Accounting for Goodwill*

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ABSTRACT

A significant portion of a merger's purchase price is allocated to goodwill. Currently, goodwill is not amortized but rather 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 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 would increase 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

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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 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 economic consequences 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 amortization did not appear to be a clear improvement.[1]

Measuring the effect of goodwill accounting on the M&A market is challenging because how accounting treats goodwill can affect acquirers' private values for 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 between the valuation of the buyer and the competition from other potential acquirers.

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

As a result, disentangling the competition effect from the valuation effect is necessary 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 whereby 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 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. Using bid-level information for each takeover, together with this structure, allows us to disentangle the competition effects from the underlying valuations of the bidders.

Our model distinguishes between two types of bidders: strategic and financial. Financial bidders, often private equity investors, seek to maximize fundamental value, that is, expected future cash flows. Strategic bidders, such as competitors, suppliers, or customers, also want to maximize fundamental value but also care about earnings. These bidders prefer high earnings because they believe it will lead to higher stock prices. This "functional fixation" on high earnings (Skinner, 2008) is motivated by the focus on short-term stock price (Stein, 1989) and contracting incentives, which is shown empirically to exist (Lys and Vincent, 1995; Andrade, 1999; Ayers, Lefanowicz and Robinson, 2002). Thus, these bidders care about the accounting for goodwill because it directly influences reported earnings.

We allow the relative preference of earnings 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 earnings preferences among managers of public

firms. As such, a strategic bidder's valuation depends not only on the fundamental value of the target, but also on the amount of goodwill created, and its subsequent accounting treatment.

We estimate our model via simulated maximum likelihood using 861 all-cash deals executed as takeover auctions on public targets effective from July 2001 until September 2022. Following Gorbenko and Malenko (2014), we allow the distribution of fundamental valuations to differ between financial and strategic bidders to account for potential differences in access to synergies. In line with prior literature, we find that effective valuations of strategic bidders are higher and more varied than those of financial bidders. However, we can disaggregate these differences into fundamental and accounting-driven components because we complement the bidding model with data on goodwill allocations and future impairments. In expectation, the fundamental value that strategic bidders assign to a target is higher, owing to potentially higher synergies. However, the accounting preferences of strategic bidders further strengthen their willingness to pay, because the acquisition cost relating to goodwill will not occur until an uncertain later day when an impairment occurs. As a result, strategic bidders only partially internalize the purchase price for the target. Consequently, a strategic bidder has a higher effective valuation than if they only focused on the fundamental value of the target and can therefore bid more aggressively.

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 of the relative weights quantifies the commonly cited

trade-off that firms face between maximizing cash flows and financial-reporting concerns (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 do so, 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 with 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 decrease by 9.94%.

Having demonstrated the sizeable effect of accrual accounting on takeovers, we also compare the current regime with alternative regimes that would amortize goodwill. We focus on the hypothetical accounting regime where firms must amortize goodwill over 10 years, and goodwill is subject to annual impairment testing.[2] Relative to the current accounting regime, we estimate that with a 10-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-

[2]This regime corresponds to ASC 350-20-35, which permits private firms to amortize goodwill over 10 years (or less) instead of treating goodwill as an indefinitely lived intangible asset.

action prices and aggregate deal values change, but so does the type of winners. 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 than an impairment-only standard. This earlier expensing decreases strategic bidders' target values but does not affect financial bidders' values. Our counterfactual simulations indicate 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 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. Remarkably, we find the increased competition from an additional bidder has a smaller effect on deal characteristics than the effect of switching from impairment-only to amortizing goodwill.

Our paper contributes to two strands of literature. First, we add to the sizeable takeover literature.[3] Several papers examine how takeovers are shaped by the composition of po-

[3]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 the effect of 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), who provide reduced-form evidence of increased overpayment of public acquirers after the passage of SFAS 142, by leveraging the approach developed in de Bodt, Cousin and Roll (2018). This approach ignores the role of competition among bidders and only relies on approximations of bidders' underlying valuations from observables. By contrast, we explicitly model the competition among bidders, which we find has important effects on the merger market. Furthermore, modeling 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 economic consequences of financial reporting. 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 given that accounting incompletely reflects their value.[4] Several studies examine how the imprecision of accounting can alter the incentive of the firm to make value-maximizing investment (e.g., Kanodia, Sapra and Venugopalan, 2004; Kanodia, Singh and Spero, 2005; Geng, Zhang and Zhou, 2023; McClure and Zakolyukina, 2023). 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. We show the accounting for goodwill has a sizeable impact on the market for corporate control. Furthermore, our findings indicate 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.[5] Thus, 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.

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

[5]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. [6] Effective December 15, 2001, Statement of Financial Accounting Standards (SFAS) 142 specified the accounting for goodwill.[7] 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 first need to qualitatively assess whether an impairment is likely. If the answer is affirmative, they need to determine the fair value of the reporting unit to which the goodwill is assigned. If the fair value is less than the carrying value of the reporting unit, the firm must recognize a goodwill impairment equal to the difference.[8]

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

[6]Note significant differences exist between the initial recognition of goodwill under IFRS and US GAAP (see, e.g., Zeng, Zhang and Zuo, 2023)

[7]Before the adoption of SFAS 142, takeovers were accounted for under Accounting Principles Board (APB) 16 and APB 17. If a takeover satisfied 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 did not satisfy these criteria, APB 16 required firms to use purchase accounting, which entails 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. 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.

