impaired" deals, we can classify 333+55+17=405 as "impaired deals".

For 131 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 96 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 655 transactions flagged as potentially impaired, we can credibly classify 62% as large impaired, 20% as not impaired, 4% as small impaired (and so excluded), and we are unable to classify only 15% of transactions. Moreover, for transactions classified as impaired, for 82% (333/405) 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 405 transactions in the Impairment sample and 1,553 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.[17] 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 to impairment is 3.2 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.[18] For the Impairment sample, cumulative abnormal returns are negative and statistically different from zero for all four event windows (mean

[17] As discussed in Francis, Hanna, and Vincent (1996), impairment announcements are rarely disclosed in isolation, and are most commonly disclosed in earnings reports. Bens, Heltzer, and Segal (2011) find that 89% of goodwill impairments were disclosed with earnings announcements or pre-announcements.

[18] 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.

CARs range from -2.9% to -3.9%). 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. 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.[19]

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 2008. 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 four 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 the most impairments occurring in 2008. There is a weak upward trend in the number of impairments through time, with an average of 15 impairments each year between 2003 and 2007 and 32 impairments each year between 2009 and 2017. Transactions may have multiple goodwill write-downs. There are 524 impairments associated with the 405 unique transactions with goodwill write-downs. Finally, and most importantly, the write-down of goodwill balances is common. Of 1,553 transactions in our sample, 21% experience at least one material impairment event.

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

[19] Li et al. (2011) document a -1.39% mean 3-day abnormal return surrounding the impairment announcement date over the 2002 to 2006 period.

in the energy and consumer nondurables sectors and fewer targets in the healthcare and utilities sectors for the Impairment sample relative to the Non-Impairment sample.

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 $338 million ($337 million). Importantly, on average, goodwill represents 51% and 53% of the purchase price and 11% 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, $102 billion of $661 billion of recorded goodwill ($525+$137) is impaired over our sample (representing 15% of total goodwill), with an average transaction-level impairment loss of $252 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 45% 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 3.2 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 Abnormal Return at Announcement Detect Future 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 our 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:

$$AR_{it} = R_{it} - \alpha_i - \beta_i R_{mt} \quad (1)$$

where AR_{it} is the daily abnormal return for acquirer *i* on day *t*. The market model parameters, α_i and β_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 33% of Impairment sample CARs are in the three most negative return buckets, whereas 40% 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 initial goodwill amount against the ex-ante acquirer dollar loss at announcement scaled by initial goodwill. In this figure, we

focus on Impairment sample firms and condition on transactions with a negative market response to the announcement. We compute the acquirer dollar loss at announcement by multiplying CAR [-1, 1] by the acquirer market capitalization 50 days prior to announcement. Visually, there is little relation between acquirer dollar loss at announcement and the amount of goodwill impaired. 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 three of five events windows. However, of five event windows, Impairment sample mean CARs are positive and significant in three, positive and insignificant in one, and negative and significant in one. Further, Acquirer CAR [-1,1] is positive for 52.3% of transactions, which indicates that for more than one-half of transactions, the sign of the announcement return essentially "disagrees" with the impairment outcome: impairment occurs but the acquirer CAR is non-negative (a false negative). 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 for transactions for which the market gets the sign right (i.e., transactions with negative 'Acquirer $ Return at Announcement [-1, 1]'). All reported statistics are sample averages. Zooming in on the Impairment sample, we note a mean initial goodwill of $464 million and mean acquirer loss of $130 million. The average percent of goodwill that is ex-

ante "good" (i.e., initial goodwill less acquirer dollar loss) is 55%. This implies that expected value destruction is 45% (100%-55%) of the initial goodwill. Though 45% expected value destruction is economically substantial, the fascinating result is that this *proportion is statistically larger* for the Non-Impairment sample (expected value destruction for the Non-Impairment sample is 100%-48%=52%).

What happens ex-post? Of the average $464 million of goodwill recorded for the Impairment sample, $117 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 55% of goodwill that was ex-ante "good". Put differently, the predicted destruction of 45% 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 almost two times larger than predicted write-downs (86% versus 45%).

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. It is getting the sign right. If the measure is one, it is also getting the magnitude right. When dollar returns at announcement are positive, this measure is negative. It is getting the sign wrong. The more negative it is, the more is the error in predicting magnitude. Panel C of Table V shows that for four of five event-windows, this metric is negative indicating substantial errors in both predicting impairment directionally and predicting the magnitude of the impairment.

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: natural logarithm of deal value, natural logarithm of acquirer 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 reduction in CAR the probability of impairment increases by 0.26%, or increases from the unconditional probability of impairment of 20.68% to 20.95%.[20] 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 20.68% to 22.20%. The coefficients on the control variables indicate that the probability of goodwill impairment is higher for larger transactions, stock transactions, and transactions with higher initial goodwill relative to purchase price 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. Similar to Table VI Panel B, we focus only on transactions for which the market gets the "sign" correct (i.e., CAR is negative). Table VII Panel B reports the results of Tobit regressions for which 'Goodwill Impairment Amount / Initial Goodwill' is the dependent variable for the sample of 183 transactions in the Impairment sample with negative announcement returns.[21] The independent

[20] The 20.68% unconditional probability of impairment is computed using the 2003 to 2013 sample period. If we exclude impairments during 2008 and 2009 (when the probability of impairment was unusually elevated), the unconditional probability of impairment is 11.90%. The economic significance still remains weak - the marginal effect of 0.26% indicates that the probability of impairment increases from 11.90% to 12.10% for every one percentage point reduction in CAR. We further examine exclusion of financial crisis period impairments in Section VII.

[21] We use a Tobit regression framework as our dependent variable cannot be less than 25%. Our results do not change if an ordinary least square regression framework is used instead.

variables are the same as those reported in Panel A, except we exclude 'Hostile' and 'Unsolicited' due to the lack of variability in these measures given the reduced sample size. For all five event windows, the coefficient on 'Acquirer $ Loss at Announcement / Initial Goodwill' is not statistically different from zero. Thus, conditional on predicting impairment correct directionally (getting the sign correct), the market is unable to predict the magnitude of the impairment. With regards to the control variables, the magnitude of the impairment is negatively related to the size of the transaction and to the percentage of the purchase price allocated to goodwill and positively related to acquirer market capitalization.

D. Prediction Tests

Table VIII delves deeper into the explanatory and predictive properties of CAR. 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 and firm characteristics included in Table VII regressions. The third, "Full Model", combines Acquirer CAR and deal and firm characteristics. Models four and five are similar to models two and three, but also include industry and deal effective year controls. Given that we observe clustering by impairment year (as shown in Table III) and industry (Table IV), we report results with and without the inclusion of these controls to ensure they are not driving the superior predictive ability of the 'CAR Exclusion Model'.

We focus on the probability of impairment (similar to Table VII Panel A) and estimate five logit models with the goodwill impairment dummy as the dependent variable. We then 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.[26] 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).

[26] These 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.

Alternatively, if the model lacks predictive power, the percentage of realized impairments should be close to 10% for all deciles.

Panel A reports the results of in-sample tests in which model parameters are estimated using the full sample of 1,958 transactions. Focusing first on column 1, we see little evidence of significant explanatory 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 35% and 29%, respectively, a minor difference of 6%. However, in column (2), the CAR Exclusion Model, the relation between predicted and realized impairment is monotonic, and the aggregate realized impairment is 46% in the high-predicted probability deciles as opposed to 17% in the low-predicted probability deciles, a large difference of 29%. In column (3), Acquirer CAR is added to deal and firm characteristics in the Full Model. Here we see little improvement relative to the CAR Exclusion Model: the aggregate realized impairment is 47% in the high-predicted probability deciles as opposed to 16% in the low-predicted probability deciles, a difference of 31%. We see even stronger results in columns (4) and (5) when year and industry controls are also included.

INSERT TABLE VIII HERE

In Panel B of Table VIII, we report out-of-sample results: transactions are sorted by deal effective date and parameter estimates are computed using the first 50% of the sample. These estimates are applied to (and reported for) the second 50% of the sample. Given the smaller sample size, we focus on Models 1, 2, and 3 that do not include industry and year controls.

In column 1, we observe the CAR Only Model has poor predictive power. The proportion of realized impairments is non-monotonic as we move from decile 1 to 10. Indeed, the aggregate realized impairment is lower in the high-predicted probability deciles (30%) relative to the low-predicted probability deciles (35%). The results for the CAR Exclusion Model in column 2 are nearly mirror to the in-sample tests reported in Panel A: the aggregate realized impairment is 48% in the high-predicted probability deciles and 21% in the low-predicted probability deciles. In column 3, the predictive power of the CAR Exclusion Model is unchanged when Acquirer CAR is added to the model.

If the market reaction to the announcement provides additional information related to deal value

creation 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 and Panel B of Table VIII indicates that deal and firm characteristics, also largely known ex-ante at the deal announcement date, dominate Acquirer CAR as predictors.

E. Subsample Tests

Our evidence suggests that, on average, the factors that contribute to deal failure may be largely latent factors that are unknown at deal announcement. We next 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), acquisitions of 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.

In Table IX and Table X we report results 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 related and unrelated industries, high-tech and non-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 on an absolute basis (relative basis) if the transaction size (relative transaction size) exceeds the sample median. We classify the transaction as 'related' if the acquirer and target are in the same two-digit SIC code. Transactions are classified as 'high-tech' if both the acquirer and target are flagged as high-tech in SDC. Finally, high and low acquirer Tobin's q (computed at the end of the fiscal year prior to the acquisition announcement) subsamples are classified based on the sample median.

Table IX replicates the regressions in Table VII Panel A, yet includes subsample dummies interacted with Acquirer CAR [-1,1]. All regressions include deal and firm characteristics and industry and year fixed effects. Below each regression, we report *p*-values from tests of differences between the coefficient on the subsample 1 x Acquirer CAR interaction term and the subsample 2 x Acquirer CAR interaction term as well as the marginal effect of a one percentage point increase in the interaction term on the probability of goodwill impairment.

Column 1 in Table IX shows a negative and statistically significant coefficient on stock interacted with Acquirer CAR and negative but insignificant coefficient on cash interacted with Acquirer CAR; however the test indicates no statistical difference between the coefficients of the interaction terms. In Column 2 (Column 3), the interaction term is negative and statistically significant for both public and private target (large and small acquirer) transactions. Although the coefficient is larger (and *p*-value smaller) for public target (large acquirer) transactions, there is not a statistically significant difference between the two subsamples. The results in Column 4 indicate the coefficient on Acquirer CAR is statistically negative for large transactions and insignificant for small transactions, yet the difference between the two subsamples is not statistically significant. In Columns 5 and 6, the coefficient on the interaction of large relative size, related, and non-high-tech and Acquirer CAR is negative and statistically significant, while the coefficient on small relative size, unrelated, and high-tech, respectively, are not statistically different from zero. However, there is not a statistically significant difference in the subsample coefficients reported in Columns 5 and 6. Finally, the results in Column 7 and 8 indicate the coefficient on Acquirer CAR is statistically negative for non-high-tech and low Tobin's q acquirer transactions, but not statistically different from zero for high-tech and high Tobin's q acquirer transactions, and the difference between the two subsamples is significant at the 10% level.

