

The Underlying Economic Components of Acquired Goodwill

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ABSTRACT

In this study, we investigate what makes up acquired goodwill and find that it consists of at least three distinct components: expected synergies from combining the assets of the target and acquirer, the going concern value of the target firm, and overpayment. We identify these components empirically through a factor analysis on target, acquirer, and acquisition characteristics. We then document that acquired goodwill is positively associated with the synergy value, going concern value, and residual components. Further, we predict and find that going concern value and expected synergies are associated with a lower risk of future goodwill impairment, but that synergies reduce the risk of goodwill impairment more than the going concern value component. We also find that overpayment is associated with a greater risk of future goodwill impairment. The evidence we provide on the nature of acquired goodwill is important to understand how to account for goodwill subsequent to the acquisition, as each of these components have a different effect on the future cash inflows to the entity. Our findings suggest that a one-size-fits-all subsequent accounting alternative for goodwill may be difficult to apply due to heterogeneity in the economic components of goodwill.

Keywords: Goodwill, Business Combinations, Mergers, Acquisitions, Synergies

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I. INTRODUCTION

Accounting for business combinations is among the most long-standing and controversial financial reporting problems in accounting standard setting. Recurring questions raised by standard setters, investors, auditors, and preparers center on how to account for acquired goodwill. More specifically, some question whether to recognize goodwill as an asset, and if so, how well subsequent accounting for goodwill (i.e., alternative amortization and impairment methods) reflects patterns of future benefit and decline in the value of goodwill over time. Much of the prior literature on accounting for goodwill offers mixed evidence and limited insights into these fundamental questions.¹ The objective of this paper is to provide new empirical evidence that advances the literature through a series of analyses of the underlying economic factors that give rise to goodwill.

First, we design an analysis to identify distinct underlying goodwill components put forth by standard-setters, which include synergy value, going concern value, and a residual component that arises from overpayment and overvaluation of stock-based consideration. Second, we test whether there is empirical evidence that goodwill reflects these distinct components. Finally, we test whether and how each underlying component relates to future benefits from and declines in value of goodwill through an analysis of goodwill impairments.

The evidence we provide in this paper is important for several reasons. Goodwill is most often the largest asset recorded in business combination transactions and represents greater than \$3.0 trillion of total assets reported by U.S. Fortune 500 companies as of 2018 (Calcbench 2019).

¹ See Jennings, Robinson, Thompson, and Duvall (1996), Henning, Lewis, and Shaw (2000), Moehrlé, Reynolds-Moehrlé, and Wallace (2001), Hirschey and Richardson (2002), Beatty and Weber (2006), Bugeja and Gallery (2006), Bens, Heltzer, and Segal (2011), Gu and Lev (2011), Ramanna and Watts (2012), Li and Sloan (2017), and Wangerin (2019).

In 2017, U.S. companies added more than \$300 billion in goodwill to their balance sheets, while the average goodwill impairment charge increased by 21% to \$120 million per firm (Duff & Phelps 2018). Given the increasing importance of accounting for goodwill, the FASB issued an invitation to comment in 2019 seeking input on what goodwill represents, what items should be included in acquired goodwill, and whether goodwill amortization is a cost-beneficial alternative to the current impairment-only model for public companies under U.S. GAAP (FASB 2019). Similarly, the IASB issued a discussion paper seeking feedback on the sufficiency of disclosures related to goodwill, the costs/benefits of the current impairment-only test, and the possibility of reintroducing amortization (IASB 2020). Our research provides timely evidence that informs these important policy questions and that advances the literature.

At the time the FASB issued SFAS 141 and 142, the Board accepted the view that goodwill is an asset made up of several distinct underlying components (FASB 2001a; FASB 2001b; Johnson and Petrone 1998). Prior research provides limited empirical evidence about whether underlying goodwill components exist, and, if so, whether they are reflected in reported goodwill balances (Henning, Lewis, and Shaw 2000). Therefore, our first analysis attempts to identify empirically the synergy value, going concern value, and residual components of goodwill. Synergies arise from the combination of the target and acquiring firm that together produce value incremental to what could otherwise be achieved by the firms operating as separate standalone entities (Johnson and Petrone 1998; Chatterjee 1986). Going concern value arises from the target firm's ability to "earn a higher rate of return on an organized collection of net assets than would be expected if the assets were acquired separately" (Johnson and Petrone 1998, 295). The residual component of goodwill consists of overpayment by the acquirer (i.e., paying too much to acquire the target) or using overvalued equity shares in acquisitions involving stock-based consideration.

We conduct our analysis using a sample of 437 M&A transactions completed between 2009 and 2016 where both the acquiring and target firms are U.S. public companies. If synergy value, going concern value, and residual components of goodwill exist, these components are unobservable. Therefore, we perform a factor analysis to identify common variation among target firm, acquiring firm, and transaction characteristics identified in prior research that we expect are correlated with the synergy value, going concern value, and residual goodwill components. The firm and transaction characteristics we incorporate in the factor analysis are guided by economic theory from prior research and generate five distinct factors that explain nearly 90 percent of the common variation in the data. We interpret the factor loadings on the underlying variables to identify two synergy value factors (i.e., target-acquirer complementarities and resource availability), two going concern value factors (i.e., target firm competitive advantages and barriers to entry), and one residual component factor (i.e., acquirer incentives for overpayment).

We use the factor scores from this analysis as proxies for latent variables that capture the synergy value, going concern value, and residual value components of goodwill. Within the sample of acquisitions, we then regress the percentage of the purchase price allocated to goodwill on the factor scores to test whether goodwill reflects underlying synergy value, going concern value, and residual components. After controlling for acquiring firm characteristics and variation in goodwill across industries and over time, we find that each factor exhibits a positive and significant association with goodwill. These results provide support for the view held by standard-setters that goodwill is comprised of underlying components that include synergy value, going concern value, and an overpayment residual (Johnson and Petrone 1998).

The differing properties of the synergy value, going concern value, and residual components suggest that there is heterogeneity in the pattern of future benefit and decline in the

value of goodwill over time. Moreover, there is heterogeneity in the relative composition of each underlying goodwill component that varies across firms and acquisitions. Therefore, we estimate a hazard model regression to test a series of hypotheses that predict that the timing and likelihood (i.e., risk) of future goodwill impairments differ across goodwill components. First, we predict and find that the risk of future goodwill impairment decreases with higher levels of synergy value and going concern value in goodwill. Second, we predict and find that the risk of future goodwill impairment increases when the residual component of goodwill is higher. We also predict and find that competition erodes away the future benefits and value of the going concern component of goodwill more quickly than the synergy value of goodwill. Based on the argument that the residual component of goodwill does not possess the characteristics of an asset (i.e., there are no future benefits), we predict and find that the residual component is associated with a significantly higher risk of goodwill impairment than the synergy and going concern components. These results provide further corroborating evidence that suggests goodwill is comprised of underlying components, and that the goodwill components are associated with differential patterns of future benefit and decline in value.

Our findings contribute to the literature in several ways. We are aware of only a single study published to date that examines the underlying components of goodwill empirically (Henning et al. 2000). It is important to note that Henning et al. (2000) explicitly assumes that goodwill is comprised only of a synergy value, going concern value, and residual component, and tests whether investors price those components of goodwill. Further, Henning et al. (2000) relies on market valuations over short windows surrounding the acquisition announcement date to construct empirical proxies for the synergy, going concern, and residual goodwill components. This approach assumes semi-strong form market efficiency and the availability of information

relevant to investors' assessments of goodwill *well before* the acquisition is completed and the amount of goodwill is recognized and disclosed in financial statements. In contrast to these assumptions, Ben-David, Bhattacharya, and Jacobsen (2020) find that the market fails to form accurate expectations about deal value creation/destruction at the announcement date of an acquisition, and that short-window acquisition announcement returns are poor predictors of future goodwill impairment.

Our research design does not rely on information reflected in stock prices, and is instead guided by economic theory that target firm, acquiring firm, and transaction characteristics should capture the sources of synergy value, going concern value, and residual components of goodwill – *if* those components exist and can be identified empirically. Moreover, our research design does not assume that goodwill is comprised only of synergy value, going concern value, and residual components. Rather, we allow for the possibility that only some, or none, of these underlying components are reflected in goodwill. We view our approach as providing the first assessment about the composition of goodwill and find that it reflects synergies, going concern value, and residual components, but we acknowledge the possibility that there are additional components of goodwill that are not captured by our research design.

