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Stefan J. Huber and Charles G. McClure

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Becker Friedman Institute
FOR ECONOMICS AT UCHICAGO

5757 S. University Ave.
Chicago, IL 60637
Main: 773.702.5599
bfi.uchicago.edu

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Stefan J. Huber[a] Charles G. McClure[b]

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ABSTRACT

A significant portion of a merger's purchase price is allocated to goodwill. Currently, goodwill is not amortized but tested annually for impairment. When managers care about earnings, goodwill's accounting treatment can have large effects on future earnings and may influence how much a manager will bid for a target company. We quantify the effects of goodwill accounting by estimating a structural model of corporate takeovers. Our estimates suggest that accrual accounting increases buyout premia by an average of nearly 10 percentage points. If firms needed to amortize goodwill over 10 years, we estimate premia would reduce by 6 percentage points and M&A volume would shrink by 4.29% or $68.6 billion per year. Furthermore, the fraction of private equity acquirers increases by 7.74 percentage points, shifting control over productive assets to the private and financial sector. Our results suggest the accounting treatment for goodwill has a meaningful effect on the market for corporate control.

JEL classifications: D44, G32, G34, M40, M41

Keywords: Goodwill, mergers and acquisitions, buyout premia, structural modeling

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[a]Jones Graduate School of Business, Rice University, TX 77005.

[b]Booth School of Business, University of Chicago, IL 60637.

1. Introduction

Corporate mergers and acquisitions ("M&A") are some of the most important corporate activities, yet nearly half of the aggregate deal value is assigned to non-identifiable intangible assets, which are represented as goodwill. As a result, goodwill has become the largest intangible asset on companies' balance sheets, resulting in 6.92% of total assets or $4.9 trillion in 2021. The size of goodwill suggests that the accounting treatment of goodwill can have significant implications for the combined company's future earnings and may alter an acquirer's willingness to pay (e.g., Graham, Harvey and Rajgopal, 2005; Darrough, Guler and Wang, 2014). In this paper, we examine the real effects of goodwill accounting on the market for corporate control.

Current accounting standards treat goodwill as an indefinitely-lived intangible asset tested annually for impairment. However, this accounting treatment is not without controversy. Standard-setters have debated how to treat goodwill since at least the 1960s because of goodwill's potential to significantly affect merger activity (Seligman, 1982; Rayburn and Powers, 1991). Most recently, the Financial Accounting Standards Board ("FASB") considered changing the accounting of goodwill to amortization before deciding to drop the matter because it was unclear whether amortization was a clear improvement.[1]

Measuring the effect of goodwill accounting on the M&A market activity is difficult because how accounting treats goodwill affects acquirers' private values of a target. But we do not observe these underlying private values, only the realized transaction prices. The transaction price, however, is an equilibrium outcome determined by the interplay

[1]See https://www.fasb.org/Page/ProjectPage?metadata=fasb-IdentifiableIntangibleAssetsandSubsequentAccountingforGoodwill-022820221200.

between the valuation of the buyer and the competition from other potential acquirers.[2] As a result, it is necessary to disentangle the competition effect from the valuation effect to recover the underlying values and quantify the role of goodwill accounting.

To address these difficulties, we develop and estimate a model of corporate takeovers where potential acquirers offer bids based on their private values and the competition from others. Following Gorbenko and Malenko (2014) and Haile and Tamer (2003), we model takeovers as auctions and assume that the current market value serves as a reserve price, bidders do not bid above their private values, and bidders do not permit another bidder to win if they could have bid more and maintained a positive surplus. This structure allows us to disentangle the competition effects from the underlying valuations of the bidders. As a result, we can estimate the effect of goodwill accounting on bidders' private values and the takeover market.

In our model, bidders' valuations of the target are a function of target characteristics and the accounting treatment of goodwill. We allow bidders to exhibit different preferences over future cash and earnings streams, leading to different sensitivities to the accounting for goodwill. Some of these differences arise because we follow prior literature and assume two types of bidders: strategic and financial (Gorbenko and Malenko, 2014). Financial bidders, often private equity investors, are insensitive to goodwill as their value is based on the target firms' discounted expected cash flows. We label the net present value of the discounted expected cash flows as the target's fundamental value. Strategic bidders, often

[2]The current "impairment-only" accounting regime went into effect in 2001. Prior to this period, firms could choose between purchase accounting with subsequent amortization and the pooling of interest method under which no assets and liabilities were stepped up to their fair value. However, inferences that can be drawn from that regime are limited by the self-selection of firms using either of the two methods. Furthermore, the importance of goodwill has significantly increased since 2001, increasing from $771.1 bn to $4.9 trillion in 2021.

competitors, suppliers, or customers, care about the treatment of goodwill because their value is a weighted average of discounted cash flows and earnings. We allow the relative preference of accounting to cash flows to vary within the group of strategic bidders to account for the presence of private strategic bidders (who may care less about earnings) and differential preferences among public firms. Because cash flows evolve stochastically, the fundamental value of the target has some probability of falling below the purchase price. Should that occur, the acquirer would recognize an impairment, which lowers earnings.

We estimate our model using 861 all-cash deals executed as takeover auctions on public targets effective from July 2001 until September 2022.[3] With this sample, we estimate our model using simulated maximum likelihood, where the parameters differ between financial and strategic bidders. Similar to Gorbenko and Malenko (2014), we find that strategic bidders' valuations are higher than financial bidders and are positively related to current market conditions. Strategic bidders have higher values because they care about the future earnings stream. This preference for earnings effectively reduces the acquisition cost because the bidder defers the earnings impact to an uncertain date when an impairment occurs. As a result, strategic bidders only partially internalize the purchase price for the target. Our estimates imply earnings receive about two-fifths the weight of cash flows for the average strategic bidder so that under the current accounting regime where firms only test for impairment, the average strategic bidder acts as if she only internalizes 85% of the acquisition price. This estimate quantifies the commonly cited trade-off that firms face between maximizing cash flows and financial-reporting concerns

[3]We classify a takeover as an auction if the target reported at least two bidders.

(e.g., Matsunaga, Shevlin and Shores, 1992; Bens, Nagar, Skinner and Wong, 2003; Graham et al., 2005).

An important reason why we estimate a model of merger activity is to quantify how the merger market would change under hypothetical accounting regimes. To achieve this, we simulate counterfactual takeover auctions to quantify both deal-level changes, such as deal premia, and broader distributive effects, such as the value of assets controlled by private equity investors. To understand how accounting influences takeovers, we compare the current regime to a benchmark where all bidders care only about cash flows. In this counterfactual, no bidder cares about future earnings and therefore must fully internalize the purchase price. Without the ability to delay recognizing some of the cost, strategic bidders' valuations fall, so the average takeover premium declines by 13 percentage points, and aggregate deal values would decrease by 9.94%.

Having demonstrated the sizeable effect of accrual accounting on takeovers, we also compare the current regime to alternative regimes that would amortize goodwill. We focus on the hypothetical accounting regime where firms must amortize goodwill over ten years, and goodwill is subject to annual impairment testing.[4] Relative to the current accounting regime, we estimate that with a ten-year amortization schedule, the average bid premium declines by 6 percentage points, and the number of deals failing increases by 10%. Together, these two effects reduce aggregate deal value by 4.29%. Overall, this reduction would equate to a reduction of $68.6 billion in deal value for 2021.

Under this alternative accounting standard that amortizes goodwill, not only do trans-

[4]This regime corresponds to ASC 350-20-35, which permits private firms to amortize goodwill over ten years (or less) instead of treating goodwill as an indefinitely-lived intangible asset.

action prices and aggregate deal values change, but the type of winners do as well. Given the volume of deals, such changes in the makeup of winners can influence the ownership of a substantial portion of the economy. In particular, adopting an accounting standard that amortizes goodwill reduces the relative strength of strategic bidders because it leads to earlier expensing of goodwill compared to an impairment-only standard. The earlier expensing decreases strategic bidders' target values but does not affect financial bidders' values. Our counterfactual simulations indicate that this shift in strategic bidders' values increases the likelihood of a financial bidder winning the takeover from 29.6% to 37.4%. Combined with the changes in deal value, we estimate the increase in assets held by financial bidders to be 20.7%.

We perform several additional counterfactual analyses to further explore the relation between goodwill and mergers. We exploit the heterogeneity in the purchase price allocated to goodwill and the presence of financial bidders across industries. The effect of goodwill accounting is amplified in industries like Business Equipment, where a greater fraction of the purchase price is allocated to goodwill. We also examine how the competitive environment influences deal characteristics. Increasing the proportion of financial bidders magnifies the estimated effect because financial bidders tend to have lower valuations than strategic bidders. By contrast, adding an additional financial bidder has the reverse effect because it increases the competition for the target. This result supports Bulow and Klemperer (2009) that more competition yields higher payoffs for sellers.

Our paper contributes to two strands of literature. First, we add to the sizeable takeover literature.[5] Several papers examine how takeovers are shaped by the composition of po-

[5]See Betton, Eckbo and Thorburn (2008) and Eckbo (2009) for reviews.

tential acquirers (Gorbenko and Malenko, 2014; Gorbenko, 2019), the information environment (Gentry and Stroup, 2019), and the threat of entry (Dimopoulos and Sacchetto, 2014). However, this literature, primarily in finance and economics, often disregards the accounting for these acquisitions. Several accounting studies focus on how accounting influences the takeover market, such as firms' accounting quality on the type of acquisition (e.g., McNichols and Stubben, 2015; Marquardt and Zur, 2015) and the effect of goodwill on takeover premia (e.g., Robinson and Shane, 1990; Bartov, Cheng and Wu, 2021). Research on goodwill accounting documents how economic incentives shape the purchase price allocation (Shalev, Zhang and Zhang, 2013) and subsequent impairments (Beatty and Weber, 2006; Li and Sloan, 2017; Glaum, Landsman and Wyrwa, 2018). We add to this literature in two ways. First, we quantify how goodwill accounting affects acquirers' valuations. Second, by explicitly modeling competition, we address not only how goodwill accounting affects deal pricing but also how it influences the allocation of assets between private and public owners.

Closest to our paper is Bartov et al. (2021), which provides reduced-form evidence of increased overpayment of public acquirers after the passage of SFAS 142. We differ from the work in Bartov et al. (2021) along two critical dimensions. First, we explicitly model the competition among bidders, which allows us to recover bidders' underlying valuations and how they are shaped by goodwill accounting. Second, estimating a model of competition between different types of bidders allows us to quantify features of the M&A market beyond just takeover prices, such as the distribution of assets between financial and strategic bidders.

Second, our paper is related more broadly to the real effect of financial reporting.[6] Surveys suggest accounting can influence firms' investment decisions (Graham et al., 2005). Many studies in this area focus on intangible assets, in part, because intangibles are a perennial focus of standard setters as accounting incompletely reflects their value.[7] Several studies examine how the imprecision of accounting can alter the incentive of the firm to make value-maximizing investment (e.g., Kanodia, Singh and Spero, 2005; Geng, Zhang and Zhou, 2023; McClure and Zakolyukina, 2023). Kanodia, Sapra and Venugopalan (2004) shows whether or how intangible assets are measured can induce changes in managers' incentives to invest. However, most of this literature focuses on investment into internally-generated intangibles, such as R&D and advertising (e.g., Terry, 2023). We complement this literature by focusing on the largest recognized intangible asset—goodwill—and show it has a meaningful effect on the market for corporate control.