[8]This description outlines the simplified impairment test introduced in ASU 2017-04. In the earlier version, the goodwill amount was determined through a final step, involving the calculation of the fair value of identifiable assets in the reporting unit to establish goodwill's fair value and adjusting the carrying value accordingly.

exception. Ramanna (2008) finds the creation of the impairment-only approach of SFAS 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 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 by estimating a structural model in the context of corporate takeover auctions.

2.2 Corporate Takeover Auctions

A takeover auction usually starts when the target decides to sell itself to a potential buyer.[9] To facilitate the process, the target retains an investment bank to create a list of potential acquirers, whom 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 for 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

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

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 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.[10] 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, a few differences exist between takeover auctions and 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 perfectly describes the process of a takeover auction. Therefore, we build upon the approach developed by Gorbenko and Malenko (2014) to estimate bidders' valuations from the unstructured bidding process.

[10] 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 statistics data of goodwill impairments from Compustat over the sample period of June 2001 through December 2021. The first column shows 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 have 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 is 35.8%, skew is significant because the median is only 22%. For instance, nearly 10% of all impairments are for the entire goodwill amount. This table shows goodwill impairments are not infrequent, and when they do occur, they are 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%). Overall, Tables 1 and 2 show 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

1, 2001, to September 2022. The sample start date ensures all takeovers are subject to SFAS 142.[11] We identify takeover auctions and collect the data following Gorbenko and Malenko (2014).[12] 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.[13] We use the deal background section of the SEC merger filings of the target company (PREM14A, DEFM14A, SC-TOT, and S4) to identify whether a deal was a negotiation. 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 information includes the type of bidder (i.e., strategic or financial), the nature of their bid (i.e., 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 42.8% above the stock price four 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 because the median is only 6. On average, 29% of bids in an auction are formal bids. Within the set

[11] 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.

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

[13] 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, we keep non-cash losing bids.

of bidders, approximately 41% are strategic, 29% are financial, and the remainder are of unknown type. This split also manifests in the distribution of winners as we find strategic bidders win 63% of deals. For the auctions with a public acquirer, we collect purchase-price allocation from BVWire DealStats and complement this information with hand-collected data whenever missing. Among the 304 deals for which we can find PPA information, the average allocation to goodwill equals 46.3%. This fraction is significant and suggests 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, $\tilde{v}_{i,j}$, from acquiring the target exceed the cost of the acquisition, $b_{i,j}$, namely, $\tilde{v}_{i,j} - b_{i,j} \geq 0$. How close the bid, $b_{i,j}$, is to i's value, $\tilde{v}_{i,j}$, 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 $\tilde{v}_{i,j}$. Consequently, the winning bidder will receive a smaller surplus, i.e., $b_{i,j} \to \tilde{v}_{i,j}$. Thus, when more bidders are present, potential acquirers must offer more competitive bids to win.

4.1 Accounting Impact on Valuation

Each bidder's value is based on a combination of the discounted stream of expected cash flows and earnings. As a result, accounting influences how much bidders value the target and what they are willing to pay (Baiman, Fischer, Rajan and Saouma, 2007; Marinovic, 2017). Let $S_{i,j}$ be the surplus bidder i receives from winning the auction and acquiring a target j.

We assume that two components enter the surplus with differential weights, the discounted stream of expected cash flows, d_t, and earnings, e_t. We suppress i and j subscripts on earnings and cash flows for readability. Therefore, the bidder's surplus is

$$S_{i,j} = \sum_{t=0}^{\infty} \mathbb{E}[d_t]\delta^t + \pi_i \sum_{t=0}^{\infty} \mathbb{E}[e_t]\delta^t, \tag{1}$$

where δ is the discount factor and π_i is the weight on earnings.

The discounted expected cash flows enter bidders' preferences because they are the fundamental value of the acquisition. We assume that earnings enter the surplus separately. As such, the bidders exhibit a "functional fixation" on high earnings (Skinner, 2008), an assumption that has empirical support in the context of acquisitions (Lys and Vincent, 1995; Andrade, 1999; Ayers et al., 2002). Theoretically, such preferences for earnings may stem from myopic managers who want a high current stock price, which increases in the current period's earnings (Stein, 1989). Such a manager would also want high earnings in all future periods because the future stock price depends on future current earnings.

However, we do not specify the incentives that induce the manager to incorporate earnings into her surplus, nor do we solve for a rational-expectations equilibrium. Incorporating these features would add significant complexity to the model that moves beyond the objectives of this paper. As such, we acknowledge that the reduced-form preferences

on earnings in our model could also be generated by contracting-based explanation, where managers need high earnings to maxmize their compensation (e.g., Darrough et al., 2014). Consistent with such an explanation, Shalev et al. (2013) finds that managers whose compensation is tied to earnings allocate more of the purchase price to goodwill to avoid the certain expenses from depreciation and amortization of identifiable assets. Furthermore, the preference for short-term earnings can also arise from empire-building incentives because managers can increase their compensation by making acquisitions that increase their earnings (Jensen and Meckling, 1976; Jensen, 1986; Morck, Shleifer and Vishny, 1990).