These findings also help to reconcile evidence in prior research about whether goodwill consistently exhibits the characteristics of an asset over time (Bugeja and Gallery 2006; Wangerin 2019). Specifically, the synergy and going concern components of goodwill are expected to produce future cash inflows under control of the entity, whereas there is no expectation of future cash inflows from the residual component. Our findings that the residual component is associated with a higher risk of future goodwill impairment, whereas the synergy and going concern

components reduce impairment risk, provide an explanation for the mixed evidence in prior research.

Our findings also are relevant to standard setters. Specifically, our research suggests that in any acquisition, goodwill can be comprised of three components in differing amounts with differing relationships with its decline in value. This highlights the difficulty standards setters continue to face in selecting a one-size-fits-all approach to the subsequent accounting for goodwill that faithfully represents its initial and subsequent change in value. This observation is exacerbated by the fact that, while our evidence suggests that there are three components of goodwill, there is no basis for measuring these components separately at the time of acquisition and subsequently.

Finally, prior research on goodwill has focused on financial reporting, tax, and compensation incentives as determinants of allocations to goodwill and future impairment recognition (Beatty and Weber 2006; Ramanna and Watts 2012; Shalev, Zhang, and Zhang 2013). This line of research suggests that managers make discretionary allocations to goodwill to report higher post-acquisition earnings and to increase earnings-based incentive compensation. In contrast, managers allocate less to goodwill when faced with incentives to increase post-acquisition tax savings (Lynch, Romney, Stomberg, and Wangerin 2019). We add to this line of research by demonstrating that the underlying economic components are determinants of amounts allocated to goodwill, which differs from prior research that focuses on managers' use of discretion in goodwill accounting.

II. GOODWILL COMPONENTS ANALYSIS

Accounting for Goodwill and Defining Underlying Components

Current accounting for business combinations under ASC Topic 805 requires application of the acquisition method of accounting (FASB 2020). This method requires recognition of all identifiable assets acquired and liabilities assumed in a business combination at acquisition date fair value. The goodwill recognized in the acquisition is what remains of the purchase price after deducting the fair value of the acquired identifiable assets and liabilities. In many acquisitions, goodwill is the single largest asset recognized, and generally ranges between 40% to 50% of the purchase price across industries (Houlihan Lokey 2018).

Standard-setters and academics agree that goodwill comprises of some or all of the following components: (1) the difference between the fair value and book value of the acquiree's net assets, (2) the fair value of the acquiree's net assets not recognized separately on the acquirer's balance sheet, (3) the fair value of the going concern element of the acquiree's business, (4) the fair value of expected synergies arising from the combination of the acquirer's and acquiree's assets, (5) overpayment by the acquirer, and (6) overvaluation of stock-based consideration (FASB 2001b; FASB 2007; Johnson and Petrone 1998).

SFAS 141R attempts to reduce the extent to which components (1) and (2) are included in the goodwill balance by requiring acquirers to recognize at fair value all net assets acquired in a business combination and to recognize all material identifiable intangibles acquired (FASB 2007). This leaves components (3) through (6) as the primary components of goodwill identified by standard setters; component (3) going concern value and component (4) synergy value when combined is commonly referred to as "core goodwill" (Johnson and Petrone 1998).

Synergy value arises through the combination of the acquiring and target firms' operations so that "the combined entity can enjoy reduced costs, charge higher prices for its products, or both" (Chatterjee 1986, 119). In other words, synergies reflect incremental value achieved through the

business combination that could not be achieved otherwise by the target and acquirer operating as standalone businesses. Synergies are typically classified as operating or financial. For example, operating synergies can arise from cost reductions (e.g., eliminating redundant costs, exploiting economies of scale), revenue enhancements (e.g., cross-marketing to existing customers), or both. Financial synergies arise commonly through reducing the cost of capital and from tax planning strategies.

Going concern value is defined as “the ability of the acquiree as a stand-alone business to earn a higher rate of return on an organized collection of net assets than would be expected if those net assets had to be acquired separately” (Johnson and Petrone 1998, 295). Said differently, going concern value reflects how the assets deployed within the target firm’s business create an ability to earn abnormal profits, including the effects of barriers to entry on potential competitors.

Component (5) overpayment by the acquirer and component (6) overvaluation of stock-based consideration when combined is commonly referred to as the residual component of goodwill. Overpayment by acquirer can “occur when the price is driven up in the course of bidding for the acquiree (conversely, goodwill might be understated if the acquiree’s net assets were obtained through a distress or fire sale)” (Johnson and Petrone 1998, 295). Overvaluation of consideration stems from “possible errors in valuing the purchase consideration, such as an all-stock transaction in which the value placed on the consideration is based on the current market price of the stock and the number of shares being traded daily is small relative to the number of shares issued in the combination (because imputing the current market price to all of the shares issued to effect the combination might produce a higher value than if those shares were sold for cash and the cash was then used to effect the combination)” (Johnson and Petrone 1998, 295).

The only study in prior research of which we are aware that examines the underlying components of goodwill is Henning, Lewis, and Shaw (2000). This study explicitly assumes that goodwill is comprised of distinct synergy, going concern, and residual components, and seeks to establish whether each component is associated with acquiring firm equity prices. The research design disaggregates the total amounts of reported goodwill into these three components, all of which are constructed based on equity market values of the acquiring and target firms over short windows surrounding the acquisition announcement date. Specifically, the going concern component is constructed as the difference between the target firm's market value six days before the first acquisition bid and the fair value of the net identifiable assets acquired. The synergy value component is defined as the combined net change in market value of the acquiring and target firm within the 11-day window around the deal announcement date. Lastly, the residual component is defined as the difference between total goodwill and the going concern and synergy components.

If strong assumptions about market efficiency fail to hold, this approach is likely to suffer from significant measurement error. It is also worth noting that there is limited publicly available information around the time of acquisition announcement relevant to valuing goodwill, and that much of the work to finalize the purchase price allocation occurs after deal completion. Several studies show that the average time between acquisition announcement and deal completion dates exceeds 100 days, and in many cases spans several fiscal quarters in large M&A transactions (Wangerin 2019; Marquardt and Zur 2015; Amel-Zadeh and Zhang 2015). Ben-David, Bhattacharya, and Jacobsen (2020) suggest that the market fails to form accurate expectations about deal value creation or destruction at the announcement date of an acquisition, and that deal announcement returns are poor predictors of future goodwill impairments. Ellahie and Zhang

(2000) also find that combined target-acquirer deal announcement returns are unrelated to future goodwill impairments and changes in acquirer post-acquisition operating performance.

Factor Analysis

We posit that a model of goodwill based on underlying economic characteristics of the acquirer, target, and the transaction will help us to better understand whether underlying components of goodwill exist, and if so, the sources of each component. Because the synergy value, going concern value, and residual components of goodwill are not directly observable, we perform a factor analysis on characteristics of the acquiring firm, target firm, and transaction that prior research suggests are correlated with the components of goodwill. Another advantage of factor analysis in this empirical setting is that many of the variables we describe below are multidimensional. Factor analysis extracts the dimensions that explain the common variation with other variables, including allowing the same variable to load with different signs in different factors. Therefore, factor analysis can reduce the effects of measurement error and allows for the possibility that individual variables explain multiple goodwill components.

Variable Selection

Prior research suggests that synergies arise from leveraging complementary acquiring and target firm characteristics to achieve improved profitability. Therefore, we first consider the target firm's profitability based on the inefficient management hypothesis in Palepu (1986) which suggests that one source of synergy arises from replacing inefficient managers in the market for corporate control. To capture target firm profitability, we include in the factor analysis the target firm's industry adjusted profit margin (*Tar_IA_Profit*).² To the extent that industry-adjusted profit margins capture operating performance, lower (greater) profit margins provide greater (lower)

² Refer to the Appendix for variable definitions.

potential for improvements in operations that can be achieved through operating or financial synergies.