By doing so, our paper may interest regulators and standard setters. Our results suggest that accounting for goodwill influences whether strategic or financial bidders are more likely to acquire target companies. Our findings indicate that reducing the advantage of strategic bidders by amortizing goodwill can shift more assets toward financial bidders, who are often private equity funds. These results speak directly to the SEC's concerns over the public's inability to invest in large portions of the economy because of the rise of private funding.[8] As our paper shows, accounting standards can contribute to the balance between public and private markets. Our results suggest an additional consideration for standard setters as they continue to debate how to account for intangible assets.

[6]For a review of this literature, see Kanodia and Sapra (2016).

[7]For a discussion of the considerations by standard setters, see Appleton, Barckow, Botosan, Kawanishi, Kogasaka, Lennard, Mezon-Hutter, Sy and Villmann (2022).

[8]See, for instance, https://www.sec.gov/news/speech/lee-sec-speaks-2021-10-12.

2. Institutional Background

2.1 Accounting for takeovers

In an acquisition, the acquirer values the identifiable assets and liabilities at their fair value. The difference between the purchase price and the fair value of the assets, less the liabilities, is classified as goodwill. Effective December 15, 2001, Statement of Financial Accounting Standards (SFAS) 142 specified the accounting for goodwill.[9] Under SFAS 142, goodwill is not subject to amortization but is tested annually for impairment. One challenge with impairing goodwill is it cannot be separately identified, so a firm cannot determine its fair value directly. Instead, firms assess whether they need to impair goodwill by comparing the fair value of the reporting unit to which the goodwill is assigned with the reporting unit's carrying value. If the fair value is less than the carrying value, the firm must determine the fair value of the identifiable assets and liabilities, with the fair value of goodwill set as the difference between the two. If this difference is less than goodwill's carrying value, the company must recognize an impairment charge to decrease the carrying value to its fair value.

How to account for goodwill has been a perennial topic of interest to standard setters (Seligman, 1982; Rayburn and Powers, 1991), and the current reporting regime is no exception. Ramanna (2008) finds the creation of the impairment-only approach of SFAS

[9] Before the adoption of SFAS 142, takeovers were accounted for under Accounting Principles Board (APB) 16 and APB 17. If a takeover satisfies 12 criteria, APB 16 permitted firms to use the pooling-of-interests method, where the target's assets and liabilities are carried forward at their recorded amounts and the retained earnings of the two companies are combined. If a takeover does not satisfy these criteria, APB 16 required firms to use purchase accounting, which entailed valuing the target's assets and liabilities at their fair value. The difference between the purchase price and the fair value of the target's net assets was classified as goodwill. APB 17 required firms to amortize goodwill for a period of less than 40 years.

142 was the result of political pressure by firms, as managers valued the discretion that periodic impairment provided relative to amortization (Ramanna and Watts, 2012).

In 2018, the FASB re-examined the accounting for goodwill because many considered the current regime of annual tests for impairments as costly to perform and subjective in nature (Maurer, 2022). In its place, the FASB contemplated whether to require firms to amortize goodwill over a 10- to 25-year period. Ultimately, the FASB decided to drop the matter in 2022, with the FASB chair, Richard Jones, citing uncertainty about whether amortization would lead to a meaningful improvement given the significance of the change (Lugo, 2022). This paper helps resolve this uncertainty by examining how the takeover market would change under different accounting regimes.

2.2 Corporate Takeover Auctions

A takeover auction usually starts when the target decides to sell itself to a potential buyer.[10] To facilitate the process, the target retains an investment bank to create a list of potential acquirers, which the bank contacts to solicit their interest in acquiring the target. Interested parties sign confidentiality agreements, allowing them access to nonpublic information about the target, which assists them in determining their value of the target.

The bidding process typically proceeds in multiple rounds. In the first several rounds, bidders submit nonbinding bids, which can change in each round and may be withdrawn at any point. After each round of bidding, the target may select a subset of bidders to continue to the next round and provide these bidders with additional information for due diligence. At the end of this process, the target invites the remaining bidders to a final round of bidding. Final-round bids are typically binding, but the target may negotiate

[10]For a more detailed description, see Hansen (2001) and Boone and Mulherin (2007).

with some of the bidders to raise the price further.

Within a few days of receiving the final-round bids, the target chooses an acquirer, and a takeover agreement is signed. Until the agreement is signed and the target announces an agreement has been reached, the bidding process and bidders' identities are kept private.[11] However, the target must disclose the bidding process when it puts the buyout to a shareholder vote. This background is disclosed as part of the Merger Background in either the DEF14A or SC-TOT documents, which allows us to observe the bids and the type of each bidding participant.

Takeover auctions are most similar to an (ascending) English auction, with bidders offering higher prices until only a single winner remains. However, takeover auctions have several differences from English auctions. Unlike an English auction, takeover auctions have several rounds of bidding during which bidders can exit and reenter the bidding process or revise their bids downwards. Also, bidders are typically only informed about the highest bid and are unaware of the number of other bids or their amounts. Finally, targets design their own process, which may have interspersed rounds of negotiations. One consequence of these negotiations is they can induce bidders to jump their bids and bypass intermediate bids that we would expect from a pure English auction. As such, no theoretical auction model describes the process of a takeover auction perfectly. Therefore, we build upon the approach developed by Gorbenko and Malenko (2014) to estimate bidders' valuations from the unstructured bidding process.

[11] In some instances, a target will pre-empt this takeover announcement and issue a press release that they are in the process of looking for acquirers.

3. Stylized Facts and Sample Data

To motivate the importance of goodwill and subsequent impairments, we report several stylized facts. Table 1 reports summary statistic data of goodwill impairments from Compustat over the sample period of June 2001 through December 2021. The first column shows that the probability a firm recognizes a goodwill impairment in a given year is 9.6%. This percentage varies by industry, with oil and gas firms having the highest probability (13.7%) and medical and pharmaceutical firms with the lowest (7.3%). The remaining columns in Table 1 show the fraction of the beginning-year goodwill amount that is impaired, conditional on the firm recognizing an impairment. Although the mean amount is 35.8%, there is significant skew as the median is only 22%. For instance, nearly 10% of all impairments are for the entire goodwill amount. For certain industries, this is significantly higher, as oil and gas firms have over 25% of all impairments are for the entire amount of goodwill. This table shows that goodwill impairments are not infrequent, and when they do occur, it is often a large fraction of goodwill.

Table 2 reports the fraction of the purchase price allocation for public acquirers from June 2001 until December 2021 that is attributed to goodwill. The data to construct this table are from BVWire's DealStat database, which is based on public acquirers' subsequent filings and the disclosed purchase-price allocation. This table shows nearly half (43.6%) of the purchase price is allocated to goodwill. Table 2 also shows this fraction varies substantially across industries. Oil and gas firms have the lowest average goodwill allocation (23.7%), whereas business equipment firms have the highest, with over half of the purchase price allocated to goodwill (50.1 %). Presumably, this variation implies the

effect of goodwill accounting will vary by industry. Overall, Tables 1 and 2 show that goodwill is a sizeable fraction of the purchase price and subsequent impairments are a significant reduction in goodwill's carrying value.

We analyze a sample of 861 corporate takeover auctions that were effective from July 1st 2001 to September 2022. The sample start date ensures that all takeovers are subject to SFAS 142.[12] We identify takeover auctions and collect the data following Gorbenko and Malenko (2014).[13] Briefly, we identify all takeovers of publicly-traded non-financial firms in the Refinitiv SDC Platinum data with a non-missing deal value and where the acquirer sought 100% of the target's shares. We further restrict the sample to deals that were completed with an all-cash consideration.[14] We identify whether a deal was a negotiation from the deal background section of the SEC merger filings of the target company (PREM14A, DEFM14A, SC-TOT, and S4). Consistent with prior literature (Boone and Mulherin, 2007; Gorbenko and Malenko, 2014), we classify a deal as an auction if two or more potential bidders execute confidentiality agreements with the target. For the sample of auctions, we hand-collect comprehensive information on the bidding process from the merger background disclosures. This includes the type of bidder, i.e., strategic or financial, the nature of their bid, formal, informal, no bid, or drop out, the value of each formal bid, and the date of any press release relating to the takeover auction.

Table 3 presents the summary statistics of our sample. The average bid premium is

[12] Although SFAS 142 went into full effect for fiscal years ending after December 15, 2001, it already applied to all deals completed after June 30, 2001. See https://www.fasb.org/page/PageContent?pageId=/reference-library/superseded-standards/summary-of-statement-no-142.html&bcpath=tff.

[13] Data from September 2001 to 2012 was generously provided to us by Alexander Gorbenko and Andrey Malenko.

[14] This restriction is necessary because the identification strategy relies on the value of the winning bid. The value of a (partial) stock bid is to some extent uncertain when the merger is consummated (Gorbenko and Malenko, 2014). Note, however, that we keep non-cash losing bids.

42.8% above the stock price 4 weeks before the takeover announcement or the stock price one day before the first press release about the auction, whichever is earlier. The average number of bidders is 11; however, this amount has significant skew as the median is only 6. On average 29% of bids in an auction are formal bids. Within the set of bidders, approximately 41% are strategic, 29% are financial, and the remainder are of unknown type. This split also manifests itself in the distribution of winners as we find that strategic bidders win 63% of deals. For the auctions with a public acquirer, we collect purchase price allocation from BVWire DealStats and complement it with hand-collected data whenever missing. Among the 304 deals that we can find PPA information, the average allocation to goodwill equals 46.3%. This fraction is significant and suggests that the accounting treatment of goodwill can meaningfully influence the takeover market. The remaining summary statistics largely comport to findings in prior research.

4. Model

Bidders decide how much to bid for the target company based on their private value from acquiring the target and the competition from other bidders. Bidders can either be strategic acquirers (e.g., competitors) or financial sponsors (e.g., private equity funds), and their values are drawn from a distribution specific to their bidder type. We make this distinction because prior research observes these two types of acquirers often prefer targets with different characteristics (e.g., Gorbenko and Malenko, 2014; Gorbenko, 2019).

We assume a bidder will bid such that the bidder receives a positive surplus from acquiring the target. Thus, bidder i will only acquire target j if the expected benefits, $v_{i,j}$, from acquiring the target exceed the cost of the acquisition, $b_{i,j}$, i.e., $v_{i,j} - b_{i,j} \geq 0$.

How close the bid, $b_{i,j}$, is to i's value, $v_{i,j}$, is in part determined by the number of bidders because bidder i does not allow another to acquire the target with a bid that is less than $v_{i,j}$. Consequently, the winning bidder will receive a smaller surplus because as the number of bidders increases, $b_{i,j} \to v_{i,j}$. Thus, when there are more bidders, potential acquirers must offer more competitive bids to win.