INSERT TABLE IX HERE

Although the results in Table IX indicate that the ability of CAR to predict future goodwill impairment outcomes performs better in certain subsamples based on acquirer, target, and deal characteristics, similar to Table VII Panel A, the economic significance of this variable is arguably modest in all subsamples (e.g., the marginal effect ranges from 0.05% to 0.57%).

To gain insight into the variation in the predictive power of Acquirer CAR on impairment outcomes across subsamples, in Table X, we replicate Table VIII for the sixteen subsamples defined

in Table IX. For each subsample, 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. Below these statistics, we report *p*-values from tests whether the prediction capability of the Acquirer CAR model performs statistically better in one subsample over another.

Panels A, E, F, and H show the ability of Acquirer CAR to predict impairment outcomes does not vary between cash and stock, large and small relative size, unrelated and related industry transactions, and high and low acquirer Tobin's q transactions, respectively. Panel G shows moderately improved performance for non-high-tech industry transactions relative to high-tech transactions, albeit no statistically significant differences between these subsamples exists. Panels B, C, and D indicate substantial improvement in the CAR Only Model for public target, large acquirer, and large transactions relative to private target, small acquirer, and small transactions, respectively, and the difference between subsamples is statistically significant. For example, for public (private) target transactions, the aggregate realized impairment is 42% (34%) in the high-predicted probability deciles as opposed to 22% (31%) in the low-predicted probability deciles, a difference of 20% (2%).

INSERT TABLE X HERE

To summarize, we find improved performance of the CAR Only Model in subsets of the data – the CAR Only Model performs substantially better for public target, large acquirer, and large transactions and weakly better for non-high-tech industry transactions. The results point to the importance of the information environment and market participant's access to data to sufficiently value the acquirer, the target, and the combined synergy gains. Detection deteriorates in settings in which the availability of acquirer and target-specific information may be weaker (e.g., small acquirers and private targets) and deal-specific information is more difficult to access or process (e.g., small transactions and high-tech industry transactions). Although, as discussed above, we find improved performance in subsets of the data, detection errors remain large in all subsets. For all subsamples, the CAR Only Model forecasts dramatically fewer impairments than the benchmark CAR Exclusion Model, and the inclusion of Acquirer 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.

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

Section V had indicated 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 the deal 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 CEO is associated with multiple impairment events, we retain only the transaction with the largest impairment amount. This reduces our sample from 405 to 350 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 XI presents results for the full sample of 350 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. To provide a relative comparison, Lehn and Zhao (2006) find similar CEO turnover propensity (47%) within five years of the announcement date for a full sample of acquisitions that may or may not experience impairment events.

However, our main interest is the *timing* of the turnover, to assess whether the CEO departure 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 than immediately following the impairment. We find that 6% of impaired firm CEOs are terminated in the year of or year following the deal effective year, whereas 20% are fired in the year of or year following the goodwill impairment year.[22] 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 XI HERE

In Panel B of Table XI, we report turnover statistics for the above median and below median predicted impairment probability using the CAR 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 (albeit not statistically) to experience a turnover event overall (49% vs. 44%), more likely to experience internal turnover (46% vs. 44%), more likely to experience takeover turnover (63% vs. 53%), and more likely to experience bankruptcy turnover (83% vs. 0%) relative to firms in the below median predicted impairment group.

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, 7% (4%) of CEOs are fired following the deal announcement and 19% (21%) following the impairment. Hence, there is a modest and insignificant increase in the probability of turnover after the deal completion

[22] There are no cases for which the turnover event occurs in a deal announcement year that is one year prior to the deal effective year. Put differently, we are not missing impairments that occur between the deal announcement and effective date.

date for the high predicted impairment sample relative to the low predicted impairment sample (*p*-value 0.1671), and no difference between the samples in the probability of turnover after the impairment (*p*-value 0.6869).

To summarize, the results in Table XI 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 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 underperform performance metrics of firms with low-predicted impairment probability (largely positive CAR transactions) following the merger. We examine industry-adjusted accounting and stock performance for the two years prior to three years subsequent to deal announcement. We retain only one observation when an acquirer in the Impairment or Non-Impairment sample announces multiple transactions in the same year. This restriction reduces our sample from 1,958 to 1,837. 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 scaled by sales, selling, general, and administrative expenses scaled by sales, property, plant, and equipment (PPE) growth, free cash flow scaled by 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 XII 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 lines with triangle markers) and the Non-Impairment sample (shown in solid blue lines), 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 modest divergence in performance subsequent to the transaction between the Above Median Predicted Impairment (shown in red dotted lines) and Below Median Predicted Impairment (shown in 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.

INSERT FIGURES 4A-4J HERE

Table XII reports median industry-adjusted statistics and tests of statistical differences between the Non-Impairment and Impairment samples and between the Below Median 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, we observe statistically superior performance for the Below Median Predicted Impairment sample relative to the Above Median Predicted Impairment sample for all three years following the acquisition announcement for none of the performance measures. Indeed, we observe statistically significant underperformance for the Above Median relative to the Below Median Predicted Impairment for only two of ten measures at T+3, zero of ten measures at T+2, and six of ten measures at T+1. Importantly, the magnitude of the difference between the Non-Impairment and Impairment samples is dramatically larger than the difference between the Below Median and Above Median Predicted Impairment samples. Further, following the deal announcement year, Impairment firms underperform relative to the industry for seven of ten measures, whereas Above Median Predicted Impairment firms underperform relative to the industry for only one of ten measures.

INSERT TABLE XII HERE

Zooming in on buy-and-hold returns, 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 XII shows that industry-adjusted one-year buy-

and-hold returns are positive for the Above Median Predicted Impairment sample for all three years following the transaction announcement year and higher than the Below Median Predicted Impairment sample at T+2 and T+3. 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. Distressed Delisting

Table XIII 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. We retain only one observation when an acquirer in the Impairment or Non-Impairment sample announces multiple transactions in the same year. This restriction reduces our sample from 1,958 to 1,837. Percentages are based on 1,453 total transactions in the Non-Impairment sample and 384 total transactions in the Impairment sample.

Impairment samples firms 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, whereas Non-Impairment sample firms are significantly more likely to merge or go private than Impairment sample firms. 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 distressed delisting outcomes. To summarize, Tables XI, XII, and XIII, provide strong evidence that Impairment sample firms, but not Above Median Predicted Impairment sample firms, are more likely to experience other symptoms of deal failure such as CEO turnover, poor stock and accounting performance and distressed delisting. These results validate impairment as a robust measure of deal failure as well as the inability of announcement returns to detect such deal failure.

INSERT TABLE XIII HERE

VII. Robustness Tests

A. Combined Acquirer and Target Announcement Returns

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 total expected synergies gains (as opposed to the division of synergy gains), can predict large goodwill impairment outcomes.

We zoom in on the subsample of transactions for which the target is publicly traded. Table XIV reports univariate statistics similar to Table VI for the subsample of 77 Impairment and 301 Non-Impairment acquisitions of public targets. Panel A shows Target CAR [-1,1] is economically and statistically *lower* for the Impairment sample compared to the Non-Impairment sample (19.1% vs. 27.5%). Target dollar abnormal returns are lower for the Impairment compared to the Non-Impairment sample, but the difference is not statistically significant.

Table XII had shown that the detection capability of acquirer announcement return is higher in public target relative to private target transactions. This is also reflected in Table XIV Panel B. Unlike the full sample results for which Impairment sample Acquirer CAR is positive for most event windows, mean Acquirer CAR [-1,1] is negative and significant in the public target sample (-3.8%). On average, Acquirer CAR [-1,1] is not significantly different from zero for the Non-Impairment sample (0.0%) and differences between the two samples are statistically significant. Further, 66.2% of Impairment sample transactions generate a negative market response at announcement.

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 percent returns by dividing combined dollar gains by the sum of acquirer and target market capitalization.

In Panel C of Table XIV, the mean combined percent return is positive and significantly greater than zero for five of the five event windows for the Non-Impairment sample. For the Impairment sample, combined percent returns are positive and statistically significant for four of five event windows, indicating the market, on average, has positive synergy expectations for transactions in the Impairment sample. Importantly, although Non-Impairment sample combined percent returns are larger than Impairment returns, the difference is not statistically different across four of five event

windows. On a combined dollar return basis, both Impairment and Non-Impairment samples have positive values that are not statistically different.

We next consider the ability of combined returns to explain the magnitude of the impairment amount. Similar to Table VI Panel B, we focus on transactions with negative combined percent returns (e.g., transactions for which the market gets the 'sign' of the impairment right). Surprisingly, Panel D of Table XIV shows that the percentage of goodwill that the market deems as ex-ante "good" is higher for the Impairment sample than for the Non-Impairment sample (65% vs. 51%). For the Impairment sample, the percentage of goodwill that is ex-post "good" after the write-down is 21%, indicating that like the full sample, the market severely underestimates the impairment. Actual losses are 2.2 times larger than predicted losses.

In Table XV we replicate Table VII Panel A and report logit regressions with goodwill impairment as the dependent variable and combined percentage CAR as our main independent variable of interest. The coefficient on Combined % CAR is negative, but not statistically different from zero for all five event windows. Overall, Table XIV and Table XV provide weak evidence that combined return measures, which reflect total synergy expectations, are able to detect future impairment outcomes.

B. Excluding Financial Crisis Period Impairments

Table III shows that a significant portion of impairment events occurred during the financial crisis, a period that likely triggered many unexpected and unfavorable outcomes. In Table XVI Panel A and Panel B, we replicate Tables VII Panel A and Table VIII, respectively, yet exclude all crisis-period impairments during 2008 and 2009.

In Table XVI Panel A, which reports logit regressions of the probability of impairment on Acquirer CAR and other deal and firm characteristics and industry and year controls, the results are similar to the full sample results. The coefficient on Acquirer CAR is negative and statistically significant across all but one event window, yet the marginal effects remain small (-0.07% to -0.24%) relative to the unconditional probability of impairment for this sample of 11.9%.

In Table XVI Panel B, similar to Table VIII, the percentage of realized impairment is non-monotonic as we move from low predicted to high predicted impairment probability deciles for the CAR Only Model. The aggregate realized impairment is 34% in the high-predicted probability deciles

and 31% in the low-predicted probability deciles, a difference of 2%. Again, we observe the CAR Exclusion Model performs much better: the aggregate realized impairment is 50% in the high-predicted probability deciles and 15% in the low-predicted probability deciles, a difference of 35%. Including Acquirer CAR in the Full Model (column 3) has no impact on model performance. To summarize, the results in Table XVI provide no evidence that the lack of predictive power of acquirer announcement returns is driven by the massive, and arguably unanticipated, financial crisis.

C. Non-Transaction-Specific Information Incorporated In CAR

Our empirical approach assumes that acquirer announcement returns are an unbiased measure of value destruction expectations. The lack of relation between acquirer announcement return and goodwill impairment could 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.[28]

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 also find large prediction errors in cash-financed acquisitions in Table X, 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.

[28] See Schipper and Thompson (1983), Asquith, Bruner, and Mullins (1983), Roll (1986), and Mitchell, Pulvino, and Stafford (2004) for discussion on the potential issues with using bidding firm announcement returns to gauge acquisition value implications. Hietala, Kaplan, and Robinson (2003) use failed acquisitions and acquisitions with multiple bidders and Barraclough, Robinson, Smith, and Whaley (2013) use option prices to decompose the information content of acquisition announcements.

Three, announcement returns may also be a biased measure of expected value destruction due to price pressure from arbitrageurs during acquisitions of public targets. Since we also find large prediction errors for private target transactions in Table X, 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 returns and impairment outcomes. So this bias also goes against our results.