Harrison, Hitt, Hoskisson, and Ireland (1991) find that resource complementarity is related to greater post-acquisition performance, consistent with synergy realization. Following Harrison et al. (1991), we capture resource complementarity using the absolute difference prior to the acquisition between the following acquiring and target firm resource-related characteristics: R&D expense over total revenues (*RD_Comp*), capital expenditures over total revenues (*Capx_Comp*), and SG&A expense over total revenues (*SGA_Comp*). Larger absolute differences in these firm characteristics reflect greater potential operating synergies through cost reductions and/or revenue improvements. We also consider the potential benefits of financial synergies with the absolute difference between acquirer and target firm debt intensity (*Debt_Comp*), where we measure debt intensity as interest expense over total revenues (Harrison et al. 1991) and target firm tax credit carryforwards (Hayn 1989). Tax benefits arise in tax-free acquisitions from NOL carryforwards and unused investment and foreign tax credits that can be utilized in the future to reduce post-acquisition taxable income. We use the target firm's NOL carryforwards (*Tar_NOL*) as a proxy for potential tax benefits.

Realization of operating and financial synergies also depend on resources available to invest within the firm to integrate operations and redeploy assets more efficiently. Palepu (1986) shows that an imbalance of leverage, liquidity, and growth opportunities are important forces in the market for corporate control. Therefore, we include *Leverage*, *Liquidity* and *Growth* for both the target and acquiring firms. All else equal, the availability of liquid assets for discretionary investment increases the likelihood of achieving operating and financial synergies.

Turning to the going concern value of the target firm, we select a set of variables shown in prior research to be associated with abnormal profits realized by exploiting a firm's competitive advantages and barriers to entry that reduce the threat of new entrants to the marketplace. Dickinson and Sommers (2012) show that several variables capturing firms' competitive advantages are associated with abnormal profitability. These variables include innovation intensity (*Tar_Innovation*), capital intensity (*Tar_Capital_Intensity*), power over suppliers (*Tar_Power_Supp*), and power over customers (*Tar_AR_TO*). We also draw on prior research to include variables capturing barriers to entry that result in abnormal target firm profitability. Following Hou and Robinson (2006), we use the target firm's industry Herfindahl index (*Tar_Ind_Con*) as one proxy for barriers to entry. Consistent with Li (2010), we also incorporate several additional entry barrier variables reflecting start-up costs including industry weighted-average R&D (*Tar_Ind_RD*), capital expenditures (*Tar_Ind_Capx*), and PP&E (*Tar_Ind_PPE*). The ability for a target firm to earn abnormal profits through an organized collection of assets is also likely reflected in the firm's physical and human capital. Therefore, we also include in our factor analysis additional variables capturing the number of target firm employees (*Tar_Num_Emp*), firm age (*Tar_Firm_Age*), firm size (*Tar_Size*), and relative deal size (*Rel_Deal_Size*).

We select a set of variables shown in prior research to reflect overpayment and overvalued stock-based consideration that we expect are correlated with the residual component of goodwill. We begin with variables capturing incentives for overpayment and first consider pressure on short-term earnings. Specifically, we include in our analysis a variable capturing declining pre-acquisition sales growth for the acquiring firm (*Overpay_Incentive*). We also incorporate the Biddle, Hilary, and Verdi (2009) ex-ante measure of overinvestment likelihood (*Acq_Overfirm*),

based on the acquiring firm's relative levels of cash and leverage. We expect that firms with declining growth prospects and a high propensity to over-invest, are more likely to invest in negative NPV projects. We also include a variable capturing merger waves based on prior literature connecting periods of increased M&A activity to high premiums and poor M&A performance (e.g., Rhodes-Kropf, Robinson, and Viswanathan 2005; Shleifer and Vishny 2003; Duchin and Schmidt 2013). Thus, we include the log of the number of deals initiated in the acquirer's 2-digit SIC in the acquisition announcement year (*ln_Dealvolume*) as a proxy for merger activity.

Myers and Majluf (1984) predict that firms with overvalued stock are more likely to make acquisitions using overvalued stock as currency. Therefore, we use the percentage of consideration paid in stock (*Stock*) as a proxy for overvaluation of consideration in our analysis. Gu and Lev (2011) construct an index of share overpricing in acquisitions involving stock-based consideration and find that overvalued shares are associated with future goodwill impairments. Therefore, we incorporate the variables that Gu and Lev (2011) use to construct their overvaluation index including the acquiring firm's industry-adjusted P/E ratio (*Acq_PE_Adj*) and an indicator for prior equity issuance (*Acq_Equity_Issuance*).

Sample and Data

We use a proprietary purchase price allocation dataset maintained by Houlihan Lokey with a large sample of acquisitions completed by U.S. companies. Our sample begins with 3,774 deals in the Houlihan Lokey dataset completed between 2009 and 2016. We begin our sample in 2009 because SFAS 141R changed the accounting for identifiable intangibles – and consequently the residual allocated to goodwill – for fiscal years beginning after December 15, 2008 (FASB 2007). We exclude from the sample: deals that cannot be matched with SDC (221 observations), deals with a private target or acquirer (3,041 observations), or deals without the necessary target and

acquirer data to construct our variables (77 observations). The resulting sample size is 437 acquisitions. See Table 1 for Panel A for a summary of the sample attrition.

Table 1 Panel B provides the composition of the sample by year the deal closed. The sample is evenly distributed throughout time, with the greatest number of observations in 2010. Table 1 Panel C provides the composition of the sample (target and acquirer) by 2-digit SIC code. Acquirers and targets are concentrated in several industries: electronic and other electrical equipment and components, chemicals and allied products, business services, and depository institutions, consistent with other recent studies (e.g., King, Linsmeier, and Wangerin 2020).

[INSERT TABLE 1 ABOUT HERE]

Descriptive Statistics

Table 2 provides descriptive statistics for each of the target, acquirer, and acquisition variables we include in the factor analysis. Target firm R&D expense and patent amortization as a percentage of net sales (*Tar_Innovation*) is 27.9 percent of sales at the mean, but 2.9 percent at the median, suggesting a positive skew. Target firms are on average (at the median) 22 (17) years old. The low value on *Tar_Ind_Con* (the Herfindahl index, ranging from 0 to 1) suggests that targets operate in an industry with a large number of small firms, as opposed to a small number of large firms. Finally, purchase consideration as a percentage of acquirer's market value (*Rel_Deal_Size*) is 72.3 (29.3) percent on average (at the median).

Target firm industry-adjusted profitability (*Tar_IA_Profit*) is negative at the mean and median, suggesting that most target firms are less profitable than their industry competitors. The descriptive statistics also show that targets and acquirers have higher average R&D (*RD_Comp*) and SG&A (*SGA_Comp*) complementarities than capital (*Capx_Comp*) and debt (*Debt_Comp*)

complementarities. Acquirers also exhibit higher growth and liquidity than target firms on average and at the median. Further, target and acquirer leverage (proxied by the debt-to-equity ratio) is negative on average, but positive at the median. The negative means are driven by acquirers and targets with large negative equity book values. Acquirers issue common stock as a percentage of total assets (*Acq_Equity_Issuance*) of 2.2 (0.6) percent on average (at the median) in the year prior to the acquisition. However, stock (*Stock*) makes up 20.65 percent of the purchase consideration on average but is zero at the median, suggesting that at least half of the deals in our sample do not use stock-based consideration.

[INSERT TABLE 2 ABOUT HERE]

Summary of Factors

Table 3 summarizes the results of the factor analysis. We allow for correlation among the factors because we have no theoretical reason to assume that synergy value, going concern value, and residual components of goodwill should be orthogonal. Our estimation produces five factors with Eigen values greater than 1.0 that collectively explain 88.7% of the common variation among the underlying variables. We report variables with absolute factor loadings greater than 0.40 and describe our interpretation of each distinct factor (Peterson 2000). The first factor has an Eigen value of 4.447 and explains 31.6% of the common variation in the data. We observe negative factor loadings on *Tar_IA_Profit* and *Tar_Num_Emp*, and positive factor loadings on the variables capturing acquirer-target complementarities *RD_Comp*, *Capx_Comp*, *SGA_Comp*, and *Debt_Comp*, as well as another positive factor loading on *Tar_NOL*. We interpret the factor loadings to capture synergies as higher factor scores will be produced in deals involving poorly performing targets with high target-acquirer complementarities, consistent with prior research (Palepu 1986; Hayn 1989; Harrison et al. 1991).