4.1 Accounting Impact

Each bidder's value is based on a combination of the discounted stream of expected cash flows and earnings and a personal benefit from the acquisition, e.g., from empire building (e.g., Morck, Shleifer and Vishny, 1990). We assume earnings factor into bidders' assessment of value following prior literature (Baiman, Fischer, Rajan and Saouma, 2007; Marinovic, 2017). As a result, accounting influences how much bidders value the target and what they are willing to pay. In particular, bidders must follow the accounting standard, a, for allocating their purchase price across the target's assets. This standard determines whether the purchase-price allocation results in future expenses, such as amortization of goodwill. Thus, a directly affects a bidder's expected surplus.

Let S be the surplus bidder i receives from winning the auction and acquiring the target. We assume that the value derived from acquiring j is comprised of the personal benefit to the manager, $F_{i,j}$, and the discounted stream of expected cash flows and earnings. The terms $\mathbb{E}[d_t]$ and $\mathbb{E}[e_t]$ are the expected cash flows and earnings for time t. We include $F_{i,j}$ because we are agnostic as to whether $v_{i,j}$ reflects the fundamental value of the target or whether it is also determined by ulterior motives of the potential acquirer, such as empire-building by the acquiring firm's manager. If $v_{i,j}$ reflects fundamental value, the

resulting goodwill reflects legitimate synergies between the acquirer and the target. If $v_{i,j}$ also reflects ulterior motives, the resulting goodwill will also reflect overpayment.

The relative weight the manager places on earnings relative to cash flows is determined by the weight $w \sim h(\theta)$. We assume this weight is drawn from the distribution $h(\theta)$ governed by the parameter θ because different bidders may overweight or underweight earnings relative to cash flows. We suppress the index on w for ease of notation. Therefore,

$$S_{i,j} = F_{i,j} + \sum_{t=0}^{\infty}(1-w)\mathbb{E}[d_t]\delta^t - (1-w)b_{i,j} + \sum_{t=0}^{\infty} w\mathbb{E}[e_t]\delta^t, \tag{1}$$

where δ is the discount factor. If the bidder only cares about cash, $w = 0$. Thus, the first three terms of this expression are what the cash-focused bidder cares about: the personal benefit, the discounted cash flows generated by the acquisition, and the initial cash outlay. The last expression is the earnings impact, which influences the surplus when a bidder cares about earnings.

Cash flows differ from earnings by the non-cash cash charges that result from the acquisition. Therefore, we disaggregate earnings, e_t, into cash flows, d_t, and the fraction of the purchase price recognized as an expense in period t under the accounting regime a, α_t^a. For example, if the firm must amortize the purchase price over ten years, then $\alpha_t = 0.1$ for $t \in \{1, ..., 10\}$ and 0 afterward. Thus,

$$e_t = d_t - \alpha_t^a b_{i,j}. \tag{2}$$

The fraction of the purchase allocated to the target's net assets with a finite life will lead to future amortization expenses. For net assets with an indefinite life and goodwill, as $t \to \infty$, there will eventually be a negative shock sufficiently large such that these assets

will require an impairment. Therefore, $\sum_{t=0}^{\infty} \alpha_t^a = 1$.[15] Using this identity and Equation 2, we can rewrite Equation 1

$$S_{i,j}(b_{i,j}; s) = \underbrace{F_{i,j} + \sum_{t=0}^{\infty} \mathbb{E}[d_t]\delta^t}_{\equiv v_{i,j}} - (1-w)b_{i,j} - w\sum_{t=0}^{\infty} \alpha_t^a b_{i,j}\delta^t \tag{3}$$

$$= v_{i,j} - b_{i,j}\left[(1-w) + w\sum_{t=0}^{\infty} \alpha_t^a \delta^t\right].$$

Bidder i allocates a fraction $g_{i,j}$ of the total purchase price to goodwill and the remaining $1 - g_{i,j}$ to net identifiable assets. Therefore, we disaggregate the earnings impact of the bid $b_{i,j}$ into its portion of goodwill, $g_{i,j}$, and net identifiable assets $n_{i,j} = 1 - g_{i,j}$. Given that the purchase price is divided between identifiable assets and goodwill, we similarly disaggregate the amortization schedule into the effects specific to identifiable assets, $\alpha_t^{a,id}$, and goodwill, $\alpha_t^{a,gw}$. Thus, we can recharacterize the impact of the bid on the manager's utility as

$$b_{i,j}\left[(1-w) + w\sum_{t=0}^{\infty} \alpha_t^a \delta^t\right] = b_{i,j}\left[(1-w) + w\sum_{t=0}^{\infty} \left(\alpha_t^{a,id} n_{i,j} + \alpha_t^{a,gw} g_{i,j}\right)\delta^t\right] \tag{4}$$

$$= b_{i,j}\left[(1-w) + w\sum_{t=0}^{\infty} \left(\alpha_t^{a,id} n_{i,j} + \alpha_t^{a,gw} g_{i,j}\right)\delta^t\right],$$

and rewrite the manager's surplus from Equation 3 as

$$S(b_{i,j}; s) = v_{i,j} - b_{i,j}\left[1 - w + w\sum_{t=0}^{\infty} \left(\alpha_t^{a,id} n_{i,j} + \alpha_t^{a,gw} g_{i,j}\right)\delta^t\right] \tag{5}$$

$$= v_{i,j} - b_{i,j} A_{i,j}^a.$$

The term $A_{i,j}^a$ is the proportion of the bid price that bidders internalize in their utilities. For a cash-focused bidder, $w = 0$, which implies $A_{i,j}^a = 1$ because this bidder cares about

[15] Because the bid price affects future earnings through amortization and impairments, an earnings-focused bidder does not directly internalize the initial cash outlay. If an earnings-focused bidder also internalized the cash outlay, the bidder would "double-count" the acquisition price because she would care about the initial payment *and* the future earnings decreases from amortization and impairment expenses.

the initial cash outlay to acquire the target. For bidders who care about earnings, $w > 0$, which implies $A^a_{i,j} < 1$. These bidders impound a smaller amount of the bid into their utilities because the bidder incurs the acquisition cost during future-period amortization and impairment expenses, which are discounted to the present by the discount factor δ.[16]

4.2 The bidder's problem

With this setup, we can now write the bidder's problem. The bidder i chooses a bid $b_{i,j}$ for target j to maximize her expected surplus, multiplied by the probability of winning the takeover auction,

$$\max_{b_{i,j}} (v_{i,j} - A^a_{i,j} b_{i,j}) Pr(b_{i,j} \geq b_{k,j} \forall k \neq i). \tag{6}$$

To characterize this problem in the usual auction framework, we reformulate the bidder's problem as

$$\max_{b_{i,j}} A^a_{i,j} \left(\frac{v_{i,j}}{A^a_{i,j}} - b_{i,j} \right) Pr(b_{i,j} \geq b_{k,j} \forall k \neq i), \tag{7}$$

and define the pseudo-value of bidder i for target j as $\tilde{v}_{i,j} = \frac{v_{i,j}}{A^{(s)}}$. With this adjustment, the bidder's problem is equivalent to

$$\max_{b_{i,j}} \left(\tilde{v}_{i,j} - b_{i,j} \right) Pr(b_{i,j} \geq b_{k,j} \forall k \neq i). \tag{8}$$

5. Empirical Strategy

This section describes how we identify and estimate the primitives of the auction model. To do so, we need to estimate the parameters governing the distribution of underlying

[16] For example, consider the case where the identifiable assets in an acquisition are depreciated or amortized over the next T periods while goodwill is indefinitely lived and subject to annual impairment testing. Hence, $\alpha^{a,id}_t = \frac{1}{T}$, $t \in 1, \ldots, T$ and zero otherwise, while α^{a,g^w}_t is generated stochastically. Assuming risk-neutrality, bidder i with a given w would therefore internalize $A^a_{i,j} = 1 - w \left[1 - n_{i,j} \frac{\delta(1-\delta^T)}{1-\delta} - g_{i,j} \mathbb{E} \left(\sum_{t=0}^{\infty} \tilde{\alpha}^{a,g^w}_t \delta^t \right) \right]$

valuations $v_{i,j}$, including bidders' earnings preferences relative to cash flows.

5.1 Identification

The unstructured nature of takeovers does not allow us to impose a standard auction format to identify the distribution bidder valuations. Instead, we follow an approach developed by Haile and Tamer (2003) and adjusted by Gorbenko and Malenko (2014) to estimate the distribution of bidder valuations in non-standard auctions. In particular, identification comes from three assumptions:

1. A bidder does not submit a bid that would leave her with a negative surplus, i.e., bid more than her value for the target
2. A bidder does not allow a bid to win that she could beat with a non-negative surplus
3. A bidder does not make informal, noncommittal bids if her pseudo-valuation is below the value of the target as a standalone company, i.e., the target's market value

These assumptions provide five non-parametric restrictions that help identify the distribution of bidder pseudo-values, $\frac{v_{i,j}}{A^a_{i,j}}$. To see how these restrictions aid in identifying the distribution, suppose bids for target j are sorted in decreasing order so that $b_{1,j}$ is the winning bid. Further, suppose the distribution of pseudo-values is represented by the black line in Panel A, Figure 1, and the dashed vertical line is the winning bid, then:

- A winning bid implies $b_{1,j} < \frac{v_{1,j}}{A^a_{1,j}}$. Thus, this bidder's pseudo-value must be in the shaded region in Panel B of Figure 1.
- A formal losing bid from bidder i implies $b_{i,j} < \frac{v_{i,j}}{A^a_{i,j}} < b_{1,j}$. Thus, this bidder's pseudo-value must be in the shaded region in Panel C.

- An informal losing bid from bidder i implies $1 < \frac{v_{i,j}}{A^a_{i,j}} < b_{1,j}$. Thus, this bidder's pseudo-value must lie within the shaded region in Panel D.
- If a bidder makes neither a formal nor an informal bid, i.e., this bidder declines to bid, then $0 < \frac{v_{i,j}}{A^a_{i,j}} < b_{1,j}$. Thus, this bidder's pseudo-value is in the shaded region of Panel E.
- If a bidder states that their value is below the market value, then $0 < \frac{v_{i,j}}{A^a_{i,j}} < 1$. Thus, this bidder's pseudo-value is in the shaded region in Panel F.

By knowing the regions in the distribution where pseudo-values are located and incorporating additional parameterization assumptions (discussed below), we can trace the distribution of pseudo-values.

5.2 Parameterization Assumptions

On their own, the assumptions of the previous section only provide set-identification (Haile and Tamer, 2003). Therefore, we need to impose parametric assumptions of bidders' valuations to achieve point identification. We follow Gorbenko and Malenko (2014) and assume that the bidders' values follow a log-normal distribution with a common and an idiosyncratic component:

$$v_{i,j} = \exp\{X_{i,j}\beta_i\} \exp\{\epsilon_{i,j}\} \tag{9}$$

with $\epsilon \sim N(0, \sigma_i)$. The vector $X_{i,j}$ corresponds to the observable bidder, target, and time characteristics, representing the target's common value component. The term $\epsilon_{i,j}$ corresponds to the idiosyncratic component of value and represents bidder i's preferences for target i that are unobservable to the econometrician.