The initial cash outlay to acquire the target reduces cash flow by $b_{i,j}$ in period 0, so $d_0 = -b_{i,j}$. However, this cash outflow does not impact earnings, because cash used for investing (e.g., for acquisitions) does not affect the income statement. Therefore, $e_0 = 0$.[14]

Because π_i is unbounded, we re-scale equation 1 so that the relative weight on earnings is bounded between 0 and 1, by defining the weight, w, as $w \equiv \frac{\pi_i}{1+\pi_i}$ and suppress the index on w for ease of notation. We assume w is drawn from the distribution $h(\theta)$, which is governed by the parameter θ, because different bidders may overweight or underweight earnings relative to cash flows, and the earnings multiple can also differ across firms. Separating the cash outflow from the discounted stream of future expected cash flows and using the relative weight, w, we recharacterize the bidder's surplus as

$$S_{i,j} = (1-w)\left(\sum_{t=1}^{\infty} \mathbb{E}[d_t]\delta^t - b_{i,j}\right) + w\sum_{t=1}^{\infty} \mathbb{E}[e_t]\delta^t. \tag{2}$$

Cash flows differ from earnings by the non-cash charges that result from the acquisition. Therefore, we disaggregate earnings, e_t, into cash flows, d_t, and the fraction of the purchase

[14]Although price is a linear function of earnings, having $e_0 = 0$ does not imply stock price is zero. Presumably, the acquiring firm has other earnings that are distinct from the acquisition.

price recognized as an expense in period t under the accounting regime a, α_t^a.[15] Thus,

$$e_t = d_t - \alpha_t^a b_{i,j}. \tag{3}$$

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 $t \to \infty$, a negative shock will eventually occur that is sufficiently large such that these assets will require an impairment. Therefore, $\sum_{t=0}^{\infty} \alpha_t^a = 1$, so that all of the purchase price eventually impacts earnings. Using this identity and equation 3, we can rewrite equation 2:

$$\begin{aligned} S_{i,j}(b_{i,j}; s) &= \underbrace{\sum_{t=1}^{\infty} \mathbb{E}[d_t]\delta^t}_{\equiv v_{i,j}} - (1-w)b_{i,j} - w b_{i,j} \sum_{t=1}^{\infty} \alpha_t^a \delta^t \\ &= v_{i,j} - b_{i,j}\left[1 - w + w \sum_{t=1}^{\infty} \alpha_t^a \delta^t\right]. \end{aligned} \tag{4}$$

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 characterize the impact of the bid on the manager's utility as

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

[15] For example, if the firm must amortize the purchase price over 10 years, $\alpha_t = 0.1$ for $t \in \{1, ..., 10\}$, and 0 afterward.

and rewrite the manager's surplus from equation 4 as

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

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

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 the initial cash outlay to acquire the target. For bidders who care about earnings, $w > 0$, which implies $A_{i,j}^a < 1$. 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 Discussion of bidder preferences

Despite the reduced form of bidders' preferences, bidders have rational expectations of the target's valuation. Thus, their value includes instances when the target's fundamental value drops below the purchase price, and they must impair goodwill. Impairments not only imply the value of the target has fallen below the purchase price, but may also lead to a negative market reaction, which further punishes the bidder if she cares about stock price.

Alternative accounting regimes, such as one that amortizes goodwill, would not have this additional punishment, because unlike an impairment, an amortization expense does not imply a drop in value. Consequently, an amortization regime may alter how bidders internalize future states of the world. However, Li and Sloan (2017) document that

[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, $\alpha_t^{a,id} = \frac{1}{T}$, $t \in 1,\ldots,T$, and 0 otherwise, while α_t^{a,g^w} is generated stochastically. Assuming risk neutrality, bidder i with a given w would therefore internalize $A_{i,j}^a = 1 - w\left[1 - n_{i,j}\frac{\delta(1-\delta^T)}{1-\delta} - g_{i,j}\mathbb{E}\left(\sum_{t=0}^{\infty}\tilde{\alpha}_t^{a,g^w}\delta^t\right)\right]$

impairment information was more timely under the pre-SFAS-142 amortization regime than under the current impairment-only regime. Hence, Li, Shroff, Venkataraman and Zhang (2011) documents lower market reactions to impairment losses in the post-SFAS-142 period, suggesting the market is already aware of the drop in the target's value when the firm discloses an impairment. Thus, we believe our reduced-form setup of bidders' preferences captures the most important economic considerations bidders face.

We also assume the preferences for accounting are stable under our counterfactual accounting regimes. However, under alternative accounting regimes, market reactions to earnings and the optimal compensation contract could change, which could change w. Although preferences may change, the renegotiation costs to exclude the accounting for goodwill seem non-trivial as compensation strongly reacts to impairments under the current regime (Darrough et al., 2014). We acknowledge this limitation and leave it for future research to explore how w may change.

4.3 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

$$\max_{b_{i,j}} \left(\tilde{v}_{i,j} - b_{i,j}\right) Pr(b_{i,j} \geq b_{k,j} \forall k \neq i), \tag{7}$$

where $\tilde{v}_{i,j} = \frac{v_{i,j}}{A^{(s)}}$ is the pseudo-value of bidder i for target j.

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 valuations, 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 of 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, that is, 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, that is, the target's market value.