The second factor has an Eigen value of 3.281 and explains 23.3% of the common variation in the data. Here we observe positive factor loadings on *Tar_Liquidity*, *Acq_Liquidity*, and *Tar_AR_TO* and negative loadings on *Tar_Ind_Capx*, *Tar_Ind_PPE*, and *Tar_Num_Emp*. These results show that we will obtain higher factor scores for acquisitions in which the target and acquiring firm have more liquid resources available for investment and lower commitments for physical and human capital. We interpret this second factor to reflect another dimension of synergy value (e.g., resources available for investment).

[INSERT TABLE 3 ABOUT HERE]

The third and fourth factors have Eigen values of 2.032 and 1.441 and explain 14.4% and 10.2% of the common variation in the underlying data, respectively. The third factor exhibits positive loadings on *Rel_Deal_Size*, *Tar_AR_TO*, *Tar_Ind_Capx*, and *Tar_Ind_PPE* which we interpret to reflect a combination of target firm economies of scale, power over customers, and barriers to entry related to physical capital. The same barriers to entry reflected in *Tar_Ind_Capx*, and *Tar_Ind_PPE* also exhibit positive factor loadings in the fourth factor, which is the opposite sign to the loading on these variables in the third factor. Overall, we interpret the third and fourth factors to reflect the target going concern value component of goodwill as they are driven by economies of scale, target firms' competitive advantages, and industry barriers to entry. In combination, these underlying economic characteristics contribute to target firms' ability to earn abnormal profits. The fifth factor has an Eigen value of 1.294 and explains 9.2% of the common variation in the data. Two variables have large positive factor loadings and reflect acquiring firm incentives for growth *Acq_Growth* and overpayment *Overpay_Incentive*. This suggests that the fifth factor can be interpreted to reflect the residual component of goodwill.

We use the factor scores to test our hypotheses regarding whether goodwill reflects underlying components, and if so, whether there are differences in each component's relation to goodwill impairment.

III. HYPOTHESIS DEVELOPMENT

It is well-established in prior research that acquiring firms pay significant premiums in excess of 30% the target's market value to acquire control of M&A targets (e.g., Officer 2007; Betton et al. 2008). If acquiring firms obtain valuable private information about the target firm's assets during the due diligence process, they may determine that some portion of the acquisition premium is a result of the target firm's existing assets being undervalued by the market prior to the acquisition. Goodwill is the amount remaining after the acquiring firm allocates the purchase price to all of the acquired net assets using acquisition date fair value estimates. Therefore, the remaining unallocated portion of the purchase price recognized as goodwill reflects the portion of the premium paid by the acquirer in excess of the fair value of the target's individual net assets. The fact that goodwill is often the largest single asset recognized in an acquisition suggests that managers of acquiring firms believe additional returns can be generated by combining the firms' operations. Operating and financial synergies are possible sources of additional returns that explain the significant acquisition premiums documented in prior literature.

The going concern value of the target firm represents another possible explanation for acquisition premiums. This value increases when the target firm can realize abnormally higher profits from the assets deployed jointly in their operations than the return that could be achieved by the acquirer by obtaining each individual asset separately. Some sources of going concern value may not be recognized as assets in the target firm's financial statements or by the acquiring firm when applying the acquisition method of accounting. For example, the value of the target firm's

assembled workforce can be a highly valuable economic resource, but the value of human capital cannot be directly assigned to the value of any particular tangible or intangible asset. Going concern value also increases when the target firm has competitive advantages and when barriers to entry exist that enable the target firm to earn abnormal profits.

The acquisition method of accounting does not separately identify synergies or the going concern value of the target firm. Instead, assets are identified when they arise from (1) contractual or legal rights or (2) are separable from the entity (meaning that the asset can be sold, transferred, rented, licensed, or exchanged individually). The factors giving rise to goodwill fail to meet these criteria and, therefore, should be captured in the remaining amount of the purchase price after recognizing the net identifiable assets acquired at acquisition date fair value. If acquirers pay premiums to obtain synergies and for the going concern value of the target firm, then we expect to observe a positive association between goodwill and underlying factors reflecting synergy value and going concern value. This leads to H1a and H1b stated below in the alternative form:

***H1a:** Synergy value is positively associated with the amount of goodwill recognized in a business combination.*

***H1b:** Going concern value is positively associated with the amount of goodwill recognized in a business combination.*

However, prior research suggests that acquiring firm shareholders often perceive acquisitions as value-destroying and motivated by agency conflicts between managers and shareholders (Morck, Shleifer, and Vishny 1990; Moeller, Schlingemann, and Stulz 2005; Betton, Eckbo, and Thornburn 2008; Harford, Humphery-Jenner, and Powell 2012). Other research reaches similar conclusions about acquisitions, but attributes these findings to hubris or the

“winner’s curse” hypothesis in which prices are driven up in the course of competitive bidding to acquire the target firm, and the winning bidder is most likely to overpay (e.g., Roll 1986; Hansen and Lott 1991). In either case, this line of research suggests that in many acquisitions, premiums paid to target firm shareholders represent overpayment and that the acquisition will destroy rather than create value for the acquiring firm. Another line of research suggests that acquirers are more likely to make acquisitions using stock-based consideration when their shares are overvalued (Myers and Majluf 1984; Gu and Lev 2011). Consistent with these views, it is possible that goodwill might largely reflect overpayment or overvaluation of stock-based consideration. If that is the case, we may fail to find any evidence supporting H1a and H1b that goodwill reflects synergy value and going concern value. Johnson and Petrone (1998) consider either overpayment or overvalued stock-based consideration as a residual component of goodwill. This leads to H1c stated below in the alternative form:

***H1c:** Overpayment and overvaluation of stock-based consideration is positively associated with the amount of goodwill recognized in a business combination.*

The properties of the synergy value, going concern value, and residual components suggest that there is variation in the pattern of expected future cash flows from goodwill, and variation in the rate at which goodwill declines in value over time. This is the case because the composition of goodwill is likely to vary across firms and acquisitions if goodwill is made up of some mix of synergy value, going concern value, and residual components. Therefore, we make several hypotheses about the underlying components of goodwill and their relationship with the timing and likelihood (i.e., risk) of future goodwill impairments.

Goodwill impairments occur when the fair value of a reporting unit declines below its book value. When expected future cash flows are positive after an acquisition, the fair value of the

reporting unit is less likely to decrease, therefore reducing the risk of goodwill impairment. We expect both the synergy value and going concern value components of goodwill to be sources of expected future cash flows following an acquisition. However, we expect that no future cash flows will arise from overpayment or overvaluation of stock-based consideration. Prior research interprets goodwill as an ex post indicator revealing overpayment for an acquisition (e.g., Li, Shroff, Venkataraman, and Zhang 2011; Wangerin 2019). Therefore, we predict that the risk of future goodwill impairment will decrease with higher levels of synergy value and going concern value in goodwill. We also hypothesize that the risk of future goodwill impairment will increase when the residual component of goodwill is higher. These hypotheses are stated below in the alternative form:

***H2a:** The synergy value component of goodwill reduces the risk of future goodwill impairment.*

***H2b:** The going concern value component of goodwill reduces the risk of future goodwill impairment.*

***H2c:** The residual component of goodwill increases the risk of future goodwill impairment.*

We also make several predictions that the risk of goodwill impairment will vary across each goodwill component. Based on the argument that the residual component of goodwill does not possess the characteristics of an asset (i.e., there are no future benefits), we predict that the residual component is associated with a significantly higher risk of goodwill impairment than the synergy and going concern components. Prior research also suggests that the market forces of competition erode away the future benefits and value of the going concern component of goodwill

because it is difficult for companies to maintain abnormal profitability indefinitely (Linsmeier and Wheeler 2020). In contrast, synergy value may be less sensitive to the effects of competition when the business combination creates new sources of abnormal profitability, which generate new sources of competitive advantage. These predictions are stated below in the alternative form:

***H3a:** The synergy value component of goodwill reduces the risk of future goodwill impairment more than the going concern value component of goodwill.*

***H3b:** The synergy value component of goodwill reduces the risk of future goodwill impairment more than the residual component of goodwill.*

***H3c:** The going concern value component of goodwill reduces the risk of future goodwill impairment more than the residual component of goodwill.*

It is unclear ex ante whether goodwill consists of all, some, or none of the three components. Our first set of hypotheses predict that each of these components are reflected in the recorded goodwill amount based on prior literature. However, we may find that none or only a subset of these components is reflected in recorded goodwill. For example, if acquisitions are mostly driven by synergies, acquiring firms may not pay significant premiums for the going concern value of the target. In this case, we would not expect to observe a significant positive association between variables capturing the target's going concern value and goodwill. Further, we may find no relationship between our factors and recorded goodwill if the factors we obtain fail to capture the economic drivers of acquisitions or the purchase price allocation to goodwill is subject to high levels of management discretion/manipulation. This provides tension for our first set of hypotheses as well as our predictions for goodwill impairment.