We assume the parameters that determine $v_{i,j}$, β_i, and σ_i, are the same for bidders

of type $z \in \{Financial, Strategic\}$.[17] Thus, $\beta_i = \beta_z$ and $\sigma_i = \sigma_z$. We assume that financial bidders only care about cash flow, so if i is a financial bidder, $w_i = 0$ and $A_{i,j} = 1$. Strategic bidders have some preference for future earnings, so if i is a strategic bidder, $w_i \geq 0$ and $A_{i,j} \leq 1$. However, we do not assume all strategic bidders are alike in their preferences for earnings relative to cash flows. We assume strategic bidders have heterogeneous preferences because strategic bidders contain both private and public bidders who are known to value earnings differently.[18] Furthermore, even among public acquirers, preferences for future earnings vary in the cross-section and time-series, such as for management compensation reasons (Healy, 1985). We therefore assume that the accounting preference of strategic bidder i is drawn from a beta distribution with shape parameters $a = 1$ and $b = \theta$. Thus, $w \sim h(\theta)$.

The beta distribution offers two desirable properties that make it well-suited as a parametric assumption from which w_i is drawn.[19] First, beta distributions have support over the interval $[0, 1]$, which ensures that a bidder's weight on earnings relative to cash flows does not exceed 1 or is negative. Second, the beta distribution is flexible, and depending on the shape parameters, the resulting distribution can be unimodal, U-shaped, left or right-skewed. We assume the distribution is right skewed to account for the fact that some strategic bidders, such as private firms, are primarily focused on cash flows. We ensure the distribution of w_i is right skewed by requiring $\theta > 1$. Doing so

[17] SEC filings that describe the merger history typically only distinguish financial and strategic bidders. We can only infer whether a bidder was a public or private firm for winning bids, which is not enough variation to estimate a separate valuation distribution.

[18] We assume private and public strategic bidders bid as if they must treat goodwill under an impairment-only regime. This ignores the alternate accounting treatment for private firms under ASU-2014-02, where private firms can elect to amortize goodwill on a straight-line basis over ten years.

[19] For other examples that use the beta distribution in structural models in accounting, see Huber (2022) and McClure (2023).

allows a sizeable fraction of strategic bidders to have w_i near zero, which implies they strongly prefer cash flows over earnings. For instance, this constraint accommodates the possibility that private strategic bidders may not have strong preferences for earnings.

5.3 Estimation

Bids are a function of bidder, target, and time characteristics and the structural parameters β_i and σ_i. We estimate the structural parameters via simulated maximum likelihood estimation (SMLE). Briefly, SMLE is used when estimating parameters by maximum likelihood estimation is infeasible because there is no closed-form solution for the likelihood function. SMLE simulates a large number (in our case, 500) of simulated observations for a guess of parameter values, computes the likelihood function, and compares it to the observed data. SMLE iterates these steps by changing parameter values until the simulated likelihood converges. See Cameron and Trivedi (2005) for details on the method.

Using the distributional assumptions from Section 5.2 and the five restrictions from Section 5.1, every observed bid maps into a well-defined contribution to the likelihood. For example, assumption 1 implies that the winning bidder needs to have a pseudo-valuation weakly greater than her winning bid. Let $L^z(b_{i,j}; x, \beta_z, \sigma_z|w)$ be the likelihood contribution from bidder i of type z, which is conditional on the characteristics, x, structural parameters β_z and σ_z, and preference for earnings w, then the likelihood for the winning bidder, $i = 1$ is

$$L^z(b_{1,j}; x, \beta_z, \sigma_z|w) = 1 - \Phi\left(\frac{\log(b_{1,j}) - X_{1,j}\beta_z + \log(A^a_{1,j}(w))}{\sigma_z}\right),$$

where $\Phi(\cdot)$ is the cdf of the standard normal distribution. Hence, this likelihood corre-

sponds to the area under the upper tail of the pseudo-value distribution.[20]

To arrive at the unconditional likelihood contribution, note that for financial bidders, $A_{i,j} = 1$ because $w = 0$. The likelihood contributions of all other bids can be constructed similarly and are reported in the appendix. Note that for strategic bidders, because $w > 0$ is drawn from the distribution $h(\theta)$ and we do not observe it directly, we need to take the integral over the support of $h(\theta)$. Accordingly, the likelihood contribution becomes:

$$L^{strategic}(b_{i,j};\cdot) = \int_0^1 L^z(b_{i,j}; x, \beta_z, \sigma_z|w)h(\theta)\,\mathrm{d}w. \tag{10}$$

To estimate the parameters, we minimize the following log-likelihood:

$$\min_{\beta,\sigma,\theta} \sum_j \sum_i \log\left(\prod_z p_{i,j}^z L^z\left(b_{i,j}\right)\right), \tag{11}$$

with p^z being the probability of bid $b_{i,j}$ being submitted by a bidder with type z. Including p^z allows us to include losing bids where the type of bidder is unknown.

Three complications arise in our estimation. First, when bidders determine the expected value of a target, they do not know whether goodwill will need to be impaired in the future and, if so, by how much. We assume rational expectations by the firm, so the firm's belief of the likelihood of a goodwill impairment mirrors the realized distribution of impairments in Table 1. For instance, in our data, the probability of a firm needing to impair goodwill is 9.6%. We assume bidders correctly infer this probability when determining their private value for the target. Rational expectations also apply to the size of the impairment, conditional on an impairment happening.

The stochastic nature of goodwill impairments requires us to model the evolution of the target's value in the years after it is acquired. To do so, we simulate the evolution

[20] All remaining conditional likelihoods are derived in the appendix.

of goodwill over the next 200 fiscal years for each of our 500 simulated observations. When discounting future cash flows, earnings, and the effect of goodwill's accounting treatment on the acquiring firm's utility, we follow prior research and set the discount rate $\delta = 0.9$ (e.g., Taylor, 2013; Zakolyukina, 2018). In each year, an impairment occurs with the empirically observed probability. If an impairment occurs, the size of the impairment, relative to the firm's overall goodwill amount, is randomly drawn from the empirical distribution of impairment charges.

The second complication occurs because we only observe purchase-price allocations when the winning bidder is a public company. Hence, we have to impute the fraction of the goodwill allocation, $g_{i,j}$, when the winning bidder is a privately-held strategic bidder and for all losing bids. To approximate the goodwill allocation when the winning bid is a private firm, we assume they allocate goodwill according to the mean allocation to goodwill in the target firm's Fama-French 12 industry. For losing bids, we impute the minimum of the industry mean or the allocation of the winning bidder (if observable).[21]

The third complication is we do not observe the type of every losing bidder. Although many SEC filings with background on the merger distinguish between financial and strategic bidders for losing bids, it is not universal, especially not in the early stages of a takeover auction. When we do not observe the bidder type, we infer the type of bidder using a determinants model with the sample of losing bids where the type is known

[21] When we observe a formal bid, we could have also assumed that the fair value of identifiable assets would be the same as for the winning bid (if the winning bid is public) and imputed the goodwill allocation as the remainder. Such an approach would still leave the problem of informal bids, which comprise most of the bids. For consistency, we impute the goodwill allocation for all losing bids similarly. Such an assumption is consistent with bidders making bids before having allocated the purchase price to individual assets and therefore bid with an expectation over the percentage of goodwill rather than on how much identifiable assets are worth. This distinction matters for whether a marginal increase of the bid is allocated 100% to goodwill or only a fraction of it.

following Gorbenko and Malenko (2014). Specifically, we estimate the following logistic regression

$$Strategic_{i,d,t} = X'_{d,t}\beta + \varepsilon_{i,d,t}, \tag{12}$$

where $Strategic_{b,d,t}$ is an indicator for whether bidder i in deal d at time t was a strategic bidder, and $X_{d,t}$ is a vector of deal and target-firm characteristics that follows Gorbenko and Malenko (2014). We use the results from this regression with industry fixed effects to assign probabilities a losing bidder with an unknown type is a strategic or a financial bidder and, thus, estimate how much this bidder cares about the treatment of goodwill.

Table 4 reports the results from this regression. Column 1 shows that strategic bidders are more likely to target firms with a higher Tobin's Q and R&D and lower leverage, cash flows, and credit spreads. Strategic bidders are also more likely to bid when there are fewer bidders and when a financial bidder does not make the winning bid. Column 2 includes Fama-French 12 industry fixed effects and shows similar results. Overall, these results are consistent with the findings in Gorbenko and Malenko (2014).

6. Results

6.1 Distribution of Takeover Valuations

We use a simulated likelihood model, as described in Section 5, to estimate the factors influencing the valuation of the target by different types of bidders. Our findings are summarized in Table 5. In Columns 1 and 2, we present estimates from a reduced model that excludes target and market characteristics for strategic and financial bidders. Columns 3 and 4 display estimates from the full model for both bidder types.

Similar to the study by Gorbenko and Malenko (2014), we observe that strategic bidders have a lower intercept than financial bidders in Columns 3 and 4. However, the average valuation of strategic bidders is higher, as shown in the first two columns. In Columns 1 and 2, the estimates suggest that strategic bidders value a target at approximately 1.07 times its market valuation, not taking into account the accounting preferences, while financial bidders value it at around 1.01 times.[22]

The key differences between financial and strategic bidders are related to target size, market-to-book ratio, and cash holdings. Financial bidders prefer smaller targets with lower market-to-book ratios and higher cash amounts. Both strategic and financial bidders' valuations are influenced by current equity market conditions. Valuations tend to be higher when the market return in the previous month is higher. Contrary to intuition, valuations also increase with credit spreads, which can be attributed to credit spreads showing little variation over the sample period but significantly increasing during the financial crisis when other indicators decrease. Therefore, the coefficient on credit spread becomes important for the model to explain acquisition activity during that period.

Interestingly, we find that valuations exhibit considerable dispersion, with standard deviations of 0.173 and 0.219 for strategic and financial bidders, respectively. Under the assumption of a lognormal distribution, this implies that the standard deviation of underlying values is approximately 20% and 24% of the current market value of the target for strategic and financial bidders respectively.[23]

Finally, the crucial parameter in our estimation is θ, which governs the distribution

[22]Note that the mean of a lognormal variable is equal to $\exp(\mu + \sigma^2/2)$

[23]Note that the variance of a log normal variable equals $\left(\exp(\sigma^2) - 1\right) \exp(2 * \mu + \sigma^2)$.

of acquirers' preferences between earnings and cash flows. The estimate of $\hat{\theta} = 2.52$ suggests a mean value of approximately $E(w) = 0.28$, indicating that strategic bidders, on average, assign more than twice the weight to acquired cash flows compared to the acquired earnings stream. We show the distribution of w and its mean based on our estimate of θ in Figure 2. Taking into account the expected value of w and the distribution of the impairment data, we find that $A^{imp} = 0.85$. In other words, public strategic bidders only internalize 85% of their bids in their surplus. Consequently, they can afford to be about 15% more aggressive in their bidding compared to financial or private bidders, who are primarily concerned with the cash flow implications of acquiring a target.