Four, there is a literature that considers whether the decision to withdraw an acquisition bid is related to negative acquirer announcement returns.[29] If transactions associated with extreme negative market responses are more likely to be canceled, this would bias our tests which focus on completed transactions. However, as documented in Jacobsen (2014), on average, less than 10% of announced transactions are canceled each year. Further, in Figure 2, we show that extreme announcement date losses of more than 10% are prevalent in the data.

D. Type II Error

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. This presents the possibility of Type II error: if value gains of one target offset reductions in goodwill in another target in the same reporting unit, impairment will not occur.[23] So it is possible that goodwill impairment implies deal failure but deal failure does not imply impairment if deal failure can be masked. If such Type II errors are large, our tests will be biased against finding a relation between announcement return and impairment realizations. To examine this issue, we consider transactions in which the target is large relative to the acquirer – in these settings it is less likely the acquirer can use other businesses to hide value reductions in a target.

In Table X, we had reported results for both transactions of large and small relative size (deal value scaled by acquirer market capitalization). The CAR Only Model performs equally poorly for both the large and small relative size subsamples and continues to underperform the benchmark CAR Exclusion Model. Table IX had shown that the interaction of Acquirer CAR and a large relative size dummy has a more negative coefficient and smaller *p*-value than the interaction of Acquirer CAR and

[29] See Jennings and Mazzeo (1991), Luo (2005), and Kau, Linck, and Rubin (2008).

[23] We thank Adam Kolasinsky for pointing out this issue.

a small relative size dummy; however these two coefficients are not statistically different. To summarize, there is no strong evidence that the lack of relation between acquirer CAR and impairment outcome is driven by Type II errors. Moreover, we focus on *extreme* impairments and do not focus on the timing of the impairment – such value destruction is difficult to mask over time.

VIII. Conclusion

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. 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 21% of acquirers, and over 85% of goodwill is eliminated due to the impairment.

We 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 for more than 50% of transactions in the Impairment sample. Actual write-downs are almost two times larger than write-downs predicted from acquirer announcement returns. We find that impairment probability prediction models using deal and firm characteristics, also largely known ex-ante at the deal announcement date, dominate acquirer announcement returns as predictors of future impairment. We find improvement in the deal failure detection capability of announcement returns in certain subsets of the data. Acquirer announcement returns forecast impairments substantially better for large, public target, and large acquirer transactions and weakly better for non-high-tech industry transactions. Detection errors, however, still remain large in these subsamples.

We validate impairment as a robust measure of deal failure and the inability of announcement return to detect deal failure, by focusing on other ex-post firm-level symptoms of deal failure: CEO turnover, poor stock and operating performance, and distressed delisting. We find turnover events are 2.5x more likely to occur in the years following the impairment date rather than the deal announcement date for transactions with negative announcement returns. 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 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 measures subsequent to the transaction in subsamples for which acquirer announcement returns predicts and does not predict future impairment. Impairment sample firms are significantly more likely to experience distressed delisting due to bankruptcy, liquidation, and exchange requirements than Non-Impairment sample firms. However, we find little difference in distressed delisting outcomes in subsamples for which acquirer announcement returns predicts and does not predict future impairment.

Our results are robust to using combined target and acquirer announcement returns rather than acquirer returns, to excluding impairments during the financial crisis, and to the consideration of other non-transaction-related information that may contaminate announcement returns.

To conclude, our results indicate that, while known ex-ante determinants of value destruction may 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. So our evidence suggests that deal failure may be largely triggered by latent factors that are unknown at deal announcement.

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.

Barraclough, K., Robinson, D. T., Smith, T., Whaley, R. E. (2013). Using option prices to infer overpayments and synergies in M&A transactions, *Review of Financial Studies*, 26 (3), 695-722.

Bayazitova, D., Kahl, M., Valkanov, R. I. (2012). Value creation estimates beyond announcement returns: mega-mergers versus other mergers. Working paper, University of North Carolina at Chapel Hill, University of Colorado at Boulder, and University of California, San Diego.

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.

Bessembinder, H., Zhang, F. (2013). Firm characteristics and long-run stock returns after corporate events. *Journal of Financial Economics*, 109(1), 83-102.

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. (1998). Takeovers of privately held targets, method of payment, and bidder returns. *Journal of Finance* 53, 773–784.

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., 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 and Finance* 21, 223-265.

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.

Jacobsen, S. (2014). The death of the deal: Are withdrawn acquisition deals informative of CEO quality? *Journal of Financial Economics* 114, 54-83.

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.

Jennings, R., Mazzeo, M. (1991). Stock price movements around acquisition announcements and management's response. *Journal of Business* 64, 139–163.

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.

Lang, L.H.P., Stulz, R.M., Walkling, R.A. (1989). Managerial performance, Tobin's Q, and the gains from successful tender offers. *Journal of Financial Economics* 24, 137–154.

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

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.

Officer, M.S. (2007). The price of corporate liquidity: acquisition discounts for unlisted target. *Journal of Financial Economics* 83, 571–598.

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. (2005). 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.

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

Schipper, K., Thompson, R. (1983). The impact of merger-related regulations using exact distributions of test statistics. *Journal of Accounting Research* 23, 408-415.

Servaes, H. (1991). Tobin's q and the gains from takeovers. *Journal of Finance* 46, 409–419.

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

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

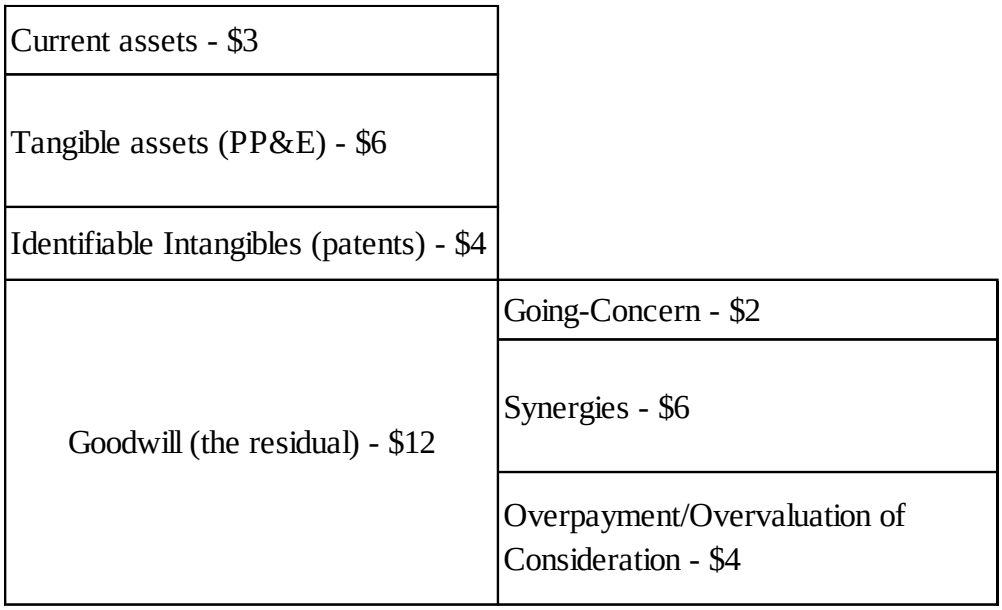


Figure 1. Example allocation of goodwill at deal completion date. This figure provides a numerical illustration of the model presented in Section II. The value of the target's identifiable net assets is $13 (current assets ($3) + tangible property, plant and equipment ($6) + identifiable intangible assets 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 $25-($3+$6+$4) = $12. This is recorded at time t=2. At t=1, assume that the acquirer's abnormal return is negative, and so the market forecasts value destruction to the acquiring firm, which is $4 in our example. Therefore, the market estimates that only $12 - $4 = $8 is ex-ante "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). 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.

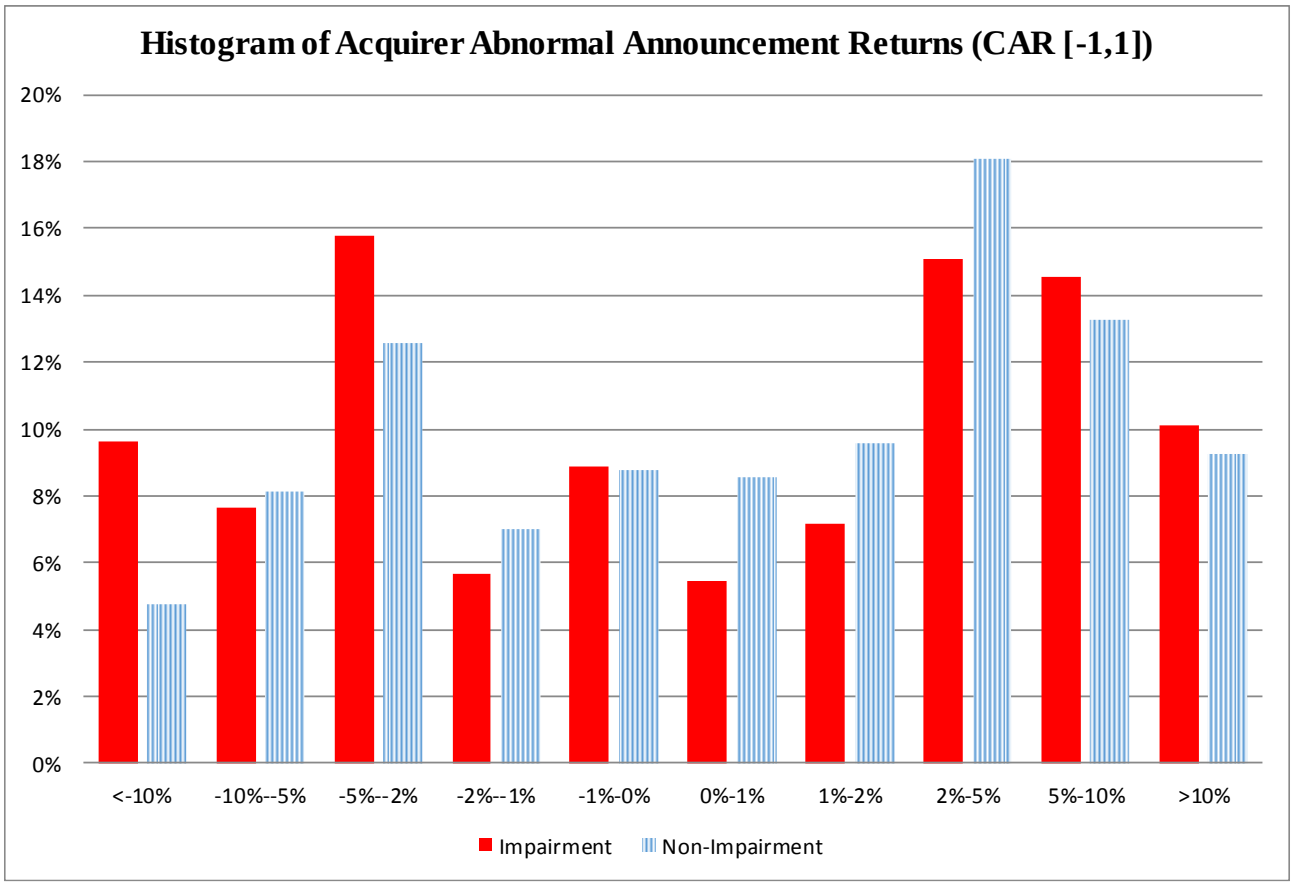


Figure 2. Histogram of acquirer abnormal announcement returns. This figure plots the histogram of acquirer cumulative abnormal returns over a three day window surrounding the announcement date for ten buckets of returns (below -10%, -10% to -5%, -5% to -2%, -2% to -1%, -1% to 0%, 0% to 1%, 1% to 2%, 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.