Goodwill impairment occurs when the fair value of the reporting unit to which goodwill is allocated to is less than the carrying value of the reporting unit. Finding a relationship between our factors and goodwill impairment requires a correspondence between the underlying goodwill components and the future fair value of the reporting units. To the extent that managers can delay reporting a goodwill impairment, or there are large amounts of internally generated goodwill in these reporting units, we may fail to detect the predicted associations between these economic components and future goodwill impairment.

IV. METHODS AND RESULTS

Descriptive Statistics

Table 4 presents the descriptive statistics for the variables used in our hypotheses tests. The goodwill component factors are distributed such that each variable has a mean close to zero and standard deviation close to one. Within the sample of 437 deals, the percentage of the purchase price allocated to goodwill (*Goodwill%*) is 29.2 (30.0) percent on average (at the median). The natural log of the acquirer's total assets (*Acq_Size*) in this table (7.6 on average) is greater than the natural log of the target's total assets (*Tar_Size*) in Table 2 (7.1 on average), suggesting that acquirers are larger than targets on average.

In the goodwill impairment analysis, we have a total of 1,315 firm-year observations to estimate the risk of future goodwill impairment following each acquisition. The average number of years after the acquisition that we observe for each firm in this analysis is 4.34. Further, 8.4 percent of observations eventually record an impairment (*Goodwill_Imp*). ΔInd_ROA is positive (zero) on average (at the median), indicating that industry-adjusted ROA is increasing (is stagnant). ΔAcq_ROA is positive (negative) on average (at the median), indicating that acquirer ROA is

increasing (decreasing), suggesting a positive skew resulting from firms with large increases in profitability. We also observe declining acquirer sales growth (ΔAcq_Sales) at the mean and the median.

[INSERT TABLE 4 ABOUT HERE]

Tests of H1

To test the first set of hypotheses examining whether goodwill is comprised of underlying economic components, we estimate equation (1) shown below. In this model, we regress the percentage of the purchase consideration allocated to goodwill, *Goodwill%*, on the synergy value, going concern value, and residual component factor scores produced by the factor analysis described above. Consistent with the scaling of the dependent variable *Goodwill%*, we also scale the factor scores by the purchase consideration. The model also controls for the effects acquiring firm characteristics (size, leverage, and relative deal size) as well as industry and year fixed effects to account for variation in amounts allocated to goodwill across industries and over time. To reduce the influence of outliers, all continuous variables are winsorized at the 1st and 99th percentiles of their distributions. Standard errors are clustered by firm.

$$\begin{aligned}
 Goodwill\%_{i,t} = & \alpha_0 + \alpha_{1,\dots,n} (Synergy_{i,t} + Going\ Concern_{i,t} + Residual_{i,t}) + \beta_1 Acq_Size_{i,t} \\
 & + \beta_2 Acq_Leverage_{i,t} + \beta_3 Rel_Deal_Size_{i,t} + \gamma_{i,t} + \varepsilon_{i,t}
 \end{aligned} \tag{1}$$

Results are reported in Table 5 and show that the model has significant explanatory power with an Adjusted R^2 coefficient of 0.227. The coefficient on *Acq_Size* is positive and significant (p -value < 0.01; two-tailed test) and the coefficient on *Rel_Deal_Size* is negative and significant

(p -value < 0.05; two-tailed test). These results suggest that larger acquirers allocate greater amounts to goodwill but the amount of goodwill allocations decrease in deals that are larger relative to the acquiring firm as a whole, consistent with prior research (Shalev et al. 2013).

[INSERT TABLE 5 ABOUT HERE]

Turning to the goodwill components variables, we find support for H1a, H1b, and H1c. Specifically, the coefficients on *Synergy 1* (2.461) and *Synergy 2* (1.885) are both positive and significant at the 0.01 and 0.05 level (one-tailed tests), respectively. These results are consistent with goodwill reflecting a synergy value component on average across the sample of acquisitions, resulting from target-acquiring firm complementarities and resources available to allocate to post-acquisition integration. The coefficients are also positive and significant on *Going Concern 1* (0.599, p -value < 0.05; one-tailed test) and *Going Concern 2* (0.642, p -value < 0.10; one-tailed test), consistent with the prediction that goodwill also reflects an underlying going concern value component that is associated with the target firm's competitive position within its industry. Finally, the results also suggest that a residual component arising from overpayment makes up a third underlying component of goodwill. Specifically, the coefficient on the *Residual* factor score is 0.812 and significant at the 0.05 level (one-tailed test).

Collectively, these results provide empirical support for the view put forth by standard setters that goodwill is comprised of distinct underlying components reflecting synergies, going concern value, and an overpayment residual. However, the results of this analysis raise several important questions worth noting. While the explanatory power of the model is statistically significant (Adjusted $R^2 = 0.227$), we conclude that there is also significant variation in goodwill balances left unexplained by the model. One potential reason for this is that the factor scores are noisy proxies for the underlying constructs of synergy value, going concern value, and residual

components. Another non-mutually exclusive explanation is that there are other components of goodwill that are omitted from the model. We conclude that our findings provide support for the view that goodwill is comprised of synergy, going concern value, and residual components, but it is possible that other factors are also included in goodwill.

Tests of H2 and H3

We test our second and third sets of hypotheses by estimating the Cox proportional hazards regression as shown below in equation (2). In a hazard model, the dependent variable consists of two parts; one part, a binary variable indicating the occurrence of an event, and the other is the time to occurrence of the event. In our setting, the event of interest is goodwill impairment, which we specify as an indicator coded one if firm i records a goodwill impairment in year t . The variable $\#years$ is the time to occurrence, which we measure as the number of years after acquisition completion for firm i in year t . The Cox proportional hazards model allows for multiple occurrences of the event of interest and makes no distributional assumptions about the relation between the dependent and independent variables. The term $h_0(t)$ represents the baseline hazard rate of goodwill impairment for all observations. The variables of interest are represented by the terms *Synergy*, *Going Concern*, and *Residual*, which are the goodwill components factor scores from our previous analysis. The parameters in a hazard model represent the risk of occurrence of the event of interest, conditional on the observation remaining in the sample in period t , referred as a hazard ratio. Thus, another useful feature of a hazard model regression in our setting is that it takes into account censoring of the data, which occurs when the period of observation ends before observing the event of interest or observations exit the sample.

$$Impairment_{i,t} = h_0(t) \exp\{ \alpha_1 Synergy_{i,t} + \alpha_2 Going\ Concern_{i,t} + \alpha_3 Residual_{i,t} + \beta_k X_{i,t} \} \quad (2)$$

Finding a significant hazard ratio between zero and one indicates a lower risk of experiencing the event of interest in period t . In contrast, a significant hazard ratio greater than one indicates a higher risk of occurrence in period t . Therefore, finding a significant hazard ratio between zero and one on the synergy and going concern components would provide support consistent with our predictions that the risk of goodwill impairment decreases when synergy value and going concern value goodwill components are higher. Similarly, a significant hazard ratio on *Residual* greater than one is consistent with a larger residual goodwill component increasing the risk of goodwill impairment.