7. Counterfactuals

7.1 Counterfactual Simulation Procedure

We conduct counterfactual simulations to estimate how the M&A market would change under different competitive environments and alternative accounting rules for goodwill. We focus on three policy experiments. First, we consider the first-best scenario where bidders care only about the cash effect from the acquisition and disregard the accounting implications. Second, we consider how mergers would change under various accounting regimes, including different amortization periods and amortization regimes that annually test for impairment if the underlying value of goodwill falls below the amortized value. Finally, we consider changing the composition of bidders would affect mergers.

To set up our counterfactual experiments, we simulate 10,000 auctions and set the characteristics equal to the average values of target and market characteristics. For each auction, we randomly draw the number of bidders from its empirical distribution in the

data truncated at the 95% quantile (35 bidders). We randomly assign each bidder a type (strategic or financial) based on the actual proportion in the data. Having assigned each simulated bidder a type, we draw an idiosyncratic component of value, $\epsilon_{i,j}$, and compute the fundamental valuation, $v_{i,j}$, for each bidder based on the estimates from Section 5. We then draw an accounting preference, w, for each strategic bidder from the beta distribution with our estimated parameter $\hat{\theta}$ and calculate their valuation adjustments, $A^a_{i,j}$. When a bidder is financial, or it is the counterfactual where bidders only care about cash, we set the valuation adjustment equal to one, $A^a_{i,j} = 1$.

With this setup, we simulate the bidding process following the approach of Gorbenko and Malenko (2014). This process is an ascending auction with jump bids to reflect the discrete bid increases observed in the data. In each round of bidding, a bidder is randomly selected to submit a bid. If the bidder's pseudo-value, $\tilde{v}_{i,j}$, surpasses the current highest bid, the bidder updates her bid by increasing it by a random percentage of the target's market value uniformly distributed between 1% and 10%. In instances when this jump exceeds the bidder's pseudo-valuation, we set their bid equal to their pseudo-value. If the prevailing bid exceeds the chosen bidder's pseudo-value, the bidder drops out of the auction. If none of the bidders' pseudo-values exceed the current market value of the target, the auction fails.

For each counterfactual, we examine both the valuation and aggregate outcomes of mergers to better understand the impact of these hypothetical changes. For valuation outcomes, we focus on the deal premium, the valuation of the second-highest bidder, the percent of deals that fail, which are those deals where no winner has a bid greater than

the market value, and the probability a financial bidder ("PE") wins the auction.[24] For aggregate changes, we examine the aggregate amount of deal volume and the change in asset value acquired by financial bidders.

7.2 Accounting, Valuations, and the Role of Competition

Recall that our estimates imply that under an impairment-only regime, strategic acquirers act as if they only internalize 85% of the purchase price. In other words, if they only cared about the underlying cash flows, their valuations would be 15% lower. Our first counterfactual, labeled *Cash* in Table 6, uses the benchmark where all bidders only care about cash. By comparing this counterfactual to our as-observed outcomes, we can quantify how preferences for earnings interact with competition in determining deal outcomes.

In this counterfactual, where *every* bidder cares only about price, aggregate deal valuations decline by 9.94%, and deal premiums decrease by 13.7 percentage points. Both statistics are lower than the 15% decline in strategic bidders' valuation when they only care about cash. This difference illustrates that competition from bidders less sensitive to accrual accounting can partially offset the valuation change and lead to a muted response in transaction prices. This result also highlights that focusing solely on public bidders' valuations and disregarding the effect of competition, as in Bartov et al. (2021), provides an incomplete picture of how underlying valuations change as it ignores the impact of competition.

We use this insight that merger outcomes result from competition and valuation effects

[24]The valuation of the runner-up would be the realized deal value if the takeover auction were structured as a second-price auction instead of one with jump bidding.

to examine the impact of goodwill accounting standards. As a first step, we compare the difference in pseudo-valuations for strategic bidders under impairment and amortization-only regimes with varying amortization periods. Panels (a) and (b) of Figure 3 show the expected percent changes in strategic bidders' valuations across different amortization regimes and goodwill allocations relative to the current impairment-only regime. Focusing on the 10-year amortization horizon with impairments, which corresponds to the option currently available to private companies, we find that valuations are approximately 6% lower compared to the impairment-only regime for a 40% allocation of goodwill, which closely aligns with the sample average.

This figure shows that as the length of the amortization period increases, the valuations under impairment and amortization converge, resulting in smaller percent differences. The alternative of amortization with impairment is strictly more conservative than an impairment-only standard, so the pseudo-valuations never fully converge. For amortization-only regimes, we find an inflection point at the 35-year amortization period. Furthermore, considering the underlying distribution of impairment charges, we find that the expected annual impairment charge of 3% of goodwill closely aligns with the annual amortization charge for a 33-year amortization policy.

Consistent with intuition, valuation differences increase as the proportion of deal value allocated to goodwill in an acquisition increases. Additionally, we observe that the sensitivity of pseudo-valuation differences to the amortization horizon intensifies with higher levels of recognized goodwill in the acquisition.

7.3 The Effect of Accounting Standards on Merger Outcomes

Having shown how strategic bidders' expected valuations relate to alternative accounting treatments of goodwill, we next examine accounting's effect on merger outcomes. The results from our counterfactual simulations are summarized in Table 6. The first row reports the simulation results that mirror the observed M&A market: goodwill is only tested for impairment and the composition of bidders mimics what we observe in the data.

We compare the as-observed results with two amortization standards that each have varying amortization periods. The block of rows labeled *Amortization with Impairment* considers an amortization standard with annual impairment testing of goodwill, while the last block of rows (labeled *Amortization*) considers an amortization-only standard. When discussing the results, we refer to the *Amortization with Impairment* regime over 10 years as our main counterfactual because it corresponds to ASC 350-20-35, which permits private firms to amortize goodwill over a period no longer than 10 years and requires the firm to impair assets should they need to. Moving from an impairment regime to a counterfactual regime of amortization with impairments, we estimate a decrease in deal premium of 5.98 percentage points. This decline reflects strategic bidders' valuations declining because they must, at a minimum, amortize the cost equally over 10 years instead of delaying recognition until impairment. Consequently, we observe runner-up valuations decline by about 5.6 percentage points and a 10% increase in the likelihood of deals failing.

Considering both the reduction in valuations and the increase in failed auctions, our

counterfactual results suggest a significant 4.29% reduction in total deal value. To put this decline into perspective, this reduction would amount to approximately $68.6 billion in total M&A deal value for 2021 (4.29% times $1.6 tn).

Furthermore, transitioning to an amortization regime would not only affect deal valuations but also change who controls productive assets in the economy. In particular, strategic acquirers bid less aggressively because their valuations are reduced. Consequently, there would be a decrease in the fraction of auctions won by strategic bidders as financial bidders are approximately 7 percentage points, or 25%, more likely to win a takeover auction. As a result, we estimate that the value of assets acquired by financial bidders would increase by 20.73%. When we switch to an amortization-only regime, we find similar but slightly attenuated results. Overall, Table 6 shows accounting rules substantially impact the merger market.

7.4 Industry-specific Outcomes

The counterfactual analyses presented so far have been based on average target characteristics and goodwill allocations, overlooking the substantial heterogeneity observed across different industries as shown in Tables 1 and 2. To address this limitation, we conduct separate counterfactual simulations for each of the 12 Fama-French industries, accounting for their specific characteristics. In these industry-specific counterfactuals, we simulate target valuations by applying the average target characteristics and goodwill allocation corresponding to each industry.

Table 7 summarizes the results for two industries: Business Equipment and Oil and Gas. We report these two industries because Business Equipment has the highest average

goodwill allocation, whereas Oil and Gas has the lowest.[25] Generally, the impact of transitioning to a 10-year amortization policy is positively correlated with the amount of goodwill allocation in each industry. For instance, in the Business Equipment industry, where 50.1% of the purchase price is allocated to goodwill, the decrease in aggregate deal values under the amortization policy is more pronounced, with a reduction of 5.00%. By contrast, for the Oil and Gas industry, where only 23.7% of the purchase price is allocated to goodwill, the decrease in aggregate deal values is smaller, at 2.14%.

The industry-specific counterfactuals also emphasize how variation in goodwill allocations can affect the competitive dynamics among potential acquirers, which can either mitigate or amplify the effects of accounting on valuations. This effect becomes apparent when comparing the fraction of winning bidders classified as financial. In our data, Oil and Gas companies have the highest proportion of private equity winners. But when an amortization regime is imposed, the probability of a financial bidder winning an auction increases more for Business Equipment targets, nearly equalizing the probability. This result implies that the accounting treatment for goodwill has a pronounced impact on deals where the goodwill allocation is the highest.

7.5 The role of the competitive environment

The previous counterfactuals assume the only change occurs with strategic bidder valuations, while the competitive environment remains unaffected. However, accounting rules impact strategic and financial bidders differently, potentially altering the composition of the bidder pool. We therefore explore the potential impact of the type of bidders competing for the target on our analysis of alternative accounting rules. We consider

[25] Due to space limitations, results for other industries are omitted but are available upon request.

counterfactuals where we increase the prevalence of financial bidders because takeovers become less attractive for strategic bidders when they must amortize goodwill.[26]

We consider bidder composition effects by comparing three competitive environments: first, the competitive environment as observed in the data; second, we add an additional financial bidder; third, we keep the same number of bidders but increase the proportion of financial bidders, effectively changing a strategic bidder to a financial one. For each of the three competition scenarios, we report summary statistics for three different accounting standards: an impairment-only regime, a 10-year amortization schedule, and a 10-year amortization schedule with impairments. We compare the two counterfactuals to the as-observed impairment result.

In the first set of rows, we report summary statistics for counterfactuals using the observed competition levels. Comparing these results to the second set of rows, which are the counterfactuals where we examine the extensive margin of financial bidders by adding one financial bidder, we observe that the counterfactual effects of an amortization regime are muted for deal valuation outcomes. This muted effect occurs because the increased competition from an additional bidder improves the payoff for the seller (Bulow and Klemperer, 1996). For example, we find the deal premium under 10-year amortization with impairment to be 2 percentage points higher than under the as-observed counterfactual with amortization and impairment. Similarly, because the number of failed deals also decreases, the effects on aggregate deal values are less than half than in the as-observed benchmark.

[26] A changing competitive environment could be micro-founded by having a cost to enter an auction, e.g., such as costly due diligence (Gentry and Stroup, 2019). With lower valuations of strategic bidders, more financial bidders may find it attractive to enter, whereas some strategic bidders might choose not to enter the auction in the first place.