These assumptions provide five non-parametric restrictions that help us identify the distribution of bidder pseudo-values, $\tilde{v}_{i,j}$. 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, supposing 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,

- A winning bid implies $b_{1,j} < \tilde{v}_{i,j}$. 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 $b_{i,j} < \tilde{v}_{i,j} < b_{1,j}$. Thus, this bidder's pseudo-value must be in the shaded region in Panel C.
- An informal losing bid from bidder i implies $1 < \tilde{v}_{i,j} < b_{1,j}$. 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, that is, this bidder declines to bid, then $0 < \tilde{v}_{i,j} < b_{1,j}$. 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, $0 < \tilde{v}_{i,j} < 1$. 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. We can isolate the accounting component in pseudo-valuations by observing how pseudo-valuations vary with goodwill allocations and the subsequent probability of impairment.

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 the bidders' values follow a log-normal distribution with a common and an idiosyncratic component:

$$v_{i,j} = \exp\{X_j \beta_i\} \exp\{\epsilon_{i,j}\} \tag{8}$$

with $\epsilon \sim N(0, \sigma_i)$. The vector X_j corresponds to the observable 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 two types of bidders exist: financial and strategic. Within each type $z \in \{Financial, Strategic\}$, the parameters that determine $v_{i,j}$, β_i, and σ_i, are the same.[17] Thus, $\beta_i = \beta_z$ and $\sigma_i = \sigma_z$. We assume 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 the accounting preference of strategic bidder i is drawn from a beta distribution with shape parameters $a = 1$ and $b = \theta$. Thus, $w \sim h(\theta)$, where $h(\cdot)$ is the beta density function.

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 a bidder's weight on earnings relative to cash flows

[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 for public and private bidders.

[18] We assume private and public strategic bidders bid as if they must treat goodwill under an impairment-only regime. This assumption 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 10 years.

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

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, or 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 allows a sizeable fraction of strategic bidders to have w_i near zero, which implies they strongly prefer cash flows to 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, θ, 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 no closed-form solution exists 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 with 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 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

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

where $\Phi(\cdot)$ is the cdf of the standard normal distribution. Hence, this likelihood corresponds to the area under the upper tail of the pseudo-value distribution. The likelihood contributions of all other bids can be constructed similarly and are reported in the appendix.

To arrive at the unconditional likelihood contribution, note that for financial bidders, $A_{i,j} = 1$ because $w = 0$. 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

$$L^{strategic}(b_{i,j}; \cdot) = \int_0^1 L^z(b_{i,j}; x, \beta_z, \sigma_z | w) h(\theta) \, \mathrm{d}w. \tag{9}$$

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

$$\min_{\beta,\sigma,\theta} \sum_j \sum_i \log\left(\prod_z p^z_{i,j} L^z\left(b_{i,j}\right)\right), \tag{10}$$

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 bidder, so the bidder's belief regarding 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 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 classification. For losing bids, we impute the minimum of the industry mean or the allocation of the winning bidder (if observable).[20]

The third complication is we do not observe the type of every losing bidder. Although

[20]When we observe a formal bid, we could have also assumed 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 constitute most of the bids. For consistency, we impute the goodwill allocation for all losing bids similarly. Such an assumption is consistent with bidders bidding before allocating the purchase price to individual assets and therefore bidding with an expectation over the percentage of goodwill rather than based on how much identifiable assets are worth. This distinction matters for whether 100% of a marginal increase of the bid—or only a fraction of it—is allocated to goodwill.

many SEC filings with background on the merger distinguish between financial and strategic bidders for losing bids, this distinction is not universal, especially not in the early stages of a takeover auction. When we do not observe the bidder type, we follow Gorbenko and Malenko (2014) and infer it using a determinants model with the sample of losing bids where the type is known. Specifically, we estimate the following logistic regression:

$$Strategic_{i,d,t} = X_j'\beta + \varepsilon_{i,j}, \tag{11}$$

where $Strategic_{i,j}$ is an indicator for whether bidder i for target j was a strategic bidder and X_j 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 type probabilities (i.e., p^z) to a losing bidder with an unknown type, and thus estimate how much this bidder cares about the treatment of goodwill.

Table 4 reports the results from this regression. This shows 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 fewer bidders are present and when a financial bidder does not make the winning bid. 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 estimates 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 Gorbenko and Malenko (2014), we observe that strategic bidders have a lower intercept than financial bidders. However, the average valuation of strategic bidders is higher. In columns 1 and 2, the estimates suggest strategic bidders value a target at approximately 1.07 times its market valuation, not taking into account the accounting preferences, whereas financial bidders value it at around 1.01 times.[21]

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.

The crucial parameter that governs the distribution of acquirers' preferences between earnings and cash flows is θ. The estimate of $\hat{\theta} = 2.52$ suggests a mean value of approximately $E(w) = 0.28$, indicating strategic bidders, on average, assign more than twice the weight to acquired cash flows than 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 $A^{imp} = 0.85$. In other words, strategic bidders' only internalize 85% of their bids in their surplus. Conse-

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

quently, they can afford to be about 15% more aggressive in their bidding than financial or private bidders, who are primarily concerned with the cash-flow implications of acquiring a target.

Figure 3 shows the distribution of bidders' preferences for strategic and financial bidders based on the estimates in columns 1 and 2 of Table 5 (solid lines). In addition to strategic bidders having a higher mean value, their distribution is also wider than that of financial bidders, which comports with Gorbenko and Malenko (2014). We remove strategic bidders' preferences for accounting and plot the distribution with the dashed line.[22] It indicates that once we eliminate accounting preferences, strategic bidders have a smaller dispersion than financial bidders as we estimate the standard deviations of 0.173 and 0.219 for strategic and financial bidders, respectively.[23] Contrary to Gorbenko and Malenko (2014), which suggests strategic bidders' have more varied synergies, our estimates imply variation in accounting preferences is an important driver for how strategic bidders value synergies. Consequently, goodwill accounting is critical in how they value targets, because synergies are a primary component of goodwill.