The model also includes a set of control variables, represented in equation (2) as $X_{i,t}$, drawn from prior research modeling the likelihood of goodwill impairment. This includes controls for the amount of goodwill recognized in the acquisition (*Goodwill%*), relative deal size (*Rel_Deal_Size*), a set of time-varying controls for acquiring firm characteristics (e.g., size, market-to-book, leverage, changes in firm-level and industry performance, and financial reporting incentives), and year fixed effects controlling for variation in goodwill impairments over time.

The results of the hazard model regression are reported in Table 6 Panel A. The model has significant explanatory power as evidenced by the Wald X^2 statistic of 582.48 (p-value < 0.01). The statistically significant hazard ratios on *Rel_Deal_Size* of 1.445 (p-value < 0.01) and *Goodwill%* of 2.634 (p-value < 0.05) suggest that the risk of goodwill impairment is greater in larger deals and when a greater percentage of the purchase price was allocated to goodwill. The significant hazard ratio on *Bath* (hazard ratio = 1.534; p-value < 0.01) also indicates a higher risk when there are big bath reporting incentives, but a significantly lower risk of impairment in the presence of earnings smoothing incentives (hazard ratio on *Smooth* = 0.826; p-value < 0.01).

[INSERT TABLE 6 ABOUT HERE]

Turning to the goodwill components factor scores, we find significant hazard ratios between zero and one for *Synergy 1* (hazard ratio = 0.829; p-value < 0.10) and *Synergy 2* (hazard ratio = 0.390; p-value < 0.01), consistent with the prediction in H2a that the risk of goodwill impairment is lower in acquisitions with larger synergy value components of goodwill. We find some support for H2b and the relation between goodwill impairment risk and going concern value. The hazard ratio on *Going Concern 1* is 0.708 (p-value < 0.10) and statistically significant, but is not significant for *Going Concern 2* (p-value > 0.10). However, the hazard ratio on *Residual* is 1.291 and significant at the 0.05 level. This result is consistent with a greater risk of goodwill impairment when the residual component arising from overpayment is higher.

We report tests of differences in the relation between the goodwill components and the risk of goodwill impairments in Table 6 Panel B. We find support for the prediction in H3a that the risk of goodwill impairment is lower for the synergy value components of goodwill than the going concern components. Specifically, we find that the sum of the hazard ratios on *Synergy 1* and *Synergy 2* are significantly less than the sum of the hazard ratios on *Going Concern 1* and *Going Concern 2* (p-value < 0.01). This result is consistent with our prediction that competitive market forces erode away the abnormal profits arising from going concern value at a faster rate than synergy value. The results also show that the effects of synergy value and going concern value on the risk of goodwill impairment are significantly lower than the residual goodwill component. Panel B shows that the sum of the hazard ratios on *Synergy 1* and *Synergy 2* (*Going Concern 1* and *Going Concern 2*) are significantly less than the hazard ratio on *Residual*. Overall, the results reported in Table 6 are consistent with the conclusion that synergy, going concern, and residual components all exhibit significantly different relations with the risk of future goodwill impairment.

V. CONCLUSION

U.S. GAAP requires a one-size-fits-all approach to accounting for goodwill. Subsequent accounting methods (amortization-and-impairment and impairment-only) make assumptions about the nature of the goodwill balance and how it declines in value over time on average, but there is little empirical evidence on the composition and economic nature of the goodwill balance. We provide empirical evidence that there are at least three distinct components of goodwill. We perform a factor analysis on target firm, acquiring firm, and transaction characteristics and identify components relating to the going concern value of the target, the expected synergies from combining the assets of the target and acquirer, and overpayment. Using factor scores as empirical proxies for these components, we find that each factor exhibits a positive and significant association with goodwill, suggesting that acquired goodwill reflects these underlying economic components. We also estimate a hazard model and show that these components predictably affect the risk of future goodwill impairment in different ways. We find that going concern value and synergy value is associated with a lower risk of future goodwill impairment, whereas the residual goodwill component is associated with a greater risk of goodwill impairment. However, we find that greater synergy value component has a stronger effect on the risk of future goodwill impairment than does the going concern value component.

Our study adds to the limited prior research on the underlying nature of the goodwill balance. Prior literature investigating the economic components of goodwill relies on the assumption that short-window market returns around the acquisition announcement reflect the value of the components of goodwill (Henning et al. 2000). However, Ben-David, Bhattacharya, and Jacobsen (2020) suggest that the market does not accurately assess the value of acquisition at the time of the deal announcement, which occurs well before the transaction is actually completed.

We identify the economic components of goodwill using underlying economic characteristics of the target and acquiring firm that prior research suggests should be correlated with the synergy value, going concern value, and residual components of goodwill.

Our results suggest one possible explanation for the mixed evidence on the value relevance of alternative methods of subsequent accounting for goodwill including amortization (Jennings, Robinson, Thompson, Duvall 1996; Moehrle, Reynolds-Moehrle, and Wallace 2001; Wheeler 2020) and impairment (Li et al. 2011; Bens, Heltzer, and Segal 2011; Hirschey and Richardson 2002; Francis, Hanna, and Vincent 1996; Wheeler 2020). Specifically, alternative methods (amortization-and-impairment or impairment-only) will be more or less value relevant depending on which economic component primarily drives the value of goodwill in a given acquisition. Our findings should be useful to standard setters as they deliberate on subsequent accounting for goodwill. Our results suggest that the need to identify a one-size-fits-all treatment for subsequently measuring goodwill is complicated by heterogeneity in the economic composition of goodwill balances across firms and acquisitions.

Finally, our results add to the literature on purchase price allocations to goodwill and prior research on the timing and likelihood of goodwill impairment, much of which has focused on management reporting incentives. We show that the goodwill recorded in an acquisition is positively associated with the underlying economic components. These findings fill an important gap in the literature on the non-discretionary determinants of allocations to goodwill that reflect the economic nature of its expected future benefits. Further, we also show that the nature of the underlying goodwill affects the risk of future goodwill impairment, adding to literature on the discretion allowed in the impairment test.

Our study is subject to the limitation that our inferences are based on only the variables identified in prior literature as relating to going concern, synergies, or overpayment that we believe explain a large portion of the variation in the goodwill balance. It is possible that there are other economic variables that affect the amount of goodwill recorded in an acquisition that we have not considered in our analysis.

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APPENDIX
Variable Definitions

Variable Name	Definition
Panel A. Variables used in factor analysis	
<i>Tar_Innovation</i>	target firm's R&D and patent amortization / net sales
<i>Tar_Capital_Intensity</i>	target firm's depreciation expense / net sales
<i>Tar_Power_Supp</i>	target firm's inventory / COGS
<i>Tar_AR_TO</i>	target firm's receivables / net sales
<i>Tar_Ind_Con</i>	Target industry Herfindahl index where market share is based on net sales of firm <i>i</i> 2-digit industry <i>j</i>
<i>Tar_Ind_RD</i>	industry weighted-average R&D / net sales, where weights are determined based on ratio of firm's sales to total 2-digit industry sales
<i>Tar_Ind_Capx</i>	industry weighted-average capex / net sales, where weights are determined based on ratio of firm's sales to total 2-digit industry sales
<i>Tar_Ind_PPE</i>	industry weighted-average PP&E / net sales, where weights are determined based on ratio of firm's sales to total 2-digit industry sales
<i>Tar_Num_Emp</i>	natural log of target firm's number of employees
<i>Tar_Firm_Age</i>	deal announcement year less the first year the target appears on Compustat
<i>Tar_Size</i>	natural log of target firm's total assets
<i>Rel_Deal_Size</i>	purchase consideration / acquirer market value
<i>Tar_IA_Profit</i>	ratio of target firm's sales less COGS less SG&A to sales minus 2-digit industry average of this ratio
<i>RD_Comp</i>	absolute value of the difference between target and acquirer R&D expense / total revenues
<i>Capx_Comp</i>	absolute value of the difference between target and acquirer capital expenditures / total revenues
<i>SGA_Comp</i>	absolute value of the difference between target and acquirer SG&A / total revenues
<i>Debt_Comp</i>	absolute value of the difference between target and acquirer interest expense / total revenues
<i>(Acq_/Tar_)Growth</i>	percentage change in sales
<i>(Acq_/Tar_)Leverage</i>	long term debt / equity
<i>(Acq_/Tar_)Liquidity</i>	net liquid assets / total assets
<i>Tar_NOL</i>	target firm NOL carryforward / total assets
<i>Acq_PE_Adj</i>	acquiring firm's P/E less two-digit SIC industry median P/E ratio
<i>Acq_Equity_Issuance</i>	acquirer issuance of common stock in prior year / total assets
<i>Stock</i>	percentage of purchase consideration paid with stock
<i>Overpay_Incentive</i>	acquirer change in sales growth
<i>ln_Dealvolume</i>	natural log of number of mergers in acquirer's 2-digit industry year