The last set of rows reports the counterfactuals where we change the intensive margin of financial bidders. We do so by increasing the proportion of financial bidders by 8 percentage points, effectively replacing one strategic bidder with a financial bidder. This change decreases the effective level of competition because a high-value bidder is replaced by a lower-value bidder, in expectation. Hence, we observe that bid premia are lower, declining by an additional 3% for the impairment standard, and financial bidders are more likely to win. Consequently, the effects of requiring goodwill amortization are amplified by changing the competitive environment. Overall, Table 9 shows that competition and accounting standards meaningfully interact in determining merger outcomes.

8. Conclusion

This paper examines the impact of the accounting treatment of goodwill on the market for corporate control. In order to disentangle the accounting effects from the competitive effects faced by bidders, we develop and estimate a structural model of rational bidding. The model assumes the bidders' valuations of the target are a function of the target's characteristics. We assume strategic bidders can be sensitive to goodwill accounting, if they want to maximize a combination of earnings and cash flows, whereas financial bidders only maximize cash flows.

Our counterfactual analyses suggest strategic bidders' preference for earnings substantially boosts average deal premia and deal volume. This preference implies that changing the accounting for goodwill would influence merger activity. We estimate that moving from an impairment-only regime to an amortization regime for goodwill—as recently proposed by standard setters—will decrease the target valuations of public acquirers because

amortization expenses reduce future earnings. Our results suggest these hypothetical changes would reduce the bid premia and deal volume while shifting more assets to financial bidders. As a result, these findings provide insights into the real effect of accounting in the M&A market. We believe these conclusions may interest standard setters as they continue to debate whether to modify the accounting for intangible assets.

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Appendix A: Likelihood contributions

All bids and valuations are scaled by the market value of target j. $\Phi(\cdot)$ is the cdf of a standard normal distribution.

Winning bid

From assumption (1) it follows that the likelihood of that bid equals

$$\begin{aligned}
L^z(b_{1,j}; x, \beta_z, \sigma_z | w) &= P\left(b_{1,j} \leq \frac{v_{1,j}}{A^a_{1,j}}\right) \\
&= P\left(A_{1,j} b_{1,j} \leq v_{1,j}\right) \\
&= P\left(A_{1,j} b_{1,j} \leq \exp(X_j \beta_z) \exp(\epsilon_{1,j})\right) \\
&= P\left(\log(A_{1,j}) + \log(b_{1,j}) \leq X_j \beta_z + \epsilon_{1,j}\right) \\
&= P\left(\log(A_{1,j}) + \log(b_{1,j}) - X_j \beta_z \leq \epsilon_{1,j}\right) \\
&= 1 - P\left(\epsilon_{1,j} \leq \log(A_{1,j}) + \log(b_{1,j}) - X_j \beta_z\right) \\
&= 1 - \Phi\left(\frac{\log(b_{1,j}) - X_j \beta_z + \log(A^a_{1,j}(w))}{\sigma_z}\right)
\end{aligned}$$

Formal losing bid

From assumptions (1) and (2) it follows that the likelihood of that bid equals

$$\begin{aligned}
&L^z(b_{1,j}; x, \beta_z, \sigma_z | w) = P(b_{i,j} \leq \frac{v_{i,j}}{A^a_{i,j}} \leq b_{1,j}) \\
&= \Phi\left(\frac{\log(b_{1,j}) - X_j \beta_z + \log(A^a_{i,j}(w))}{\sigma_z}\right) - \Phi\left(\frac{\log(b_{i,j}) - X_j \beta_z + \log(A^a_{i,j}(w))}{\sigma_z}\right)
\end{aligned}$$

Informal losing bid

From assumptions (1), (2), and (3) it follows that the likelihood of that bid equals

$$L^z(b_{1,j}; x, \beta_z, \sigma_z | w) = P(1 \leq \frac{v_{i,j}}{A^a_{i,j}} \leq b_{1,j})$$
$$= \Phi\left(\frac{\log(b_{1,j}) - X_j\beta_z + \log(A^a_{i,j}(w))}{\sigma_z}\right) - \Phi\left(\frac{\log(1) - X_j\beta_z + \log(A^a_{i,j}(w))}{\sigma_z}\right)$$
$$= \Phi\left(\frac{\log(b_{1,j}) - X_j\beta_z + \log(A^a_{i,j}(w))}{\sigma_z}\right) - \Phi\left(\frac{-X_j\beta_z + \log(A^a_{i,j}(w))}{\sigma_z}\right)$$

No observed bid

The likelihood of observing a bidder not submitting equals

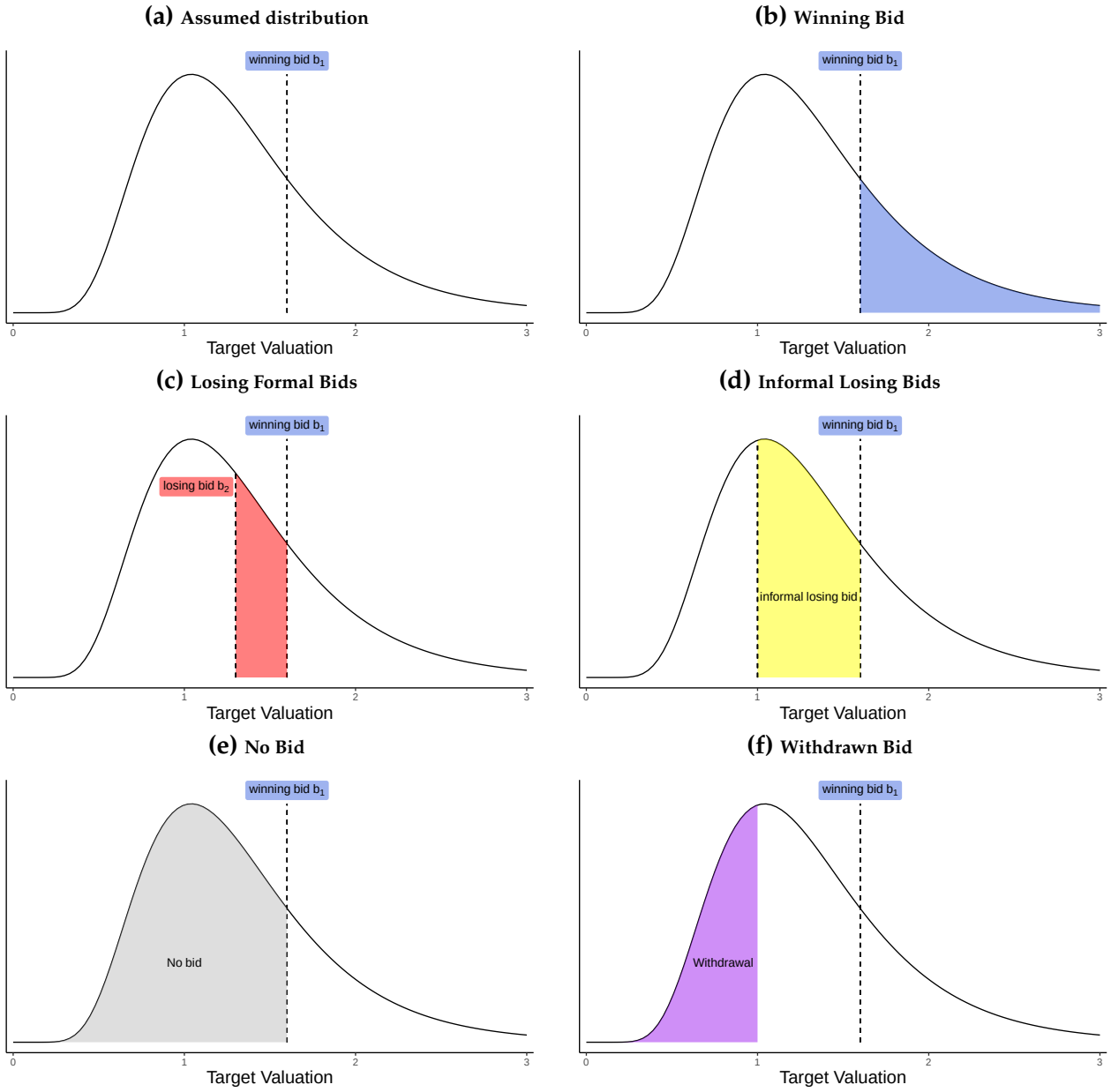
$$L^z(b_{1,j}; x, \beta_z, \sigma_z | w) = P\left(\frac{v_{i,j}}{A^a_{i,j}} \leq b_{1,j}\right) = \Phi\left(\frac{\log(b_{1,j}) - X_j\beta_z + \log(A^a_{i,j}(w))}{\sigma_z}\right)$$

Statement that valuation is below market value

From assumption (2) it follows that the likelihood of observing a bidder leaving the auction with this reason equals

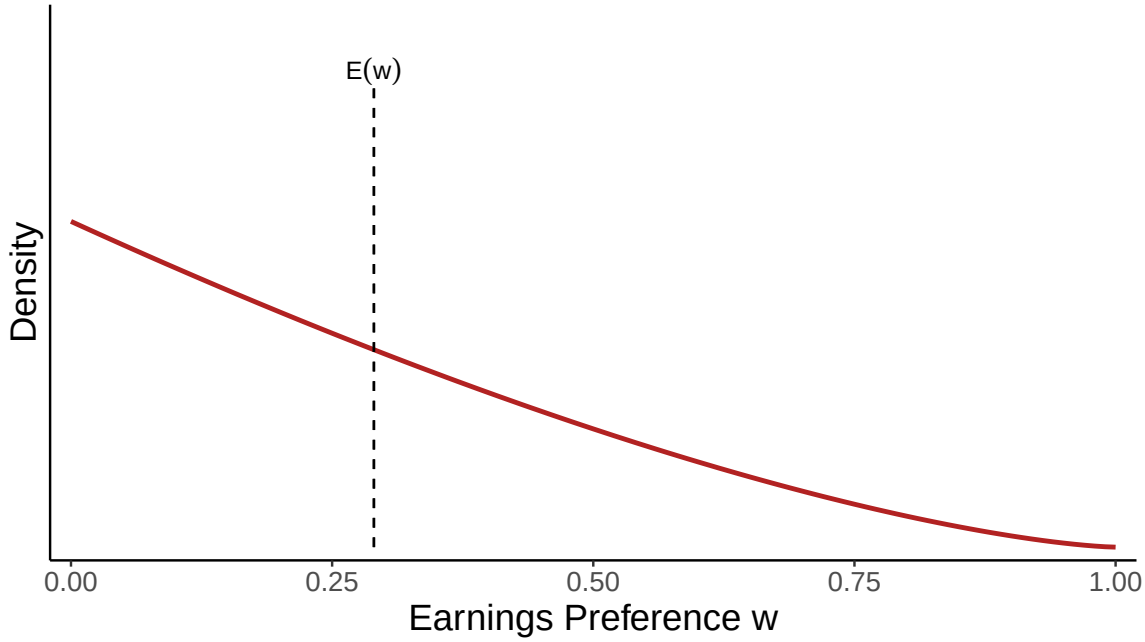
$$L^z(b_{1,j}; x, \beta_z, \sigma_z | w) = P\left(\frac{v_{i,j}}{A^a_{i,j}} \leq 1\right)$$
$$= \Phi\left(\frac{\log(1) - X_j\beta_z + \log(A^a_{i,j}(w))}{\sigma_z}\right) = \Phi\left(\frac{-X_j\beta_z + \log(A^a_{i,j}(w))}{\sigma_z}\right)$$