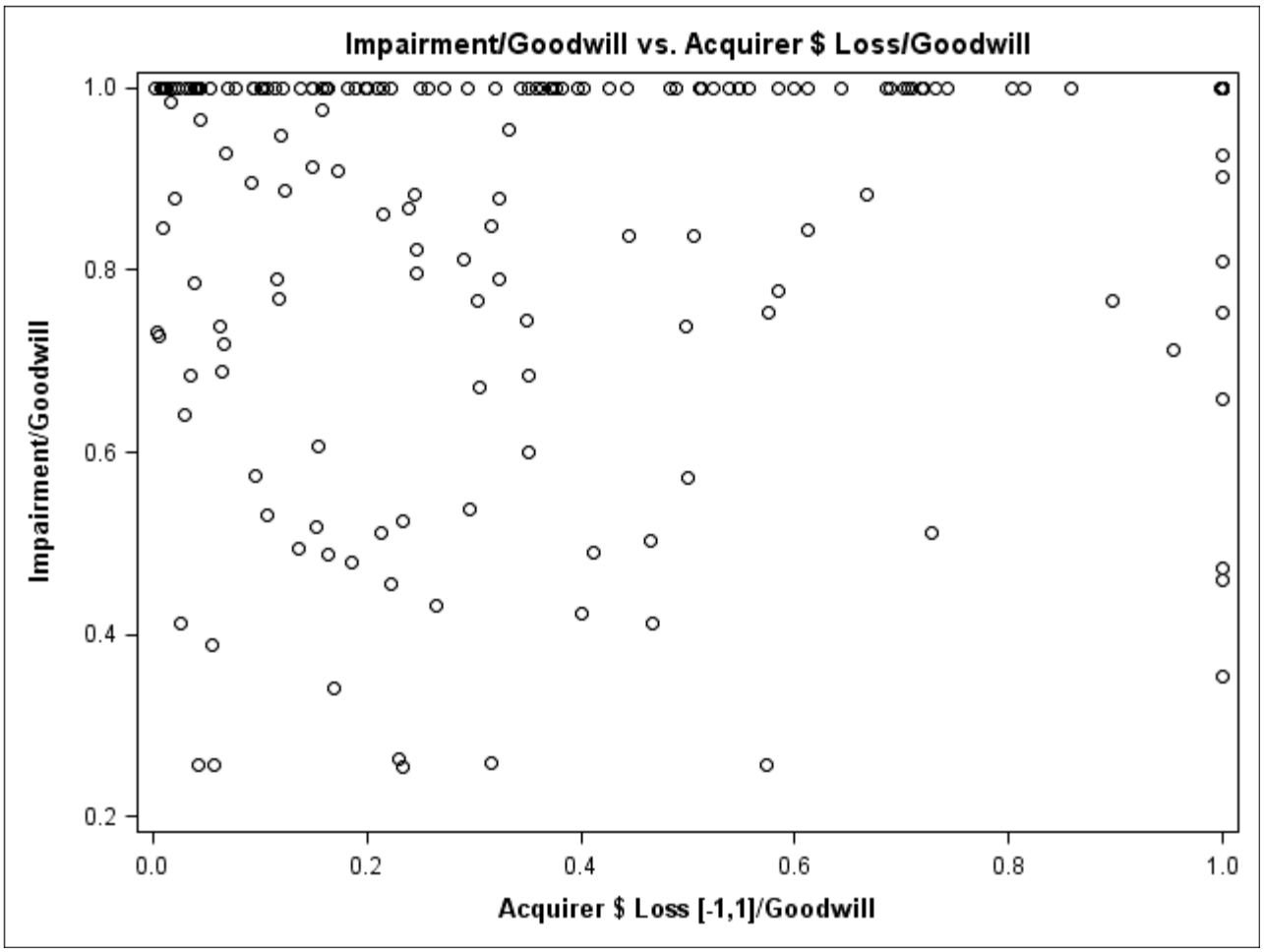
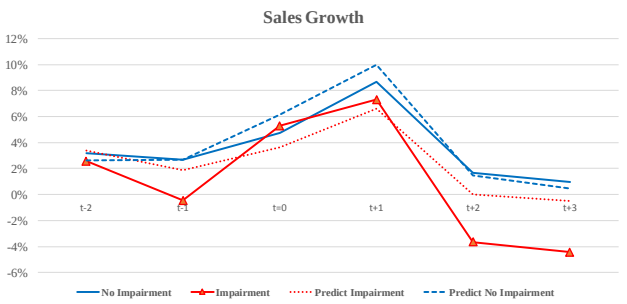


Figure 3. Scatterplot of realized impairment versus expected impairment. This figure plots the ex-post realized impairment amount scaled by the initial goodwill recorded against the ex-ante acquirer dollar loss at announcement scaled by the initial goodwill recorded. In this figure, we focus on Impairment sample firms and condition on transactions with a negative market response to the acquisition announcement. We compute the acquirer dollar loss at announcement by multiplying CAR [-1, 1] by the acquirer market capitalization 50 days prior to announcement.

Figures 4A – 4J

4A



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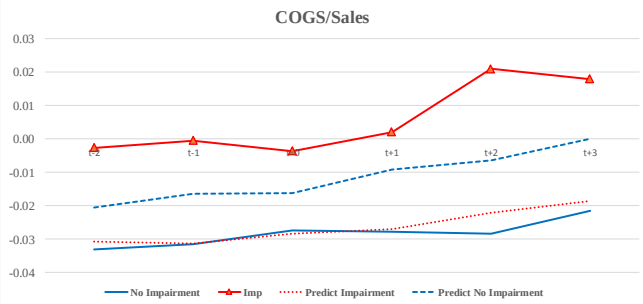

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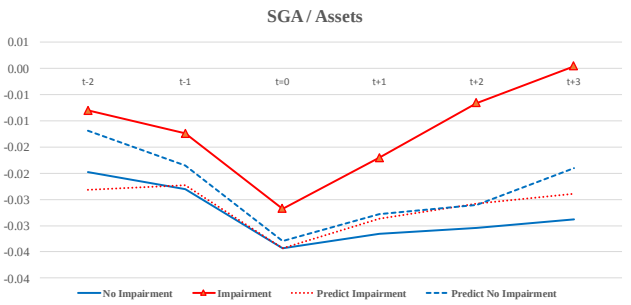

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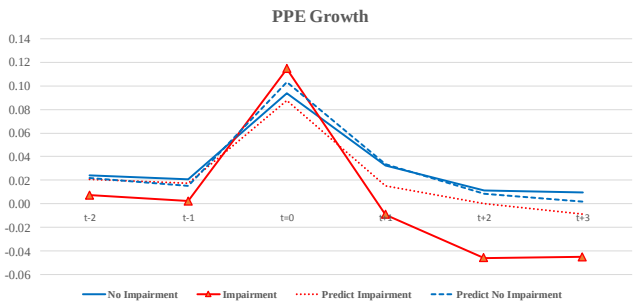
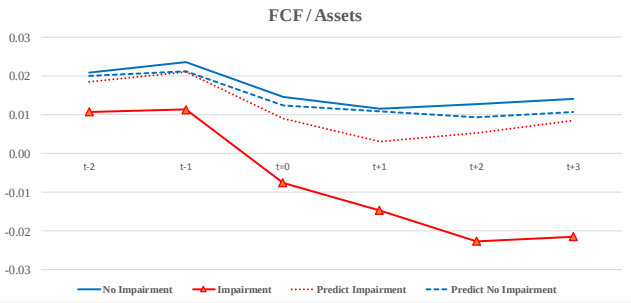
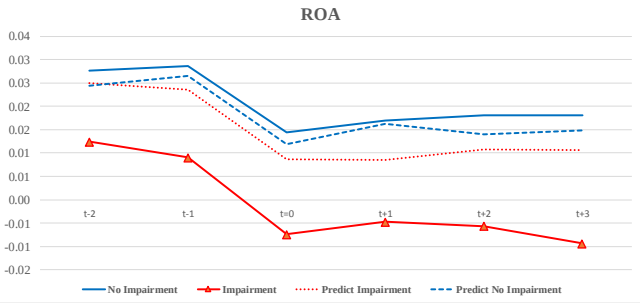


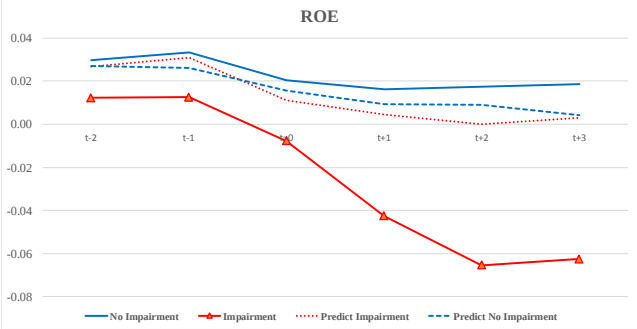
4E



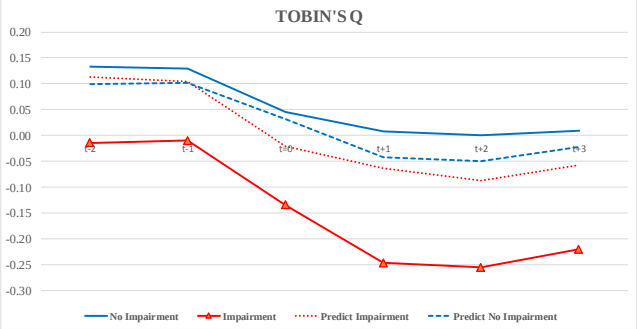
4F



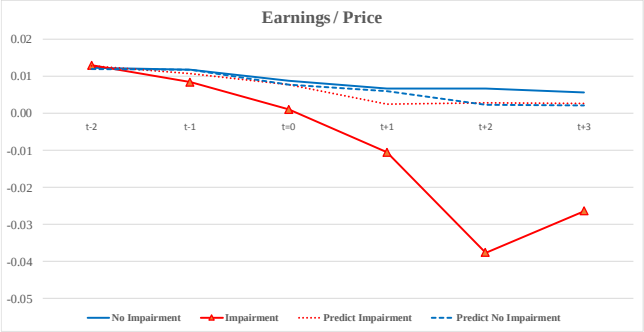
4G



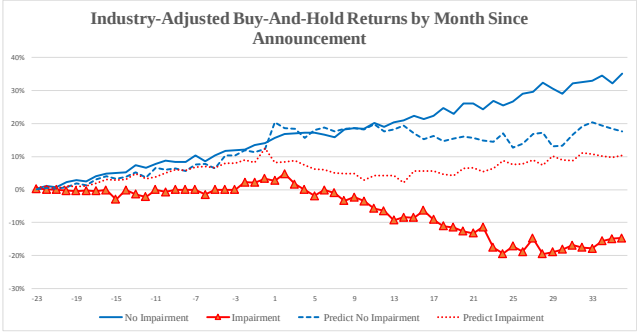
4H



4I



4J



Figures 4A – 4J. Long-term industry-adjusted accounting and stock performance graphs. Figures 4A-4I show accounting performance measures for two years prior to the acquisition announcement (t-2, t-1), the year of the acquisition announcement (t=0), and three years subsequent to the announcement (t+1, t+2, t+3). The Impairment sample is represented by red lines with triangle markers, the Non-Impairment sample is represented by solid blue lines, the Above Median Predicted Impairment sample is represented by red dotted lines, and the Below Median Predicted Impairment sample is represented by blue dashed lines. The Above Median Predicted Impairment sample (largely negative CAR transactions) and the Below Median Predicted Impairment sample is created from the Acquirer CAR only Model reported in Table VIII. We report sales growth (4A), cost of goods sold scaled by sales (4B), selling, general, and administrative expenses scaled by sales (4C), property, plant, and equipment (PPE) growth (4D), free cash flow scaled by assets (4E), return on assets (ROA) (4F), return on equity (ROE) (4G), Tobin's q (4H), and Earnings/Price (4I). Figure 4J shows the returns from buying the stock two years prior and holding to three years subsequent to the transaction. Months -23 to 0 represent the 24 months prior to the acquisition announcement, month 1 the acquisition announcement month, and months 2 to 36 represent the 35 months following the acquisition announcement. All performance measures are industry-adjusted using the Fama French 48 industry classification.