6.2 Robustness Check: Cross-sectional variation in earnings preferences

In the model, we assume that the earnings-preference parameter, θ, solely captures bidders' sensitivity to GAAP earnings. Given that all but the winning bidders are anonymous in the merger filings, we are not able to control for other bidder characteristics. Hence, we need to ascertain that our estimated $\hat{\theta}$ does not inadvertently capture other aspects of bidder characteristics. To examine this possibility, we compare how this parameter varies

[22] We remove accounting preferences by setting $w = 0$ for strategic bidders and redrawing values based on Table 5.

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

across industries based on the prevalence of non-GAAP reporting.[24]

The assumption underlying this robustness check is that if an industry relies more on non-GAAP reporting, GAAP earnings are less relevant to the capital market and, by extension, the bidders' management. As a result, a higher reliance on non-GAAP reporting would be associated with a lower sensitivity to GAAP-earnings, which implies a lower θ in high non-GAAP industries.

We implement this robustness check by re-estimating our model in two subsamples with high and low non-GAAP reliance. In particular, we compare the Business Equipment and Healthcare industries ("High non-GAAP"), the two industries with the highes non-GAAP prevalence according to Black, Christensen, Ciesielski and Whipple (2021), to the rest of the sample ("Low non-GAAP"). Table 6 reports that High non-GAAP industries have an earnings-sensitivity parameter that is substantially higher than the targets in other industries ($\theta = 3.00$ versus $\theta = 2.17$). This corresponds to an expected weight on earnings (i.e., $E(w)$) of 0.25 compared to 0.315. Thus, our earnings-based parameter moves as expected: bidders' sensitivity to GAAP earnings is lower in industries with more non-GAAP reporting.

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

[24] We use the target firm's industry because we do not observe the industry of losing bidders. Presumably, the target's industry is the same or, at least, adjacent to strategic bidders' industries. Thus, strategic bidders likely face similar preferences for earnings as firms in the target's industry.

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. Finally, we consider how 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 the counterfactual is the one where bidders only care about cash, we set the valuation adjustment equal to 1, i.e., $A^a_{i,j} = 1$.

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%. 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.[25] 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 7, uses the benchmark where all bidders only care about cash. Under this counterfactual, all bidders are optimizing the fundamental value they would receive from the acquisition, so this counterfactual is the first-best. By comparing this counterfactual with our as-observed outcomes, we can quantify how preferences for earnings interact with competition in determining deal outcomes.

In this counterfactual, 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 were they only to care about cash. This difference illustrates

[25]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.

that competition from bidders less sensitive to accrual accounting can partially offset the valuation change and lead to a muted response in transaction prices. It 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.

7.3 The Effect of Accounting Standards on Merger Outcomes

We use the insight that merger outcomes result from competition and valuation effects to examine the impact of alternative goodwill accounting standards on takeover outcomes. As a first step, we compare the difference in pseudo-valuations for strategic bidders under different impairment and amortization regimes with varying amortization periods. Panels (a) and (b) of Figure 4 show the expected percent changes in strategic bidders' pseudo-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, and a 40% allocation of goodwill, which closely aligns with the sample average, we find valuations are approximately 6% lower than in the impairment-only regime. Consistent with intuition, valuation differences increase as the proportion of deal value allocated to goodwill in an acquisition increases.

This figure shows that as the length of the amortization period increases, the valuations under impairment and amortization converge, resulting in smaller percent differences. 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 the expected annual impairment charge of 3% of goodwill closely aligns with the annual

amortization charge for a 33-year amortization policy. The alternative of amortization with impairment is strictly more conservative than an impairment-only standard, so the pseudo-valuations never fully converge.

Having shown how strategic bidders' 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 7. 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, whereas 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 this counterfactual regime, we estimate a 5.98-percentage-point (i.e., 38.93 − 44.91) decrease in deal premium. 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 find runner-up valuations decline by about 5.6 percentage points (i.e., 1.322 − 1.378) 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 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% $\times$ $1.6tn).

Furthermore, transitioning to an amortization with impairment regime would not only affect deal valuations but also change who controls productive assets in the economy. In particular, strategic acquirers will bid less aggressively because their valuations are reduced. Consequently, a decrease in the fraction of auctions won by strategic bidders would occur as financial bidders are approximately 7 percentage points, or 25%, more likely to win a takeover auction. As a result, we estimate 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 7 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.[26] 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 with impairments 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 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, whereas 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

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

competing for the target on our analysis of alternative accounting rules. We consider counterfactuals where we increase the prevalence of financial bidders because takeovers become less attractive for strategic bidders when they must amortize goodwill.[27]

We consider bidder-composition effects by comparing three competitive environments: First, we use 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 with 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 with 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, under this competitive environment, we find the deal premium under 10-year amortization with impairment counterfactual to be 2 percentage points higher than under the as-observed competition level. Similarly, because the number of failed deals also decreases, the effects on aggregate deal values are less than half of the effects in the as-observed competitive environment. Remarkably, when we compare the as-

[27] A changing competitive environment could be micro-founded by a cost to enter an auction, for example, costly due diligence (Gentry and Stroup, 2019). With lower valuations of strategic bidders, more financial bidders may enter, whereas some strategic bidders might choose not to enter the auction in the first place.

observed competition and accounting estimates to the counterfactual with an additional bidder under an amortization with impairment policy, we observe a decline in deal premia and volume. This result suggests the role of goodwill accounting has a greater effect than adding a bidder.