Figure 1: Identification of Pseudo-Values: An example



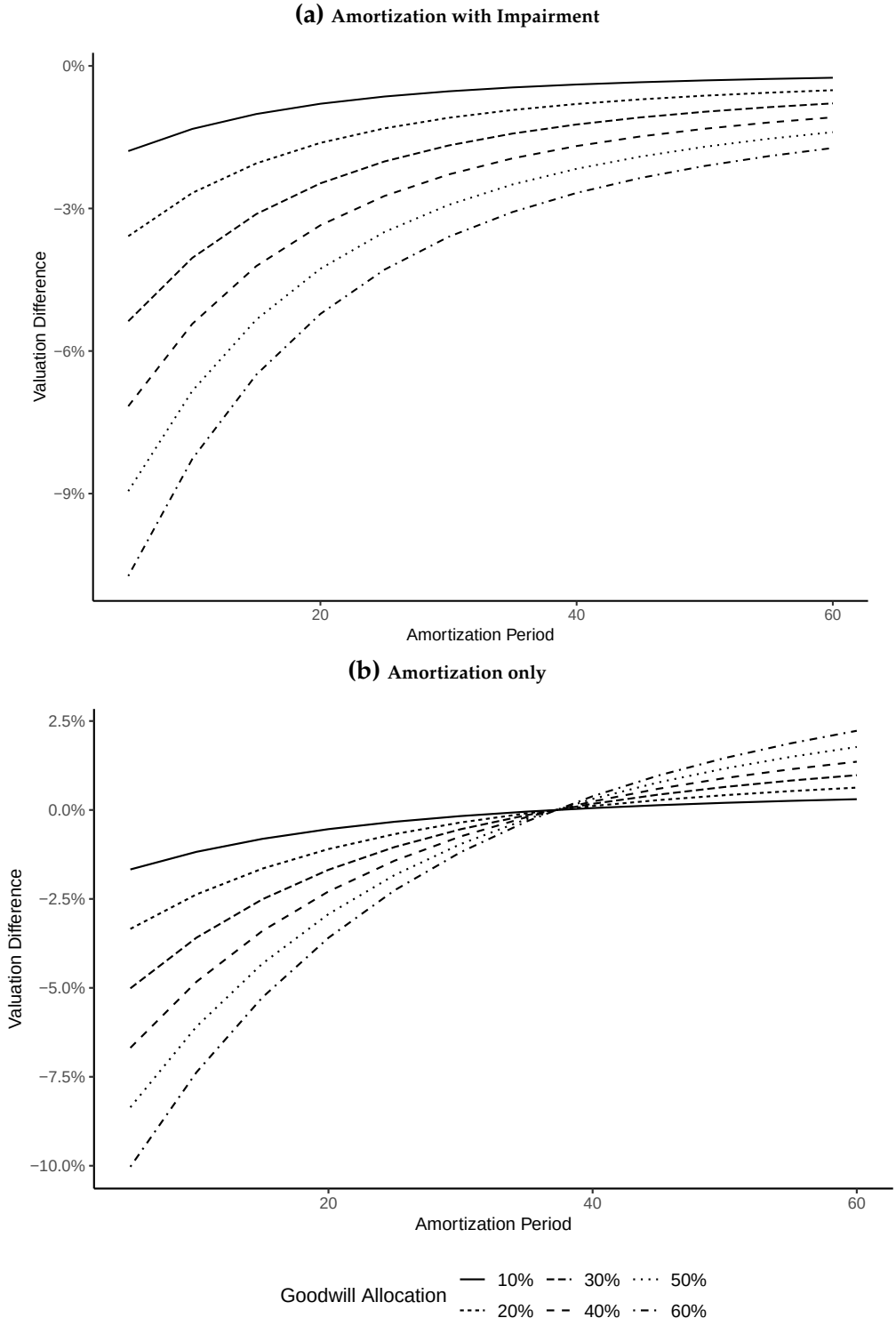
Notes: This figure shows an example of how the restrictions described in Section 5.1 induce ranges for the pseudo-values of bidders. In each panel, the solid line is the distribution, and the dashed vertical line is the winning bid.

Figure 2: Distribution of Earnings Preferences



Notes: This figure shows the distribution of strategic bidders' preference for earnings, w, based on the estimate of θ from column 4 of Table 5. The dashed vertical line is the mean value of w.

Figure 3: Pseudo-valuations under goodwill amortization



Notes: This figure shows the change in a strategic bidder's pseudo-valuation for a target, i.e., $v_{i,j}/A^a_{i,j}$, if the bidder was subjected to amortization instead of impairment of goodwill. It shows how this difference in valuation changes with the amortization period and the fraction of the purchase price allocated to goodwill. Panel A presents the valuation changes when the accounting standard requires amortization with impairments. Panel B presents the valuation changes when the accounting standard requires only amortization.

Table 1: Goodwill Impairments

		Impairment Magnitude							
Industry	P(Impairment)	N	Mean	StDev	$p^{10\%}$	$p^{25\%}$	$p^{50\%}$	$p^{75\%}$	$p^{90\%}$
All	0.096	6,575	0.358	0.352	0.009	0.044	0.220	0.623	0.997
Consumer Nondurables	0.114	536	0.274	0.326	0.004	0.018	0.114	0.456	0.905
Consumer Durables	0.104	253	0.292	0.314	0.010	0.034	0.168	0.464	0.846
Manufacturing	0.094	941	0.307	0.319	0.011	0.039	0.181	0.495	0.889
Oil and Gas	0.137	230	0.547	0.395	0.034	0.134	0.535	1.000	1.000
Chemicals	0.102	220	0.255	0.313	0.008	0.021	0.111	0.358	0.843
Business Equipment	0.087	1,350	0.439	0.362	0.015	0.090	0.368	0.796	1.000
Communication	0.135	332	0.300	0.327	0.004	0.028	0.163	0.535	0.861
Utilities	0.080	93	0.387	0.359	0.018	0.054	0.222	0.687	0.998
Wholesale and Retail	0.091	875	0.334	0.348	0.007	0.035	0.185	0.599	0.981
Medical and Pharma	0.073	548	0.434	0.392	0.007	0.061	0.298	0.881	1.000
Other	0.104	1,197	0.337	0.332	0.011	0.050	0.212	0.572	0.943

Notes: This table summarizes descriptive statistics on the occurrence and magnitude of goodwill impairments in the universe of Compustat firms and broken down by Fama-French 12 industries for fiscal years ending after June 6, 2001. *P(Impairment)* is the unconditional probability of observing a goodwill impairment charge for a fiscal year of a firm. *Impairment Magnitude* is the proportion of beginning-year goodwill impaired during a fiscal year with an impairment.

Table 2: Purchase Price Allocation to Goodwill

Target Industry	Mean	StDev	$p^{10\%}$	$p^{25\%}$	$p^{50\%}$	$p^{75\%}$	$p^{90\%}$	N
All	0.436	0.223	0.130	0.266	0.453	0.602	0.711	860
Manufacturing	0.454	0.187	0.204	0.334	0.474	0.585	0.673	61
Wholesale and Retail	0.464	0.201	0.264	0.365	0.462	0.570	0.681	44
Oil and Gas	0.237	0.206	0.000	0.065	0.204	0.370	0.502	43
Communication	0.386	0.187	0.173	0.256	0.383	0.486	0.635	39
Business Equipment	0.501	0.219	0.196	0.356	0.538	0.657	0.743	308
Consumer Nondurables	0.424	0.206	0.153	0.293	0.468	0.593	0.669	30
Utilities	0.319	0.202	0.055	0.188	0.305	0.479	0.540	25
Medical and Pharma	0.375	0.218	0.094	0.197	0.366	0.530	0.656	176
Chemicals	0.365	0.229	0.127	0.204	0.383	0.506	0.565	14
Consumer Durables	0.486	0.184	0.289	0.392	0.458	0.601	0.608	11
Other	0.460	0.223	0.141	0.322	0.494	0.614	0.719	109

Notes: This table summarizes descriptive statistics on the fraction of the purchase price of a takeover is allocated to goodwill. The data includes all M&A transactions with a public acquirer and a public target between June 2001 and September 2022 that are available from the DealStat database.

Table 3: Descriptive Statistics

	Mean	StDev	$p^{10\%}$	$p^{25\%}$	$p^{50\%}$	$p^{75\%}$	$p^{90\%}$	N
Premium (%)	42.785	36.440	12.795	21.212	34.140	52.603	83.938	861
No. of Bidders	10.595	12.425	2.000	3.000	6.000	13.000	23.000	861
Strategic Bidders	0.410	0.356	0.000	0.100	0.333	0.667	1.000	861
Financial Bidders	0.290	0.337	0.000	0.000	0.143	0.524	0.842	861
Formal Bid	0.295	0.223	0.056	0.125	0.250	0.471	0.500	861
Strategic Winner	0.631	0.483	0.000	0.000	1.000	1.000	1.000	861
Financial Winner	0.369	0.483	0.000	0.000	0.000	1.000	1.000	861
Goodwill PPA	0.463	0.224	0.156	0.297	0.478	0.623	0.715	304
Size	5.670	1.549	3.683	4.535	5.551	6.719	7.795	861
Leverage	0.174	0.229	0.000	0.000	0.078	0.304	0.500	861
Q-ratio	1.601	1.426	0.599	0.866	1.253	1.835	2.926	861
Cash Flow	0.007	0.250	-0.175	0.003	0.062	0.107	0.155	861
Cash	0.243	0.229	0.014	0.055	0.173	0.376	0.574	861
R&D	0.018	0.033	0.000	0.000	0.005	0.028	0.050	861
Intangbiles	0.205	0.213	0.000	0.013	0.139	0.350	0.536	861
S&P 500	0.086	0.150	-0.124	0.024	0.109	0.155	0.227	861
Credit Spread	0.026	0.007	0.017	0.019	0.026	0.030	0.033	861

Notes: This table shows summary statistics on the takeover auctions studied in this paper. *Deal Premium (%)* is the premium that the acquirer paid for the target relative to the target's stock price four weeks before the takeover announcement or on the day before the target issued a press release that they are engaged in a takeover process whichever is earlier. *No. of Bidders* is the number of parties that have signed a confidentiality agreement to participate in the auction. *Public Winner*, *Financial Winner*, and *Private Winner* are indicator variables equal to 1 if the winning bidder is a public company, a PE firm, or a private company respectively. *Goodwill PPA* is the fraction of the purchase price that acquirer allocated to goodwill. *Size* is the log of total assets of the target in the last quarter before the takeover announcement. *Leverage* is the target company's leverage ration in the last quarter before the takeover announcement. *q-Ratio* is the target company's Tobin's q in the last quarter before the takeover announcement. *Cash Flow* is the target company's total cash flow over the last four fiscal quarters scaled by total assets in the last quarter before the takeover announcement. *R&D* is the target company's R&D expense over the last four fiscal quarters scaled by total assets in the last quarter before the takeover announcement. *Intangibles* is the target company's total intangible assets scaled by total assets in the last quarter before the takeover announcement. *S &P 500* is the annualized return on the S&P 500 over the last fiscal quarter of the target before the takeover announcement. *Credit Spread* is the spread between Baa rated corporate bonds and the rate on 10-year U.S. treasuries on the day before the merger announcement