Acq_Overfirm the average of the decile ranks of the following variables: cash and leverage (multiplied by negative one so that both are increasing in propensity to over-invest)

Panel B. Additional variables used in goodwill allocation analysis

Goodwill% amount of goodwill recognized in the acquisition / purchase price.
Acq_Size natural log of acquiring firm market value of equity
Acq_DA acquirer debt-to-assets ratio

Panel C. Additional variables used in goodwill impairment analysis

Goodwill_Imp indicator variable coded one when the firm recognizes a goodwill impairment in year t , zero otherwise
#years the number of years following the acquisition year
ln(Assets) natural log of acquirer total assets
Acq_MTB acquiring firm market-to-book ratio
 Δ Ind_ROA the change in the difference between acquirer net income scaled by total assets from $t-1$ to t and the industry median (2-digit SIC level)
 Δ Acq_ROA the change in acquirer net income scaled by total assets from $t-1$ to t
 Δ Acq_Sales the change in acquirer sales scaled by total assets from $t-1$ to t
Acq_Total_Goodwill total acquirer goodwill scaled by total assets
Smooth indicator variable coded one when the change in acquirer pre-write-off net income from period $t-1$ to t divided by total assets at the end of $t-1$ is above the median for all positive values, and zero otherwise
Bath indicator variable coded one when the change in acquirer pre-write-off net income from period $t-1$ to t divided by total assets at the end of $t-1$ falls below the median of all negative values, and zero otherwise

TABLE 1
Sample Selection and Summary Statistics

Panel A: Sample source and data attrition

Deals included in Houlihan Lokey dataset between 2009-2016	3,774
Less: Deals not matched from Houlihan Lokey dataset to SDC	(221)
Less: Deals without both target and acquirer match to Compustat (loss due primarily to private target or acquirer)	(3,041)
Less: Deals without necessary Compustat/SDC/CRSP data	(77)
Number of transactions included in the sample	437

Panel B: Summary by deal completion year

	Year	N	%
	2009	47	10.76
	2010	75	17.16
	2011	46	10.53
	2012	64	14.65
	2013	55	12.59
	2014	44	10.07
	2015	62	14.19
	2016	44	10.07
Total		437	100

Panel C: Summary by industry composition

2-Digit SIC Industry	Acq. N	Tar. N	2-Digit SIC Industry	Acq. N	Tar. N
Metal Mining	0	2	2 Transportation by Air	4	4
Coal Mining	1	0	0 Pipelines, Except Natural Gas	1	0
Oil and Gas Extraction	6	5	5 Transportation Services	4	2
Mining and Quarrying of Nonmetallic Minerals, Except Fuels	2	1	1 Communications	19	18
Construction - General Contractors & Operative Builders	1	1	1 Electric, Gas and Sanitary Services	6	9
Heavy Construction, Except Building Construction, Contractor	1	1	1 Wholesale Trade - Durable Goods	3	4
Construction - Special Trade Contractors	1	0	0 Wholesale Trade - Nondurable Goods	6	2
Food and Kindred Products	6	6	6 General Merchandise Stores	2	2
Tobacco Products	1	1	1 Food Stores	2	2
Textile Mill Products	1	0	0 Apparel and Accessory Stores	1	2
Apparel, Finished Products from Fabrics & Similar Materials	5	5	5 Home Furniture, Furnishings and Equipment Stores	1	2
Lumber and Wood Products, Except Furniture	2	1	1 Eating and Drinking Places	1	0
Furniture and Fixtures	1	2	2 Miscellaneous Retail	5	4
Paper and Allied Products	10	7	7 Depository Institutions	43	47
Printing, Publishing and Allied Industries	7	5	5 Nondepository Credit Institutions	5	6
Chemicals and Allied Products	45	49	49 Security & Commodity Brokers, Dealers, Exchanges & Services	8	8
Petroleum Refining and Related Industries	2	2	2 Insurance Carriers	5	7
Rubber and Miscellaneous Plastic Products	0	2	2 Insurance Agents, Brokers and Service	0	1
Leather and Leather Products	2	2	2 Real Estate	0	1
Stone, Clay, Glass, and Concrete Products	0	3	3 Holding and Other Investment Offices	3	5
Primary Metal Industries	3	5	5 Hotels, Rooming Houses, Camps, and Other Lodging	1	1
Fabricated Metal Products	1	2	2 Personal Services	1	1
Industrial and Commercial Machinery and Computer Equipment	34	27	27 Business Services	53	52
Electronic/Other Electrical Equipment and Components	60	59	59 Automotive Repair, Services and Parking	2	1
Transportation Equipment	9	7	7 Motion Pictures	2	2
Measuring, Photographic, Medical, Optical Goods, Clocks	33	30	30 Amusement and Recreation Services	3	2
Miscellaneous Manufacturing Industries	2	5	5 Health Services	12	9
Railroad Transportation	1	1	1 Educational Services	0	1
Local & Suburban Transit & Interurban Highway Transportation	0	1	1 Engineering, Accounting, Research, and Management Services	6	4
Motor Freight Transportation	0	1	1 Nonclassifiable Establishments	0	4
Water Transportation	1	1			
			Total	437	437

TABLE 2
Descriptive Statistics for Factor Analysis Variables

Variable	N	mean	median	std. dev.	p25	p75
<i>Tar_Innovation</i>	437	0.279	0.029	1.327	0.002	0.170
<i>Tar_Capital_Intensity</i>	437	0.056	0.042	0.054	0.025	0.065
<i>Tar_Power_Supp</i>	437	0.285	0.163	0.512	0.015	0.325
<i>Tar_AR_TO</i>	437	1.603	0.166	4.059	0.113	0.240
<i>Tar_Ind_Con</i>	437	0.055	0.036	0.050	0.029	0.058
<i>Tar_Ind_RD</i>	437	0.038	0.043	0.035	0.001	0.073
<i>Tar_Ind_Capx</i>	437	0.059	0.047	0.057	0.033	0.062
<i>Tar_Ind_PPE</i>	437	0.658	0.520	0.575	0.394	0.649
<i>Tar_Num_Emp</i>	437	0.726	0.487	2.230	-1.033	2.351
<i>Tar_Firm_Age</i>	437	22.360	17.000	16.911	10.000	30.000
<i>Tar_Size</i>	437	7.104	6.913	2.468	5.423	8.554
<i>Rel_Deal_Size</i>	437	0.723	0.293	1.237	0.086	0.827
<i>Tar_IA_Profit</i>	437	-0.316	-0.049	1.581	-0.148	0.011
<i>RD_Comp</i>	437	0.322	0.013	1.949	0.000	0.062
<i>Capx_Comp</i>	437	0.039	0.018	0.087	0.007	0.038
<i>SGA_Comp</i>	437	0.161	0.093	0.208	0.033	0.204
<i>Debt_Comp</i>	437	0.028	0.009	0.068	0.002	0.025
<i>Tar_Growth</i>	437	0.072	0.021	0.321	-0.066	0.132
<i>Tar_Leverage</i>	437	-0.036	0.019	4.866	0.000	0.898
<i>Tar_Liquidity</i>	437	0.201	0.125	0.305	-0.010	0.419
<i>Acq_Growth</i>	437	0.101	0.064	0.261	-0.012	0.174
<i>Acq_Leverage</i>	437	-0.228	0.100	5.530	0.000	0.867
<i>Acq_Liquidity</i>	437	0.202	0.130	0.261	0.016	0.355
<i>Tar_NOL</i>	437	0.589	0.014	2.096	0.000	0.190
<i>Acq_PE_Adj</i>	437	5.304	7.679	56.209	0.000	19.630
<i>Acq_Equity_Issuance</i>	437	0.022	0.006	0.052	0.000	0.019
<i>Stock</i>	437	20.650	0.000	34.885	0.000	34.140
<i>Overpay_Incentive</i>	437	-0.006	-0.002	0.259	-0.108	0.092
<i>ln_Dealvolume</i>	437	3.665	4.078	1.164	3.045	4.382
<i>Acq_Overfirm</i>	437	0.666	0.500	2.058	-1.000	2.000