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 higher-value bidder is replaced by a lower-value bidder, in expectation. Hence, we observe that bid premia are lower, declining by an additional 3 percentage points 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 8 shows 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. To disentangle the accounting effects from the competitive effects that bidders face, 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, maximizing a combination of earnings and cash flows, whereas financial bidders only maximize cash flows.

Our counterfactual analyses suggest strategic bidders' preference for earnings sub-

stantially boosts average deal premia and deal volume. This preference implies 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—would decrease the target valuations of public acquirers because amortization expenses reduce future earnings. Our results suggest these changes would reduce the bid premia and deal volume while shifting more assets to private equity acquirers. As a result, these findings provide insights into the economic consequences 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

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

.

No observed bid

The likelihood of observing a bidder not submitting equals

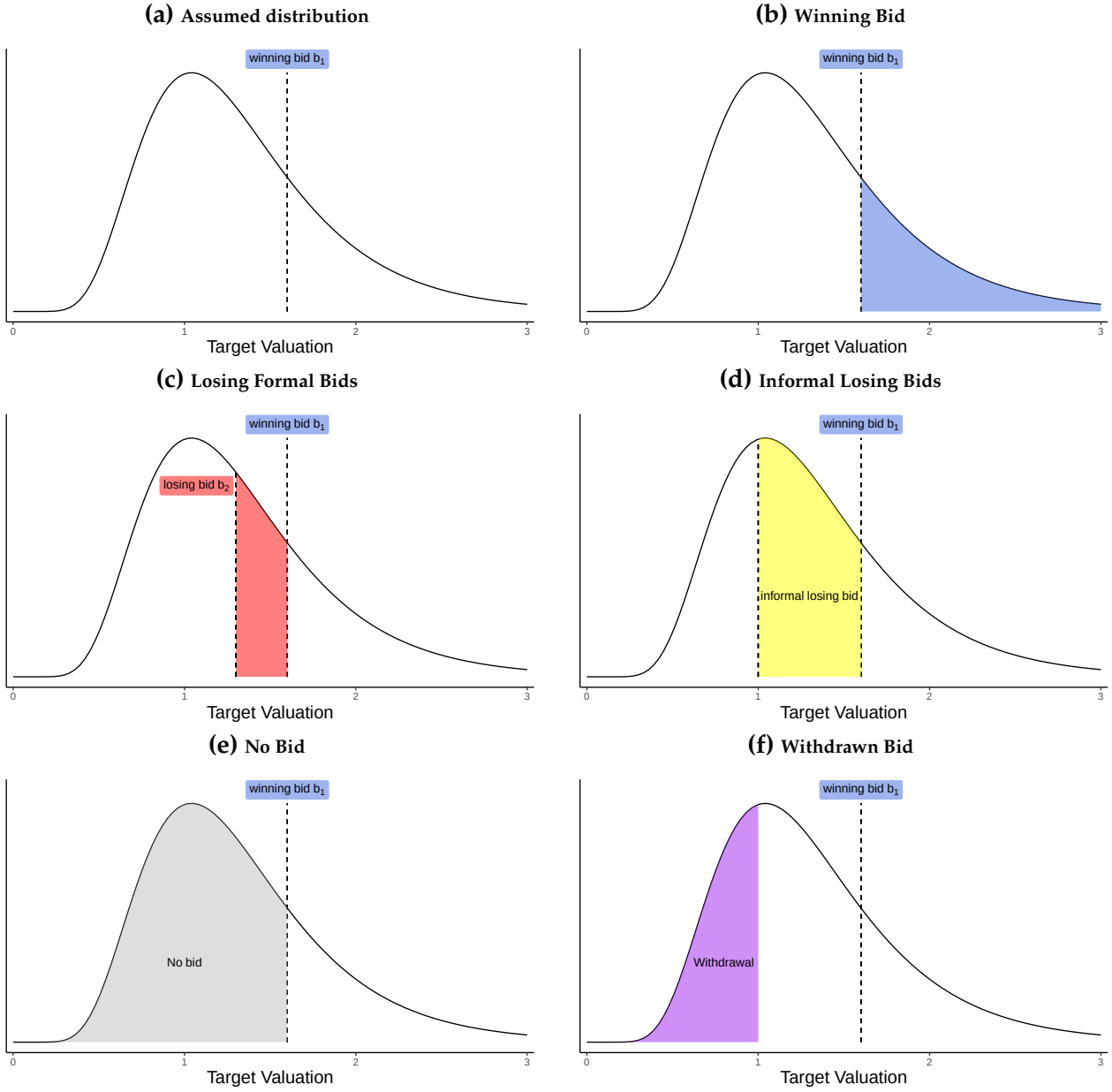
$$
L^z(b_{1,j}; x, \beta_z, \sigma_z | w) = P\left(\frac{v_{i,j}}{A^a_{i,j}} \leq b_{1,j}\right) = \Phi\left(\frac{\log(b_{1,j}) - X_j\beta_z + \log(A^a_{i,j}(w))}{\sigma_z}\right).
$$