Table 4: Determinants of Bidder Type for Losing Bids

	Bidder Type = Strategic	
	(1)	(2)
Constant	2.608***	
	(0.292)	
Size	-0.059*	-0.100***
	(0.032)	(0.034)
Q-ratio	0.068*	0.095**
	(0.039)	(0.040)
Leverage	-0.260	-0.047
	(0.198)	(0.205)
Cash Flow	-1.015***	-1.046***
	(0.296)	(0.301)
Cash	0.334	0.531**
	(0.228)	(0.248)
Intangibles	-0.275	-0.104
	(0.170)	(0.204)
R&D	6.060***	3.934*
	(2.069)	(2.051)
S&P 500	-0.205	-0.240
	(0.286)	(0.298)
Credit Spread	-17.981***	-19.087***
	(5.911)	(6.067)
Log(# of bidders)	-0.651***	-0.657***
	(0.043)	(0.044)
Financial Winner	-0.984***	-0.965***
	(0.070)	(0.073)
Winning Bid	-0.006***	-0.006***
	(0.002)	(0.002)
Industry fixed effects	No	Yes
Observations	4,659	4,659
Pseudo R^2	0.164	0.180

Notes: This table summarizes the estimation results of a logit model that estimates the determinants of whether a losing bid is from a strategic firm or a financial sponsor. The sample of bids used to estimate this logit model is those losing bids where the bidder type is known. All variables are defined in Table 3. We cluster standard errors by target industry. Levels of significance are presented as follows: *p<0.1; **p<0.05; ***p<0.01.

Table 5: Estimation Results

	Strategic	Financial	Strategic	Financial
Intercept	0.047	-0.019	-0.090	-0.108
	(0.017)	(0.018)	(0.059)	(0.070)
θ	2.518		2.288	
	(0.249)		(0.203)	
σ	0.183	0.237	0.173	0.219
	(0.017)	(0.022)	(0.011)	(0.015)
Size			0.004	-0.006
			(0.007)	(0.008)
Leverage			0.071	0.085
			(0.116)	(0.119)
Leverage^2			0.078	0.014
			(0.175)	(0.155)
Q-ratio			0.005	-0.021
			(0.011)	(0.008)
Cash Flow			-0.169	0.043
			(0.081)	(0.040)
Cash			0.026	0.063
			(0.050)	(0.050)
R&D			0.804	1.178
			(0.679)	(0.466)
Intangibles			-0.035	-0.088
			(0.039)	(0.052)
S&P 500			0.116	0.094
			(0.076)	(0.078)
Credit Spread			3.527	3.979
			(1.360)	(1.613)

Notes: This table summarizes the estimation results from estimating the model of bidders fundamental valuation of bidders as specified in Equation 11. Columns 1 and 2 (3 and 4) report estimates without (with) control variables. Columns 1 and 3 are parameter estimates for strategic bidders. Columns 2 and 4 are parameter estimates for financial bidders. *Intercept* is the coefficient for the intercept. θ is the β parameter from the beta distribution that determines the distribution of strategic investors' sensitivities to accounting. *Size* is the coefficient on the target's log of total assets, measured the quarter before the takeover announcement. *Leverage* and *Leverage*^{2} are the coefficients on the target's leverage and leverage squared, measured the quarter before the takeover announcement. *Q-ratio*, *Cash Flow*, *Cash*, *R&D*, and *Intangibles*, are the coefficients on the target's Tobin's Q, operating cash flow over the previous four quarters before the takeover announcement, cash balance, R&D expense over the previous four quarters before the takeover announcement, and total intangibles. These amounts are scaled by total assets and measured the quarter before the takeover announcement. *S&P 500* is the coefficient on the annualized market return during the last fiscal quarter before the merger announcement. *Credit Spread* is the coefficient on the spread between Baa-rated corporate bonds and the 10-year U.S. treasures, measured the day before the merger announcement. σ is the variance of the bidders' valuation. Standard errors are block-bootstrapped by deal over 500 draws.

Table 6: Counterfactuals: Alternative Accounting Regimes

	Valuation Effects				Distributional Effects	
	Premium	Runner-up Valuation	% Failed	ΔM&A Dealvalue	Probability PE Winner	ΔPE Assets
Impairment	44.91%	1.378	1.80%	—	29.61%	—
Cash	31.70%	1.253	2.69%	-9.94%	54.47%	65.67%
Amortization with Impairment						
5 Years	37.15%	1.306	2.07%	-5.62%	40.74%	29.86%
10 Years	38.93%	1.322	1.97%	-4.29%	37.35%	20.73%
15 Years	40.19%	1.334	1.95%	-3.40%	35.28%	15.10%
20 Years	41.16%	1.343	1.94%	-2.73%	33.99%	11.66%
30 Years	42.39%	1.354	1.89%	-1.83%	32.51%	7.79%
40 Years	43.02%	1.360	1.83%	-1.33%	31.62%	5.36%
Amortization						
5 Years	37.21%	1.307	2.07%	-5.57%	40.60%	29.47%
10 Years	39.27%	1.325	1.96%	-4.05%	36.78%	19.18%
15 Years	40.89%	1.341	1.94%	-2.91%	34.32%	12.53%
20 Years	42.21%	1.352	1.89%	-1.95%	32.68%	8.21%
30 Years	44.05%	1.369	1.81%	-0.60%	30.48%	2.32%
40 Years	45.20%	1.380	1.79%	0.22%	29.30%	-0.83%

Notes: This table shows counterfactual results for coporate takeover auctions under different accounting treatments of goodwill. It compares M&A market outcomes for the current impairment-only regime to a cash-accounting regime, an amortization-only regime and a regime that requires both amortization and annual impairment testing. Results are reported for amortization periods ranging between 5 and 40 years. *Premium* is the average premium of the takeover price over the market value of the target based on an ascending auction with random jump bids. *Runner-up Valuation* is the average valuation of the bidder with the second highest valuation. *% Failed* is probability of a takeover failing, i.e., no bidder has a valuation above the market value of the target. Δ*Dealvalue* is the percentage difference in aggregate dealvalue under an alternative accounting regime and the current impairment regime. This calculation takes into account both the change in average deal value and the proability of failing deals. *Probability PE Winner* is the percentage of auctions with a financial bidder winning.
Δ*PE Assets* is the percentage difference of total assets acquired by financial acquirers under an alternative accounting regime compared to the impairment regime.

Table 7: Counterfactuals for select industries

Panel A: Business Equipment

	Valuation Effects				Distributional Effects	
	Premium	Runner-up Valuation	% Failed	ΔM&A Dealvalue	Probability PE Winner	ΔPE Assets
Impairment	43.65%	1.366	2.14%	—	29.44%	—
Amortization						
10 Years w/I	36.93%	1.303	2.47%	-5.00%	38.65%	24.72%
10 Years	37.28%	1.306	2.45%	-4.74%	37.93%	22.74%

Panel B: Oil and Gas

	Valuation Effects				Distributional Effects	
	Premium	Runner-up Valuation	% Failed	ΔM&A Dealvalue	Probability PE Winner	ΔPE Assets
Impairment	42.58%	1.358	1.69%	—	34.58%	—
Amortization						
10 Years w/I	39.62%	1.330	1.76%	-2.14%	39.61%	12.09%
10 Years	39.81%	1.332	1.75%	-2.00%	39.31%	11.40%

Notes: This table shows how the counterfactual results vary by select Fama-French-12 industry. It compares the current impairment regime to regimes that require a 10-year amortization period with and without annual impairment testing (w/I). Panel A summarizes the results for Business Equipment targets. Panel B highlights the Oil and Gas industry. *Premium* is the average premium of the takeover price over the market value of the target based on an ascending auction with random jump bids. *Runner-up Valuation* is the average valuation of the bidder with the second highest valuation. *% Failed* is probability of a takeover failing, i.e., no bidder has a valuation above the market value of the target. Δ*Dealvalue* is the percentage difference in aggregate dealvalue under an alternative accounting regime and the current impairment regime. This calculation takes into account both the change in average deal value and the proability of failing deals. *Probability PE Winner* is the percentage of auctions with a financial bidder winning. Δ*PE Assets* is the percentage difference of total assets acquired by financial acquirers under an alternative accounting regime compared to the impairment regime.

Table 9: Counterfactual: Changing Competitive Environment

	Valuation Effects				Distributional Effects	
	Premium	Runner-up Valuation	% Failed	ΔM&A Dealvalue	Probability PE Winner	ΔPE Assets
Competition as observed						
Impairment	44.91%	1.378	1.80%	—	29.61%	—
Amortization w/I	38.93%	1.322	1.97%	-4.29%	37.35%	20.73%
Amortization	39.27%	1.325	1.96%	-4.05%	36.78%	19.18%
Adding one financial bidder						
Impairment	46.68%	1.392	0.83%	2.22%	33.42%	15.37%
Amortization w/I	40.98%	1.339	0.88%	-1.80%	42.17%	39.85%
Amortization	41.32%	1.342	0.87%	-1.55%	41.49%	37.95%
Increasing financial bidder proportions						
Impairment	41.98%	1.350	2.32%	-2.54%	38.76%	27.58%
Amortization w/I	37.13%	1.305	2.48%	-6.02%	46.87%	48.76%
Amortization	37.37%	1.308	2.48%	-5.86%	46.21%	46.92%

Notes: This table compares counterfactual takeover outcomes of alternative goodwill accounting treatments under changing competitive environments. *Competition as observed* imposes the empirically observed distribution of bidder competition. *Adding one financial bidder* increases the bidder pool in each auction by one financial bidder. *Increasing financial bidder proportions* keeps the total number of bidders constant but increases the incidence of a financial bidder. The considered accounting alternatives are the current impairment regime, an amortization-only regime, and an amortization regime with annual impairment testing (Amortization w/I). For brevity results are only reported for a 10-year amortization period. *Premium* is the average premium of the takeover price over the market value of the target based on an ascending auction with random jump bids. *Runner-up Valuation* is the average valuation of the bidder with the second highest valuation. *% Failed* is probability of a takeover failing, i.e., no bidder has a valuation above the market value of the target. *Probability PE Winner* is the percentage of auctions with a financial bidder winning. Δ*Dealvalue* is the percentage difference in aggregate dealvalue under an alternative accounting regime and the current impairment regime. This calculation takes into account both the change in average deal value and the proability of failing deals. Δ*PE Assets* is the percentage difference of total assets acquired by financial acquirers under an alternative accounting regime compared to the impairment regime. Aggregate changes are compared to the impairment regime under the emprically observed competitive environment.