TABLE 3
Factor Analysis of Goodwill Components

Variables	Factor Loadings				
	<i>Synergy 1</i>	<i>Synergy 2</i>	<i>Going Concern 1</i>	<i>Going Concern 2</i>	<i>Residual</i>
<i>Tar_IA_Profit</i>	-0.919				
<i>Tar_Innovation</i>	0.921				
<i>Tar_Capital_Intensity</i>	0.535				
<i>RD_Comp</i>	0.849				
<i>Capx_Comp</i>	0.456				
<i>SGA_Comp</i>	0.539				
<i>Debt_Comp</i>	0.479				
<i>Tar_NOL</i>	0.528				
<i>Tar_Num_Emp</i>	-0.430	-0.426			
<i>Tar_Liquidity</i>		0.696			
<i>Acq_Liquidity</i>		0.718			
<i>Tar_AR_TO</i>		0.711	0.475		
<i>Tar_Ind_Capx</i>		-0.554	0.409	0.532	
<i>Tar_Ind_PPE</i>		-0.624	0.405	0.484	
<i>Tar_Ind_RD</i>			-0.598		
<i>Acq_Overfirm</i>			-0.447		
<i>Rel_Deal_Size</i>			0.441		
<i>Acq_Growth</i>					0.652
<i>Overpay_Incentive</i>					0.591
Eigen value	4.447	3.281	2.032	1.441	1.294
Common variation explained	31.6%	23.3%	14.4%	10.2%	9.2%
Total variation explained			88.7%		

Notes: This table presents the results of a factor analysis of allowing for correlation among the each factor. We report all factors with Eigen values greater than 1.0 and variables with absolute factor loadings > 0.40.

TABLE 4
Descriptive Statistics for Variables used in Tests of Hypotheses

Variable	N	mean	median	std. dev.	p25	p75
Goodwill components						
<i>Synergy 1</i>	437	0.000	-0.125	0.981	-0.394	0.091
<i>Synergy 2</i>	437	0.000	-0.090	0.953	-0.486	0.337
<i>Going Concern 1</i>	437	0.002	-0.258	0.915	-0.668	0.546
<i>Going Concern 2</i>	437	0.000	0.029	0.905	-0.579	0.482
<i>Residual</i>	437	0.001	-0.105	0.850	-0.441	0.392
Goodwill allocation analysis						
<i>Goodwill%</i>	437	0.292	0.300	0.201	0.110	0.442
<i>Acq_Size</i>	437	7.625	7.622	1.902	6.297	8.880
<i>Acq_DA</i>	437	0.190	0.102	29.644	0.000	0.867
<i>Rel_Deal_Size</i>	437	0.762	0.293	1.534	0.086	0.827
Goodwill impairment analysis						
<i>Goodwill Imp</i>	1,315	0.084	0.000	0.277	0.000	0.000
<i>#years</i>	1,315	4.345	4.000	2.171	3.000	6.000
<i>ln(Assets)</i>	1,315	8.138	8.054	1.828	6.892	9.462
<i>Acq_MTB</i>	1,315	3.296	2.561	8.864	1.646	3.919
<i>Acq_DA</i>	1,315	0.273	0.267	0.192	0.124	0.386
<i>ΔInd_ROA</i>	1,315	0.006	0.000	0.257	-0.022	0.022
<i>ΔAcq_ROA</i>	1,315	0.003	-0.001	0.255	-0.020	0.015
<i>ΔAcq_Sales</i>	1,315	-0.038	-0.007	0.197	-0.078	0.038
<i>Acq_Total_Goodwill</i>	1,315	0.205	0.179	0.160	0.069	0.308
<i>Smooth</i>	1,315	0.445	0.000	0.497	0.000	1.000
<i>Bath</i>	1,315	0.081	0.000	0.272	0.000	0.000

Notes: Variables listed under the goodwill components heading represent factor scores obtained from the factor analysis reported in Table 3. All continuous variables are winsorized at the 1st and 99th percentiles of their distributions. Please refer to the Appendix for variable definitions.

TABLE 5
Goodwill Components and Initial Goodwill Recognition

Dependent Variable: <i>Goodwill%</i>	Pred. Sign	Coefficient	t-stat
Goodwill components			
<i>Synergy 1</i>	+	2.461**	2.31
<i>Synergy 2</i>	+	1.885***	3.91
<i>Going Concern 1</i>	+	0.599**	1.72
<i>Going Concern 2</i>	+	0.642*	1.46
<i>Residual</i>	+	0.812**	1.76
Controls			
<i>Acq_Size</i>	?	0.027***	5.06
<i>Acq_DA</i>	?	-0.001	-1.38
<i>Rel_Deal_Size</i>	?	-0.014**	-1.97
Intercept	?	-0.028	-0.58
Fixed effects		Industry and year	
Adjusted R^2		0.227	
Number of observations		437	

Notes: This table presents the results of an OLS regression where the dependent variable *Goodwill%* is the amount of goodwill recognized in the acquisition, divided by the purchase price. Variables listed under the goodwill components heading represent factor scores obtained from the factor analysis reported in Table 3. All other variables are defined in the Appendix. The regression includes year and industry fixed effects, based on Fama-French 12 industry-membership. Standard errors are estimated clustering at the firm-level. *p*-values are one-tailed for signed predictions, two-tailed otherwise. ***, **, * represent significance at the 0.01, 0.05, and 0.10 levels, respectively.

TABLE 6
Goodwill Components and Future Goodwill Impairments

Panel A. Hazard model regression

Dependent variable: <i>Impairment</i>	Hazard Rate	z-stat
Goodwill Components		
<i>Synergy 1</i>	0.829*	-1.69
<i>Synergy 2</i>	0.389***	-4.66
<i>Going Concern 1</i>	0.708*	-1.87
<i>Going Concern 2</i>	0.923	-0.82
<i>Residual</i>	1.291**	2.39
Controls		
<i>Rel_Deal_Size</i>	1.445***	4.00
<i>Goodwill%</i>	2.635**	2.04
<i>ln(Assets)</i>	1.022	1.24
<i>Acq_MTB</i>	1.001	0.31
<i>Acq_DA</i>	1.116	0.79
<i>ΔInd_ROA</i>	0.686	-0.53
<i>ΔAcq_ROA</i>	1.455	0.52
<i>ΔAcq_Sales</i>	0.822*	-1.64
<i>Acq_Total_Goodwill</i>	1.1330	0.79
<i>Smooth</i>	0.826***	-2.63
<i>Bath</i>	1.534***	6.23
Fixed effects		Year
Wald X^2		582.48***
Number of observations		1,315

Panel B. Tests of differences across goodwill components

Hypothesis tests (alternative form)	X^2-stat
H3a: <i>Synergy 1 + Synergy 2 > Going Concern 1 + Going Concern 2</i>	15.14***
H3b: <i>Synergy 1 + Synergy 2 > Residual</i>	26.90***
H3c: <i>Going Concern 1 + Going Concern 2 > Residual</i>	11.42***

Notes: Panel A presents the results of a Cox proportional hazard regression. Variables listed under the goodwill components heading represent factor scores obtained from the factor analysis reported in Table 3. All other variables are defined in the Appendix. Panel B presents tests of differences between hazard ratios for the goodwill components variables. Standard errors are estimated clustering at the firm-level. All p -values are based on two-tailed tests. ***, **, * represent significance at the 0.01, 0.05, and 0.10 levels, respectively.