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

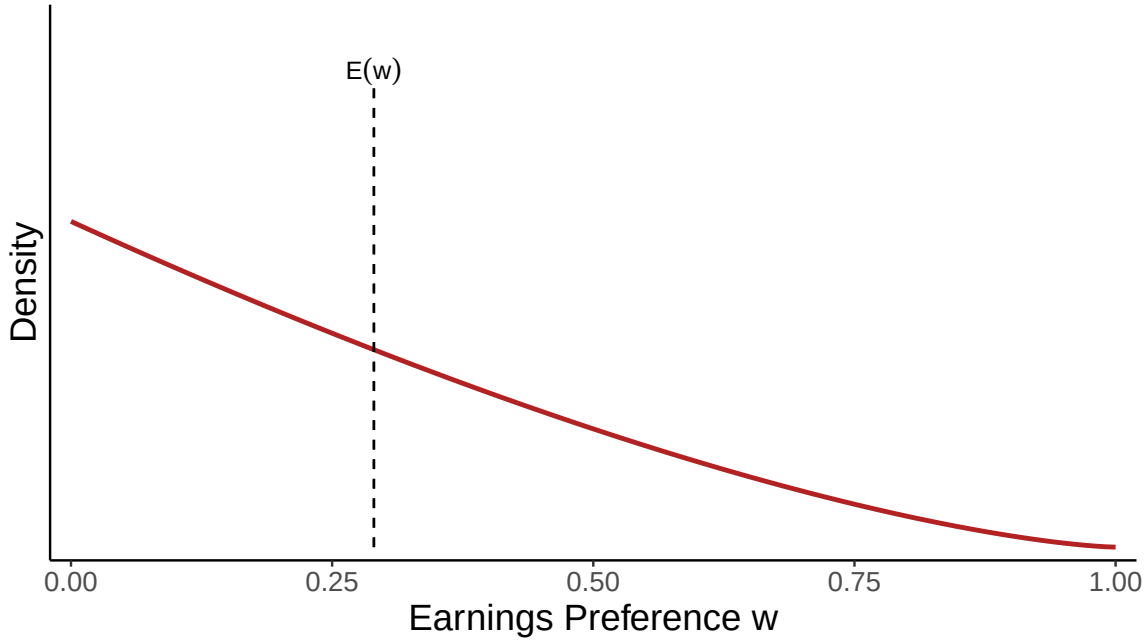
$$
\begin{aligned}
L^z(b_{1,j}; x, \beta_z, \sigma_z | w) &= P\left(\frac{v_{i,j}}{A^a_{i,j}} \leq 1\right) \\
= \Phi\left(\frac{\log(1) - X_j\beta_z + \log(A^a_{i,j}(w))}{\sigma_z}\right) &= \Phi\left(\frac{-X_j\beta_z + \log(A^a_{i,j}(w))}{\sigma_z}\right).
\end{aligned}
$$

Figure 1: Identification of Pseudo-Values: An example



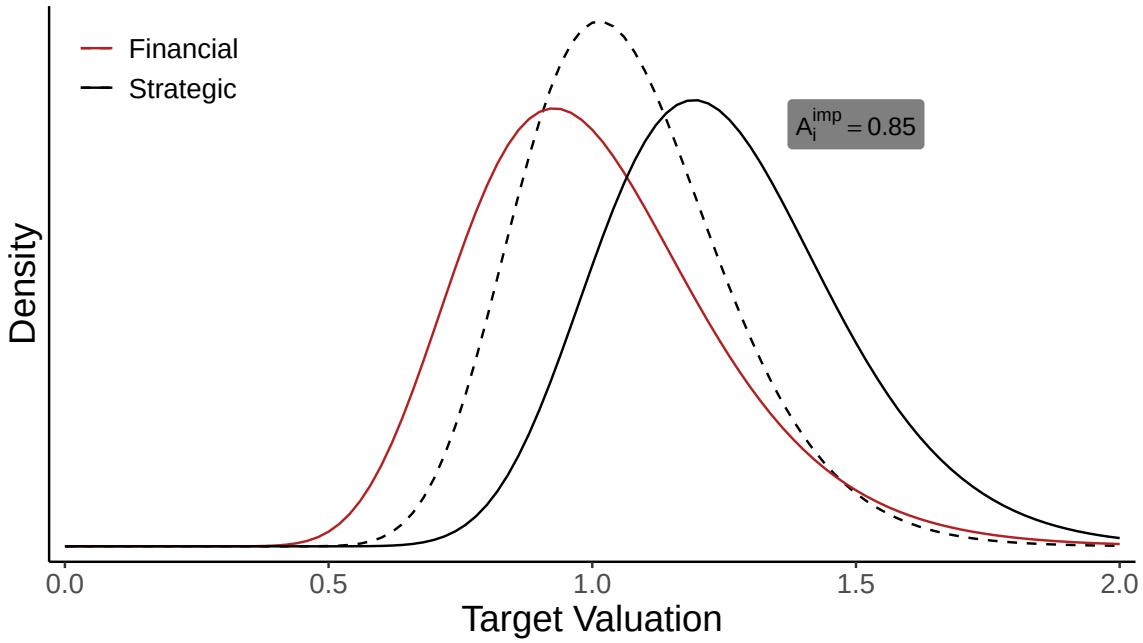
Notes: This figure shows an example of how the restrictions described in section 5.1 induce ranges for the pseudo-values of bidders. In each panel, the solid line is the distribution and the dashed vertical line is the winning bid.