Table I

Sample Description

The sample of merger and acquisition deals in Panel A 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 at 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. We exclude deals without firm-level goodwill in Compustat, deals without deal-level goodwill reported in the 10-K, and deals not structured under purchase accounting rules. The final sample consists of 2,077 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 655 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 405 transactions. The final Non-Impairment sample consists of 1,553 transactions.

Panel A: Sample Construction	
# Deals	2,981
Less: Transactions without firm-level goodwill in Compustat	258
Less: Transactions by firms that do not report deal-level goodwill data in the 10-K or not structured under Purchase Accounting	646
Total	2,077
# Transactions without acquiring firm-level impairment within 10 years of deal effective date	1,422
# Transactions "potentially impaired" with acquiring firm-level impairment within 10 years of deal effective date	655

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	333
Impairment linked directly to target, other targets in segment also linked*	13
Impairment linked directly to target, other targets in firm also linked**	42
Target is in impaired segment, target goodwill >= 20% of segment goodwill*	17
Total	405
% of deals potentially impaired	*62%*
DEALS CLASSIFIED IN NO GOODWILL IMPAIRMENT SAMPLE	
Impairment is not in target's segment or 10-K specifies other target as source of impairment	131
Total	131
% of deals potentially impaired	*20%*
DEALS EXLCUDED FROM SAMPLE: CANNOT CLASSIFY AS IMPAIRED OR NOT IMPAIRED	
Target is in impaired segment, but target goodwill is < 20% of segment goodwill	39
Impairment cannot be directly linked to a target(s) or segment	57
Total	96
% of deals potentially impaired	*15%*
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	405
Non-Impairment Sample	1,553

Table II

Market Reaction to Earnings Announcements Containing Goodwill Impairment News

This table reports the mean cumulated abnormal returns (CAR) surrounding quarterly earnings 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.

	Impairment Sample		Non-Impairment Sample		Matched Control Sample 1 (Earnings Date, SIC)		Matched Control Sample 2 (Earnings Date, SIC, Market Capitalization)		Difference					
Event period	(1)		(2)		(3)		(4)		(1)-(2)	*p*-value	(1)-(3)	*p*-value	(1)-(4)	*p*-value
CAR [-1,1]	-2.9%	***	0.1%	ns	0.2%	ns	0.0%	ns	-3.1%	***	-3.2%	***	-2.9%	***
CAR [0,1]	-3.0%	***	0.1%	ns	0.0%	ns	-0.2%	ns	-3.1%	***	-3.1%	***	-2.8%	***
CAR [-5,5]	-3.4%	***	0.2%	ns	0.4%	**	0.5%	*	-3.6%	***	-3.8%	***	-3.9%	***
CAR [-10,10]	-3.9%	***	0.5%	ns	1.0%	***	1.4%	***	-4.4%	***	-4.9%	***	-5.3%	***

Table III

Goodwill 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 405 unique acquisitions which experience 524 impairment events. The Non-Impairment sample includes 1,553 unique acquisitions which do not experience a goodwill impairment event.

	# of Goodwill Impairments																	
Deal Effective Year Cohort	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	# Impair-ments	# Unique Deals Impaired	% of Deals Impaired in Deal Effective Year Cohort
2003	1	3	5	7	2	15	8	1	1	0	0	0	0	0	0	43	35	25%
2004	0	4	10	9	7	30	11	4	2	0	2	1	0	0	0	80	58	29%
2005	0	0	2	6	9	28	9	3	3	3	2	0	1	0	0	66	53	29%
2006	0	0	0	1	7	38	17	4	7	4	4	2	1	1	0	86	66	27%
2007	0	0	0	0	3	35	24	10	6	7	3	2	3	4	0	97	74	31%
2008	0	0	0	0	0	17	6	3	3	6	3	2	1	2	1	44	37	25%
2009	0	0	0	0	0	0	2	3	5	2	1	0	2	0	0	15	11	11%
2010	0	0	0	0	0	0	0	1	4	4	3	2	4	4	2	24	20	12%
2011	0	0	0	0	0	0	0	0	1	8	8	6	6	6	0	35	25	16%
2012	0	0	0	0	0	0	0	0	0	0	5	2	7	2	2	18	13	6%
2013	0	0	0	0	0	0	0	0	0	0	1	7	5	3	0	16	13	7%
Total	1	7	17	23	28	163	77	29	32	34	32	24	30	22	5	524	405	
Unique Deals that Impair	405																	
Unique Deals Do Not Impair	1,553																	
% Impairment	21%																	

Table IV

Deal and Industry 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=405)	Non-Impairment Sample (N=1,553)	Difference Test
Panel A: Deal Statistics			
Deal Value ($M)	658	726	0.6596
Acquirer Market Capitalization ($M)	1,629	3,645	<.0001
Relative Size (Deal Value / Market Cap)	0.50	0.31	0.0055
Stock Deal Dummy	0.44	0.35	0.0008
Related Industry Dummy	0.61	0.64	0.1719
# of Bidders	1.01	1.01	0.7340
Unsolicited	0.02	0.01	0.5973
Hostile	0.02	0.01	0.1638
Public Target Dummy	0.20	0.19	0.9552
Panel B: Distribution of Impairments by Target Industry			
Business equipment	40%	37%	0.2635
Chemicals	2%	2%	0.5945
Consumer durables	2%	2%	0.6079
Energy	6%	3%	0.0246
Healthcare	8%	13%	0.0005
Manufacturing	12%	12%	0.9166
Consumer nondurables	7%	5%	0.0443
Other	10%	11%	0.3487
Shops	8%	7%	0.6545
Telecommunications	4%	4%	0.9914
Utilities	1%	2%	0.0261

Table V
Goodwill and Impairment Statistics

This table reports goodwill and impairment summary statistics for each transaction in the Impairment and Non-Impairment sample. Panel A shows initial transaction-level goodwill summary statistics for both samples. Panel B shows transaction-level impairment statistics for the Impairment sample. '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=1,553)					
$ Goodwill	338.3	18.5	54.5	201.0	524,695
Goodwill/Purchase Price	51%	33%	52%	69%	
Goodwill/Total Assets	11%	3%	7%	13%	
Impairment Sample (N=405)					
$ Goodwill	337.2	16.6	47.3	154.8	136,566
Goodwill/Purchase Price	53%	36%	55%	70%	
Goodwill/Total Assets	14%	5%	10%	18%	
Panel B: Transaction-Level Impairment Statistics					
Impairment $ Loss	-252.5	-15.1	-41.9	-110.2	-102,272
Impairment/Goodwill	86%	77%	100%	100%	15%
Impairment/Purchase Price	45%	28%	43%	60%	
Impairment/Total Assets	11%	4%	8%	15%	
Time to Impair (Years from Close)	3.2	1.7	2.8	4.4	
# of Impairments	1.3	1.0	1.0	1.0	

Table VI
Market Reaction to Deal Announcement

This table reports mean cumulated abnormal returns (CARs) surrounding the acquisition announcement date for the Impairment and Non-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 Non-Impairment samples. Tests for differences are based on the *t*-test and *p*-values are reported. Panel A reports acquirer announcement returns for the Impairment and Non-Impairment samples. Panel B reports statistics on the relation between acquirer announcement dollar return and the magnitude of the impairment loss for the subsample of transactions with negative Acquirer CAR [-1, 1]. Panel C reports acquirer announcement return prediction errors for the Impairment sample. 'Acquirer $ Return' is computed by multiplying 'Acquirer CAR' by the acquirer market capitalization 50 days prior to announcement. 'Acquirer $ Loss' is set equal to 'Acquirer $ Return' for the sample of deals with negative Acquirer CAR [-1, 1]. 'Prediction Error' is the negative of 'Acquirer $ Return' scaled by dollar impairment. ***, **, and * stand for statistical significance (based on the standardized cross-sectional test) at the 1%, 5%, and 10% level, respectively. 'ns' denotes mean CARs that are not statistically different from zero. 'GW' denotes 'goodwill'.

	Impairment Sample (N=405)		Non-Impairment Sample (N=1,553)		Difference	
	(1)		(2)		(1)-(2)	*p*-value
Panel A: Acquirer Announcement Return and Impairment Outcome						
Acquirer CAR [-1,1]	0.6%	*	1.7%	***	-1.1%	0.0383
Acquirer CAR [0,0]	0.1%	ns	1.0%	***	-0.9%	0.0211
Acquirer CAR [0,1]	0.6%	*	1.6%	***	-1.0%	0.0527
Acquirer CAR [-5,5]	1.1%	**	1.5%	***	-0.4%	0.5420
Acquirer CAR [Announcement-2, Close+2]	-0.6%	*	1.1%	***	-1.7%	0.1159
% CAR [-1,1] Positive	52.3%		58.8%		-6%	0.0208
% CAR [-1,1] Negative	47.7%		41.2%		6%	0.0208
Acquirer $ Return at Announcement [-1, 1]	-34.2		-17.1		-17.1	0.5802
Acquirer $ Return at Announcement [0, 0]	-20.4		-19.8		-0.7	0.9679
Acquirer $ Return at Announcement [0, 1]	-29.3		-20.0		-9.3	0.7345
Acquirer $ Return at Announcement [-5, 5]	-41.0		-18.5		-22.5	0.4710
Acquirer $ Return at Announcement [Ann.-2, Close+2]	-54.6		-142.1		87.5	0.2447
Panel B: Acquirer Announcement Return and Magnitude of Impairment - CAR < 0 Sample						
$ Goodwill [GW]	463.6		428.5		35.2	0.7933
Acquirer $ Loss at Announcement *	-130.2		-219.1		88.9	0.1617
$ Goodwill - Acquirer $ Loss *	336.2		250.0		86.2	0.3713
% Goodwill Ex-ante "Good" ((GW - Acq. Loss)/GW) *	55%		48%		7%	0.0153
Impairment $ Loss	-346.8		0.0		-346.8	
Goodwill Ex-post "Good" (GW $ - Impairment $)	116.8		428.5		-311.6	
% Goodwill Ex-post "Good" ((GW $ - Impairment $)/GW $)	14%		100%		-86%	
Panel C: Acquirer Announcement Return and Prediction Error						
Prediction Error ((-1*Acq. $ Return)/Imp.) [-1,1]	-0.23					
Prediction Error ((-1*Acq. $ Return)/Imp.) [0,0]	-0.03					
Prediction Error ((-1*Acq. $ Return)/Imp.) [0,1]	-0.20					
Prediction Error ((-1*Acq. $ Return)/Imp.) [-5,5]	-0.57					
Prediction Error ((-1*Acq. $ Return)/Imp.) [Ann.-2, Close+2]	-0.47					

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

Table VII

Probability and Magnitude of Goodwill Impairment 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 reports tobit regressions that focus on the magnitude of impairment: the sample is conditioned on impairment firms with negative acquirer CAR at announcement. The dependent variable is the 'Goodwill Impairment Amount / Initial Goodwill' and our key variable of interest is 'Acquirer $ Loss at Announcement / Initial Goodwill'. 'Acquirer $ Loss' is -1 * Acquirer CAR * acquirer market capitalization 50 days prior to announcement. Both panels report regressions with five different event windows to estimate acquirer cumulative abnormal returns. All regressions include deal and firm 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	-1.79**	-2.84**	-1.63**	-0.87*	-0.82**
	(0.016)	(0.017)	(0.032)	(0.059)	(0.013)
	-0.26%	*-0.41%*	*-0.24%*	*-0.13%*	*-0.12%*
Log Deal Value ($B)	0.30***	0.30***	0.30***	0.30***	0.33***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Log Acquirer Market Cap ($B)	-0.52***	-0.52***	-0.52***	-0.52***	-0.55***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Relative Size	0.06	0.06	0.06	0.05	-0.00
	(0.467)	(0.426)	(0.464)	(0.484)	(0.992)
Stock Dummy	0.26**	0.25**	0.26**	0.26**	0.24*
	(0.043)	(0.049)	(0.042)	(0.043)	(0.053)
Related Dummy	-0.20	-0.19	-0.20	-0.21*	-0.20
	(0.120)	(0.123)	(0.116)	(0.097)	(0.109)
# of Bidders	-0.13	-0.10	-0.12	-0.12	-0.08
	(0.805)	(0.853)	(0.809)	(0.811)	(0.886)
Unsolicited	0.29	0.26	0.26	0.24	0.30
	(0.660)	(0.702)	(0.691)	(0.717)	(0.651)
Hostile	0.52	0.56	0.53	0.53	0.50
	(0.359)	(0.321)	(0.350)	(0.351)	(0.385)
Public Target	-0.05	-0.04	-0.03	-0.00	-0.01
	(0.798)	(0.845)	(0.848)	(0.983)	(0.951)
Goodwill/Purchase Price	0.61**	0.63**	0.61**	0.61**	0.62**
	(0.028)	(0.023)	(0.026)	(0.026)	(0.024)
Constant	0.43	0.34	0.40	0.41	0.46
	(0.524)	(0.611)	(0.548)	(0.544)	(0.499)
Observations	1,954	1,954	1,954	1,954	1,953
Pseudo R2	0.113	0.113	0.112	0.111	0.112
Year and Industry Controls	YES	YES	YES	YES	YES

Panel B: Magnitude of Impairment (Conditional on Impairment and CAR < 0)					
Dependent Variable	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 $ Loss at Announcement / Initial Goodwill	0.01	-0.07	-0.13	-0.02	-0.11
	(0.918)	(0.642)	(0.285)	(0.853)	(0.329)
Log Deal Value ($B)	-0.14**	-0.20***	-0.19***	-0.15**	-0.11**
	(0.029)	(0.003)	(0.006)	(0.011)	(0.042)
Log Acquirer Market Cap ($B)	0.07	0.21***	0.13**	0.09	0.10*
	(0.228)	(0.001)	(0.042)	(0.124)	(0.076)
Relative Size	0.05	0.15	0.06	0.08	0.04
	(0.613)	(0.117)	(0.590)	(0.412)	(0.280)
Stock Dummy	-0.04	0.08	-0.03	0.02	0.07
	(0.595)	(0.258)	(0.716)	(0.714)	(0.381)
Related Dummy	0.10	0.09	0.06	-0.03	0.04
	(0.144)	(0.206)	(0.432)	(0.642)	(0.585)
# of Bidders	0.32	-0.15	0.21	0.18	-0.24
	(0.213)	(0.721)	(0.420)	(0.462)	(0.576)
Public Target	-0.03	-0.18*	-0.06	-0.04	-0.19*
	(0.728)	(0.079)	(0.514)	(0.656)	(0.070)
Goodwill/Purchase Price	-0.65***	-0.56***	-0.81***	-0.61***	-0.63***
	(0.000)	(0.005)	(0.000)	(0.000)	(0.002)
Constant	1.17***	1.22**	1.45***	1.27***	1.76***
	(0.001)	(0.010)	(0.000)	(0.000)	(0.000)
Observations	183	176	172	174	180
LR chi-squared	61.18	50.99	61.71	59.92	46.47
Prob > chi-squared	0.0003	0.0050	0.0002	0.0004	0.0156
Year and Industry Controls	YES	YES	YES	YES	YES

Table VIII

Prediction of Goodwill Impairment Using Acquirer Announcement Returns

This table examines the ability of acquirer announcement returns to predict the occurrence of future goodwill impairment events. We run 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 report the percentage of transactions having realized impairment for each predicted probability decile. 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 and firm characteristics included in Table VII regressions. Model 3, 'Full Model', combines acquirer CAR and deal and firm characteristics. Models 4 and 5 are similar to Models 2 and 3 but also include industry and deal effective year controls. Panel A reports in-sample results: model parameters are estimated using the full sample of 1,958 transactions. Panel B reports out-of-sample results: transactions are sorted by deal effective date and parameter estimates are computed using the first 50% of the sample. These estimates are applied to (and reported for) the second 50% of the sample.

Panel A: In-Sample Tests

	(1)	(2)	(3)	(4)	(5)
	CAR Only Model	CAR Exclusion Model	Full Model	CAR Exclusion Model	Full Model
Independent Variables Included in Regression	Acquirer CAR	Deal and Firm Characteristics	Acquirer CAR and Deal/Firm Characteristics	Deal/Firm Characteristics, Industry, and Year Controls	Acquirer CAR, Deal/Firm Characteristics, Industry, and Year Controls
Decile of model's predicted probability of impairment	% With Realized Impairment in Each Decile				
1: Low Predicted Probability	11%	4%	4%	2%	2%
2	12%	5%	7%	2%	2%
3	6%	7%	6%	4%	4%
4	11%	7%	8%	6%	5%
5	7%	9%	8%	8%	8%
6	7%	11%	10%	10%	11%
7	11%	10%	10%	14%	13%
8	10%	11%	13%	15%	15%
9	11%	18%	15%	17%	16%
10: High Predicted Probability	14%	18%	20%	22%	23%
Total	100%	100%	100%	100%	100%
Decile 8+9+10 (High Predicted)	35%	46%	47%	54%	54%
Decile 1+2+3 (Low Predicted)	29%	17%	16%	8%	8%
Difference	6%	29%	31%	45%	45%

Panel B: Out-of-Sample Tests			
	(1)	(2)	(3)
	CAR Only Model	CAR Exclusion Model	Full Model
Independent Variables Included in Regression	Acquirer CAR	Deal and Firm Characteristics	Acquirer CAR and Deal/Firm Characteristics
Decile of model's predicted probability of impairment	% With Realized Impairment in Each Decile		
1: Low Predicted Probability	13%	6%	6%
2	13%	7%	6%
3	8%	8%	8%
4	12%	5%	6%
5	7%	9%	11%
6	5%	9%	6%
7	12%	7%	9%
8	7%	15%	12%
9	10%	13%	15%
10: High Predicted Probability	13%	20%	21%
Total	100%	100%	100%
Decile 8+9+10 (High Predicted)	30%	48%	48%
Decile 1+2+3 (Low Predicted)	35%	21%	20%
Difference	-5%	28%	28%

Table IX
Subsample Tests: Logit Regressions

This table reports the results of logit regressions that model the probability of goodwill impairment. Acquirer CAR [-1,1] is interacted with eight subsample pairs: stock and cash, public and private targets, large and small acquirers, large and small transactions, large and small relative transaction size, unrelated and related industry, non- and high-tech industry, and high and low Tobin's q acquirers. Section V describes the construction of these subsamples. All regressions include the deal, firm, industry, and year controls reported in Table VII. Tests for statistical differences between the coefficient on the subsample 1 x CAR interaction term and the subsample 2 x CAR interaction term are reported below regressions as well as the marginal effect of a 1 percentage point increase in the interaction term on the probability of impairment. ***, **, and * stand for statistical significance at the 1%, 5%, and 10% level, respectively. *p*-values are reported in parentheses under coefficients.

		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Subsample 1	Stock x CAR	-1.90*							
		(0.058)							
Subsample 2	Cash x CAR	-1.67							
		(0.125)							
Subsample 1	Public x CAR		-4.14**						
			(0.013)						
Subsample 2	Private x CAR		-1.21*						
			(0.088)						
Subsample 1	Large Acquirer x CAR			-3.72***					
				(0.009)					
Subsample 2	Small Acquirer x CAR			-1.26*					
				(0.087)					
Subsample 1	Large Deal x CAR				-2.89**				
					(0.011)				
Subsample 2	Small Deal x CAR				-0.86				
					(0.319)				
Subsample 1	Large Relative Size x CAR					-1.98**			
						(0.028)			
Subsample 2	Small Relative Size x CAR					-1.26			
						(0.368)			
Subsample 1	Related x CAR						-2.52**		
							(0.015)		
Subsample 2	Unrelated x CAR						-1.05		
							(0.108)		
Subsample 1	High-Tech x CAR							-0.35	
								(0.715)	
Subsample 2	Non-High-Tech x CAR							-3.81***	
								(0.002)	
Subsample 1	High Tobin's q x CAR								-0.44
									(0.649)
Subsample 2	Low Tobin's q x CAR								-3.98***
									(0.001)
Test: Subsample 1 = Subsample 2 (*p*-value)		0.8753	0.1094	0.1200	0.1466	0.6602	0.2193	0.0245	0.0204
Subsample 1 Marginal Effect		-0.28%	-0.60%	-0.54%	-0.42%	-0.29%	-0.37%	-0.05%	-0.06%
Subsample 2 Marginal Effect		-0.24%	-0.18%	-0.18%	-0.12%	-0.18%	-0.15%	-0.55%	-0.57%
Observations		1,954	1,954	1,954	1,954	1,954	1,954	1,954	1,883
Pseudo R2		0.113	0.114	0.114	0.114	0.113	0.113	0.115	0.123
Deal, Firm, Year, Industry Controls		YES	YES	YES	YES	YES	YES	YES	YES

Table X
Subsample Tests: Prediction Models

This table shows the percentage of the realized Impairment sample that falls into the top and bottom three predicted probability of impairment deciles using three 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 and firm characteristics included in Table VII regressions. Model 3, 'Full Model', combines acquirer CAR and deal and firm characteristics. Results are reported for sixteen subsamples: stock, cash, public and private targets, large and small acquirers, large and small transactions, large and small relative transaction size, unrelated and related industry, non- and high-tech transactions, and high and low Tobin's q acquirers. Section V describes the construction of these subsamples. At the bottom of each panel, we report *p*-values from tests whether the prediction capability of the Acquirer CAR model performs statistically better in one subsample over another.

	% of Realized Impairment Sample in Each Decile					
	(1)		(2)		(3)	
	CAR Only		CAR Exclusion		Full Model	
Decile of model's predicted probability of impairment	Acquirer CAR		Deal & Firm Characteristics		Acquirer CAR & Deal/Firm Characteristics	
Panel A: Stock vs. Cash Transactions						
	Stock	Cash	Stock	Cash	Stock	Cash
Decile 8+9+10 (High Predicted)	37%	32%	43%	46%	44%	45%
Decile 1+2+3 (Low Predicted)	29%	29%	16%	18%	13%	19%
Difference	8%	3%	28%	28%	31%	26%
Test: Difference b/t Subsamples for CAR Only Model (*p*-value)	0.8853					
Panel B: Public vs. Private Target Transactions						
	Public	Private	Public	Private	Public	Private
Decile 8+9+10 (High Predicted)	42%	34%	56%	46%	58%	44%
Decile 1+2+3 (Low Predicted)	22%	31%	10%	16%	10%	16%
Difference	20%	2%	46%	31%	48%	29%
Test: Difference b/t Subsamples for CAR Only Model (*p*-value)	0.0031					
Panel C: Large vs. Small Acquirers						
	Large	Small	Large	Small	Large	Small
Decile 8+9+10 (High Predicted)	42%	33%	48%	44%	48%	42%
Decile 1+2+3 (Low Predicted)	25%	32%	19%	21%	16%	21%
Difference	17%	1%	29%	24%	32%	22%
Test: Difference b/t Subsamples for CAR Only Model (*p*-value)	0.0062					
Panel D: Large vs. Small Transactions						
	Large	Small	Large	Small	Large	Small
Decile 8+9+10 (High Predicted)	38%	34%	51%	43%	55%	43%
Decile 1+2+3 (Low Predicted)	26%	31%	14%	20%	14%	21%
Difference	12%	3%	37%	23%	40%	22%
Test: Difference b/t Subsamples for CAR Only Model (*p*-value)	0.0821					

	% of Realized Impairment Sample in Each Decile					
	(1)		(2)		(3)	
	CAR Only		CAR Exclusion		Full Model	
Decile of model's predicted probability of impairment	Acquirer CAR		Deal & Firm Characteristics		Acquirer CAR & Deal/Firm Characteristics	
Panel E: Large vs. Small Relative Size Transactions						
	Large	Small	Large	Small	Large	Small
Decile 8+9+10 (High Predicted)	34%	37%	47%	46%	50%	45%
Decile 1+2+3 (Low Predicted)	28%	31%	20%	17%	18%	18%
Difference	5%	6%	27%	29%	32%	27%
Test: Difference b/t Subsamples for CAR Only Model (p-value)	0.8708					
Panel F: Unrelated vs. Related Industry Transactions						
	Un-related	Rel-ated	Un-related	Rel-ated	Un-related	Rel-ated
Decile 8+9+10 (High Predicted)	35%	36%	50%	49%	52%	48%
Decile 1+2+3 (Low Predicted)	30%	29%	16%	19%	16%	18%
Difference	5%	7%	34%	30%	35%	30%
Test: Difference b/t Subsamples for CAR Only Model (p-value)	0.4197					
Panel G: Non- vs. High-Tech Industry Transactions						
	Non	High	Non	High	Non	High
Decile 8+9+10 (High Predicted)	40%	34%	48%	46%	47%	45%
Decile 1+2+3 (Low Predicted)	29%	29%	18%	16%	19%	17%
Difference	11%	5%	30%	30%	28%	28%
Test: Difference b/t Subsamples for CAR Only Model (p-value)	0.2582					
Panel H: High vs. Low Tobin's q						
	High	Low	High	Low	High	Low
Decile 8+9+10 (High Predicted)	35%	37%	45%	44%	45%	46%
Decile 1+2+3 (Low Predicted)	29%	28%	13%	19%	13%	17%
Difference	6%	9%	32%	25%	33%	30%
Test: Difference b/t Subsamples for CAR Only Model (p-value)	0.1355					

Table XI

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 and zero otherwise. '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. We track CEO turnover events between deal announcement and four years subsequent to the first impairment event. Statistics for turnover events are also shown for two periods: 1) turnover events occurring in the year of or the year following the deal effective year and 2) turnover events occurring in the year of or the year following the year of the goodwill impairment year. Panel A shows statistics for the full sample of goodwill impairment firms. Panel B shows statistics for the above vs. below median predicted impairment by the Acquirer CAR only Model reported in Table VIII.

Panel A: Full Sample Results

	N=350	
	% Turnover	# Turnover
% Turnover Within Deal Announcement Year and Impairment Year + 4		
Total Sample	47%	163
Firms Subject to Internal Turnover	45%	136
Firms Subject to Takeovers	58%	22
Firms Subject to Bankruptcy	63%	5
% Turnover Year of or Year After Deal Effective Year (% of Total Sample)	6%	20
% Turnover Year of or Year After Impairment Year (% of Total Sample)	20%	69

Panel B: Above Median vs. Below Median Predicted Impairment in Acquirer CAR Only Model

	Above Median		Below Median		Difference	
	N=175		N=175			
	% Turnover	# Turnover	% Turnover	# Turnover	Mean	*p*-value
% Turnover Within Deal Announcement Year and Impairment Year + 4						
Total Sample	49%	86	44%	77	5%	0.3348
Firms Subject to Internal Turnover	46%	69	44%	67	2%	0.6620
Firms Subject to Takeovers	63%	12	53%	10	11%	0.5111
Firms Subject to Bankruptcy	83%	5	0%	0	83%	0.1071
% Turnover Year of or Year After Deal Effective Year (% of Total Sample)	7%	13	4%	7	3%	0.1671
% Turnover Year of or Year After Impairment Year (% of Total Sample)	19%	33	21%	36	-2%	0.6869

Table XII

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. We retain only one observation when an acquirer in the Impairment or Non-Impairment sample announces multiple transactions in the same year. This restriction reduces our sample from 1,958 to 1,837. 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 samples are based on the *t*-test. ***, **, and * stand for statistical significance at the 1%, 5%, and 10% level, respectively.

Year Relative to Deal Announcement	Non-Impairment Sample (N=1,453)	Impairment Sample (N=384)	Difference		Below Median Predicted Impairment (N=919)	Above Median Predicted Impairment (N=918)	Difference	
Industry-Adjusted Sales Growth								
T-2	3.2%	2.6%	0.6%		2.7%	3.4%	-0.7%	
T-1	2.7%	-0.4%	3.1%	**	2.7%	1.9%	0.8%	
T=0	4.7%	5.3%	-0.6%		6.1%	3.7%	2.5%	***
T+1	8.7%	7.3%	1.4%		10.0%	6.6%	3.4%	***
T+2	1.7%	-3.7%	5.4%	***	1.4%	0.0%	1.4%	
T+3	1.0%	-4.4%	5.4%	***	0.5%	-0.5%	1.0%	**
Industry-Adjusted COGS / Sales								
T-2	-3.3%	-0.3%	-3.1%	**	-2.1%	-3.1%	1.0%	
T-1	-3.2%	-0.1%	-3.1%	***	-1.6%	-3.1%	1.5%	
T=0	-2.7%	-0.4%	-2.4%	*	-1.6%	-2.8%	1.2%	*
T+1	-2.8%	0.2%	-3.0%	***	-0.9%	-2.7%	1.8%	**
T+2	-2.8%	2.1%	-4.9%	***	-0.7%	-2.2%	1.6%	**
T+3	-2.1%	1.8%	-3.9%	***	0.0%	-1.9%	1.9%	**
Industry-Adjusted SGA / Assets								
T-2	-2.0%	-0.8%	-1.2%		-1.2%	-2.3%	1.1%	
T-1	-2.3%	-1.2%	-1.1%		-1.9%	-2.2%	0.4%	
T=0	-3.4%	-2.7%	-0.8%		-3.3%	-3.4%	0.1%	
T+1	-3.2%	-1.7%	-1.4%	***	-2.8%	-2.9%	0.1%	
T+2	-3.0%	-0.7%	-2.4%	***	-2.6%	-2.6%	0.0%	
T+3	-2.9%	0.0%	-2.9%	***	-1.9%	-2.4%	0.5%	
Industry-Adjusted PPE Growth								
T-2	2.4%	0.7%	1.7%		2.2%	2.1%	0.1%	
T-1	2.1%	0.2%	1.9%		1.5%	1.7%	-0.2%	
T=0	9.4%	11.4%	-2.0%		10.3%	8.8%	1.6%	*
T+1	3.2%	-0.9%	4.2%	***	3.4%	1.5%	1.9%	**
T+2	1.1%	-4.6%	5.7%	***	0.9%	0.0%	0.9%	
T+3	0.9%	-4.5%	5.4%	***	0.2%	-0.9%	1.1%	**
Industry-Adjusted FCF / Assets								
T-2	2.1%	1.1%	1.0%	***	2.0%	1.9%	0.2%	
T-1	2.4%	1.1%	1.2%	***	2.1%	2.1%	0.0%	
T=0	1.5%	-0.8%	2.2%	***	1.2%	0.9%	0.3%	**
T+1	1.2%	-1.5%	2.6%	***	1.1%	0.3%	0.8%	**
T+2	1.3%	-2.3%	3.5%	***	0.9%	0.5%	0.4%	
T+3	1.4%	-2.1%	3.6%	***	1.1%	0.9%	0.2%	

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	2.8%	1.2%	1.5%	***	2.4%	2.5%	-0.1%	
T-1	2.9%	0.9%	2.0%	***	2.7%	2.4%	0.3%	
T=0	1.4%	-0.7%	2.2%	***	1.2%	0.9%	0.3%	
T+1	1.7%	-0.5%	2.2%	***	1.6%	0.9%	0.8%	**
T+2	1.8%	-0.6%	2.4%	***	1.4%	1.1%	0.3%	
T+3	1.8%	-0.9%	2.7%	***	1.5%	1.1%	0.4%	
Industry-Adjusted ROE								
T-2	3.0%	1.2%	1.8%	***	2.7%	2.7%	0.0%	
T-1	3.3%	1.3%	2.1%	***	2.6%	3.1%	-0.5%	
T=0	2.1%	-0.8%	2.8%	***	1.6%	1.1%	0.4%	*
T+1	1.6%	-4.3%	5.9%	***	0.9%	0.5%	0.5%	**
T+2	1.8%	-6.5%	8.3%	***	0.9%	0.0%	0.9%	
T+3	1.9%	-6.3%	8.1%	***	0.4%	0.3%	0.1%	
Industry-Adjusted Tobin's q								
T-2	13.3%	-1.5%	14.8%	***	9.9%	11.3%	-1.4%	
T-1	12.9%	-1.0%	13.9%	***	10.2%	10.4%	-0.2%	
T=0	4.5%	-13.4%	18.0%	***	3.1%	-2.1%	5.3%	*
T+1	0.8%	-24.7%	25.5%	***	-4.2%	-6.4%	2.2%	
T+2	0.0%	-25.6%	25.6%	***	-5.0%	-8.7%	3.7%	
T+3	1.0%	-22.0%	23.0%	***	-2.2%	-5.7%	3.5%	
Industry-Adjusted Earnings / Price								
T-2	1.2%	1.3%	-0.1%		1.2%	1.3%	-0.1%	
T-1	1.2%	0.8%	0.3%	*	1.2%	1.1%	0.1%	
T=0	0.9%	0.1%	0.8%	***	0.8%	0.8%	0.0%	
T+1	0.7%	-1.1%	1.7%	***	0.6%	0.2%	0.4%	*
T+2	0.7%	-3.8%	4.4%	***	0.2%	0.3%	0.0%	
T+3	0.6%	-2.6%	3.2%	***	0.2%	0.3%	0.0%	
Industry-Adjusted Buy-and-Hold 1-Year Returns								
T-2	9.0%	-2.9%	12.0%	***	6.6%	6.1%	0.5%	
T-1	7.0%	3.2%	3.8%		6.0%	6.9%	-0.9%	
T=0	3.9%	-13.4%	17.3%	***	7.3%	-3.9%	11.1%	***
T+1	6.8%	-10.7%	17.5%	***	3.6%	3.2%	0.4%	
T+2	5.9%	-7.4%	13.3%	***	2.1%	4.1%	-2.0%	
T+3	6.0%	-7.3%	13.4%	***	0.9%	5.1%	-4.3%	*

Table XIII
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 CAR Only Model described in Table VIII. We retain only one observation when an acquirer in the Impairment or Non-Impairment sample announces multiple transactions in the same year. This restriction reduces our sample from 1,958 to 1,837. Percentages are based on 1,453 total transactions in the Non-Impairment sample and 384 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 Impairment		Above Median Predicted Impairment		Difference	
	#	%	#	%			#	%	#	%		
Merged/Went Private	520	35.8%	101	26.3%	-9.5%	***	312	33.6%	309	34.0%	0.4%	ns
Delisted	43	3.0%	32	8.3%	5.4%	***	38	4.1%	37	4.1%	0.0%	ns
Bankrupt/Liquidated	7	0.5%	10	2.6%	2.1%	***	8	0.9%	9	1.0%	0.1%	ns

Table XIV

Robustness: Univariate Acquirer and Target Combined Returns

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 and *p*-values are reported. '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. Panels A, B, and C show summary statistics for target, acquirer, and combined target and acquirer returns, respectively. Panel D reports statistics on the relation between combined announcement return and the magnitude of the impairment loss for the subsample of transactions with negative Combined CAR [-1, 1]. ***, **, 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=77)		Non-Impairment Sample (N=301)		Difference	
	(1)		(2)		(1)-(2)	*p*-value
Panel A: Target Announcement Returns						
Target CAR [-1,1]	19.1%	***	27.5%	***	-8%	<.0001
% CAR [-1,1] Positive	93.5%		94.4%		-1%	0.7872
Target $ Return at Announcement [-1, 1]	291.6		302.2		-10.6	0.8991
Panel B: Acquirer Announcement Returns						
Acquirer CAR [-1,1]	-3.8%	***	0.0%	ns	-4%	0.0011
% CAR [-1,1] Positive	33.8%		48.5%		-15%	0.0180
Acquirer $ Return at Announcement [-1, 1]	-209.4		-146.3		-63.1	0.6728
Panel C: Combined Announcement Return and Impairment Outcome						
Combined % Return [-1,1]	1.7%	*	3.7%	***	-2%	0.0780
Combined % Return [0,0]	1.7%	*	2.6%	***	-1%	0.3409
Combined % Return [0,1]	2.0%	**	3.7%	***	-2%	0.1329
Combined % Return [-5,5]	2.3%	**	3.9%	***	-2%	0.1920
Combined % Return [Ann.-2, Close+2]	4.3%	ns	2.6%	**	2%	0.5875
% CAR [-1,1] Positive	59.7%		64.5%		-5%	0.4537
Combined $ Return [-1,1]	82.2		155.9		-73.7	0.5872
Panel D: Combined Announcement Return and Magnitude of Impairment - CAR < 0 Sample						
$ Goodwill [GW]	1,342.3		1,179.0		163.3	0.7976
Combined $ Loss at Announcement *	-379.3		-474.2		94.8	0.7318
$ Goodwill - Combined $ Loss *	980.1		782.3		197.8	0.6456
% Goodwill Ex-ante "Good" ((GW - Combined Loss)/GW) *	65%		51%		14%	0.0499
Impairment $ Loss	-1,033.6		0.0		-1,033.6	
Goodwill Ex-post "Good" (GW $ - Impairment $)	308.7		1,179.0		-870.3	
% Goodwill Ex-post "Good" ((GW $ - Impairment $)/GW $)	21%		100%		-79%	

** Combined $ Loss is Combined $ Return [-1,1] when CAR <0.*

Table XV
Robustness: Logit with Combined Announcement Returns

This table reports logit regressions with the goodwill impairment dummy as the dependent variable and combined target and acquirer percent cumulative abnormal returns (CARs) over various windows surrounding the deal announcement as the key independent variable of interest. 'Combined CAR' is the sum of 'Acquirer $ Return' and 'Target $ Return' scaled by the sum of acquirer and target market capitalization 50 days prior to announcement. 'Acquirer $ Return' ('Target $ Return') is computed by multiplying 'Acquirer CAR' ('Target CAR') by the acquirer (target) market capitalization 50 days prior to announcement. All regressions include deal and firm 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.

Dependent Variable	Goodwill Impairment Dummy				
	(1)	(2)	(3)	(4)	(5)
CAR Window	[-1,1]	[0,0]	[0,1]	[-5,5]	[Ann.-2, Close+2]
Combined % CAR	-2.70	-1.03	-2.42	-1.85	-0.24
	(0.214)	(0.716)	(0.270)	(0.278)	(0.742)
Log Deal Value ($B)	0.80**	0.79**	0.79**	0.82**	0.79**
	(0.013)	(0.016)	(0.014)	(0.012)	(0.017)
Log Acquirer Market Cap ($B)	-0.87***	-0.86***	-0.87***	-0.90***	-0.87***
	(0.003)	(0.003)	(0.003)	(0.002)	(0.004)
Relative Size	0.08	0.06	0.09	0.04	0.05
	(0.858)	(0.893)	(0.849)	(0.930)	(0.919)
Stock Dummy	-0.24	-0.20	-0.23	-0.22	-0.19
	(0.472)	(0.554)	(0.486)	(0.503)	(0.572)
Related Dummy	0.11	0.09	0.11	0.10	0.08
	(0.762)	(0.798)	(0.757)	(0.781)	(0.830)
# of Bidders	-0.32	-0.34	-0.34	-0.31	-0.33
	(0.599)	(0.574)	(0.585)	(0.610)	(0.592)
Unsolicited	0.39	0.35	0.37	0.34	0.36
	(0.674)	(0.704)	(0.686)	(0.715)	(0.696)
Hostile	-0.43	-0.42	-0.41	-0.41	-0.49
	(0.679)	(0.687)	(0.691)	(0.702)	(0.647)
Goodwill/Purchase Price	2.43***	2.39***	2.43***	2.40***	2.39***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Constant	-0.72	-0.75	-0.73	-0.60	-0.70
	(0.566)	(0.547)	(0.563)	(0.634)	(0.590)
Observations	359	359	359	359	359
Pseudo R2	0.217	0.213	0.216	0.215	0.212
Year and Industry Controls	YES	YES	YES	YES	YES

Table XVI

Robustness: Excluding Crisis Impairments

Panel A replicates Table VII Panel A, yet excludes crisis period impairments. Transactions that impair for the first time during 2008 and 2009 are excluded from the sample, resulting in 207 transactions with goodwill impairments. 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. Results are reported using five different event windows to estimate acquirer cumulative abnormal returns. All regressions include deal amd firm characteristics and industry and deal effective year fixed effects. *p*-values are reported in parentheses under coefficients. Panel B replicates the results of Table VIII, yet excludes crisis period impairments. ***, **, and * stand for statistical significance at the 1%, 5%, and 10% level, respectively.

Panel A: Goodwill Impairments Probability and Acquirer Announcement Returns

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	-2.03**	-2.48	-1.83*	-1.58**	-0.71*
	(0.029)	(0.114)	(0.055)	(0.014)	(0.092)
	-0.20%	*-0.24%*	*-0.18%*	*-0.16%*	*-0.07%*
Log Deal Value ($B)	0.38***	0.37***	0.37***	0.37***	0.40***
	(0.000)	(0.001)	(0.000)	(0.000)	(0.000)
Log Acquirer Market Cap ($B)	-0.58***	-0.57***	-0.58***	-0.58***	-0.61***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Relative Size	0.09	0.09	0.09	0.09	0.02
	(0.309)	(0.271)	(0.302)	(0.284)	(0.825)
Stock Dummy	0.16	0.16	0.16	0.15	0.14
	(0.340)	(0.344)	(0.333)	(0.354)	(0.401)
Related Dummy	-0.24	-0.24	-0.24	-0.25	-0.25
	(0.151)	(0.148)	(0.145)	(0.125)	(0.127)
# of Bidders	0.70	0.72	0.71	0.73	0.63
	(0.181)	(0.170)	(0.180)	(0.168)	(0.270)
Unsolicited	-0.60	-0.65	-0.63	-0.74	-0.45
	(0.483)	(0.449)	(0.461)	(0.393)	(0.560)
Hostile	-0.50	-0.46	-0.50	-0.44	-0.56
	(0.713)	(0.735)	(0.710)	(0.742)	(0.671)
Public Target	-0.19	-0.16	-0.17	-0.15	-0.13
	(0.424)	(0.488)	(0.459)	(0.514)	(0.568)
Goodwill/Purchase Price	0.80**	0.82**	0.80**	0.79**	0.82**
	(0.024)	(0.018)	(0.022)	(0.023)	(0.018)
Constant	-0.83	-0.95	-0.86	-0.83	-0.69
	(0.258)	(0.197)	(0.247)	(0.263)	(0.372)
Observations	1,735	1,735	1,735	1,735	1,734
Pseudo R2	0.0762	0.0748	0.0753	0.0763	0.0729
Year and Industry Controls	YES	YES	YES	YES	YES

Panel B: Prediction of Goodwill Impairment Using Acquirer Announcement Returns					
	(1)	(2)	(3)	(4)	(5)
	CAR Only Model	CAR Exclusion Model	Full Model	CAR Exclusion Model	Full Model
Independent Variables Included in Regression	Acquirer CAR	Deal and Firm Characteristics	Acquirer CAR and Deal/Firm Characteristics	Deal/Firm Characteristics, Industry, and Year Controls	Acquirer CAR, Deal/Firm Characteristics, Industry, and Year Controls
Decile of model's predicted probability of impairment	% With Realized Impairment in Each Decile				
1: Low Predicted Probability	12%	4%	5%	4%	3%
2	12%	6%	5%	4%	5%
3	8%	5%	4%	4%	4%
4	9%	8%	7%	5%	6%
5	9%	8%	9%	10%	7%
6	5%	9%	9%	9%	8%
7	12%	11%	12%	11%	13%
8	8%	13%	12%	11%	12%
9	11%	13%	13%	16%	15%
10: High Predicted Probability	14%	24%	24%	26%	27%
Total	100%	100%	100%	100%	100%
Decile 8+9+10 (High Predicted)	34%	50%	49%	53%	54%
Decile 1+2+3 (Low Predicted)	31%	15%	14%	13%	13%
Difference	2%	35%	35%	40%	41%