Figure 2: Distribution of Earnings Preferences



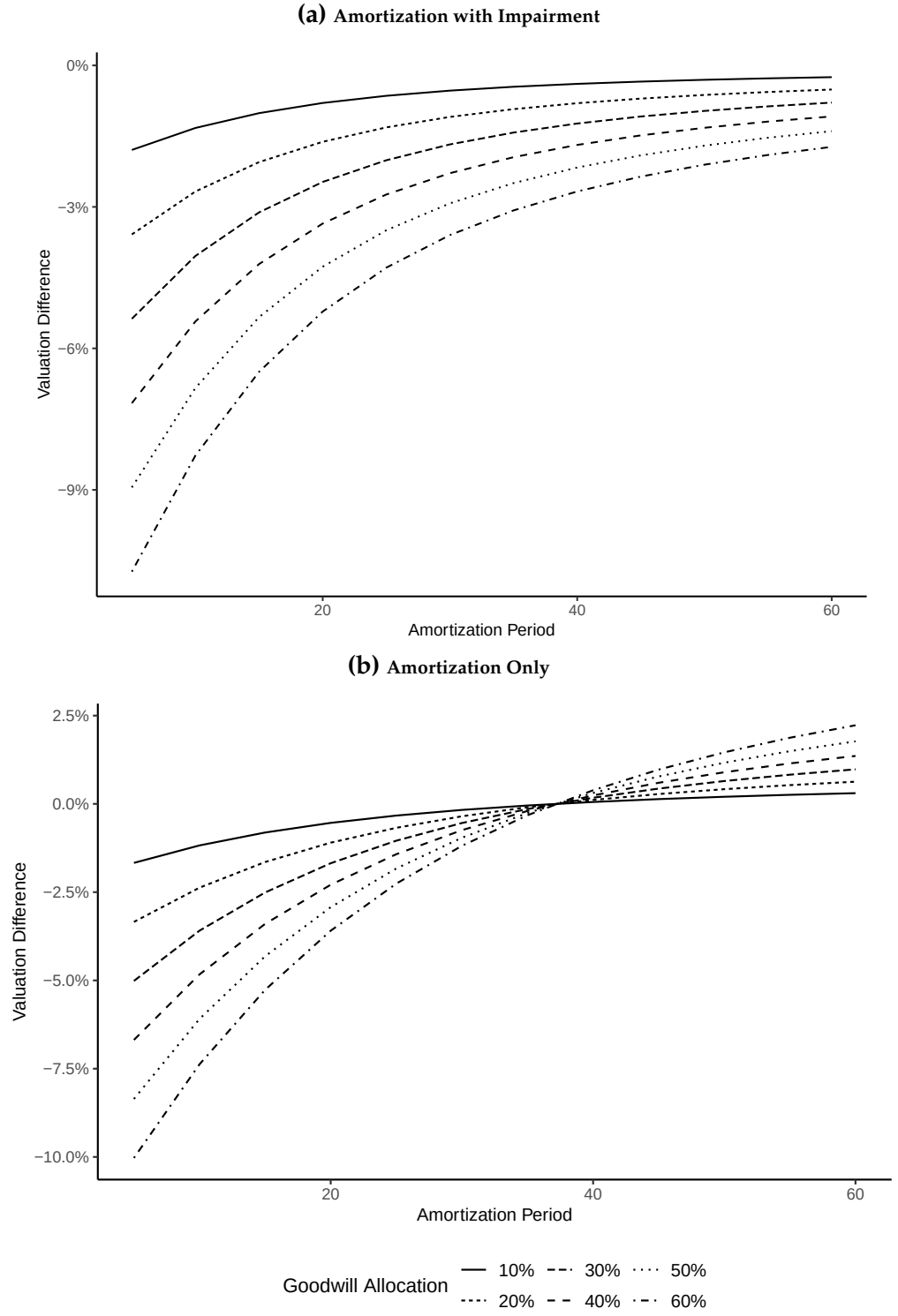
Notes: This figure shows the distribution of strategic bidders' preference for earnings, w, based on the estimate of θ from column 4 of Table 5. The dashed vertical line is the mean value of w.

Figure 3: Value Distributions



Notes: This figure shows the estimated value distributions of financial and strategic bidders. The dashed black line represents the distribution of strategic bidders' fundamental valuation not taking into account the accounting preferences. The solid black line shows the distribution of strategic bidders' effective valuation taking into account the earnings preference of the average strategic bidder.

Figure 4: 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 were 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 that is allocated to goodwill. The data include 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 were 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 the 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 10. 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: Sensitivity to Non-GAAP Reporting Prevalence

	High Non-GAAP		Low Non-GAAP	
	Strategic	Financial	Strategic	Financial
Intercept	0.057	0.0147	0.040	-0.051
	(0.016)	(0.021)	(0.016)	(0.019)
θ	3.086		2.165	
	(0.548)		(0.258)	
σ	0.173	0.254	0.192	0.215
	(0.017)	(0.023)	(0.018)	(0.026)

Notes: This table summarizes the estimation results from estimating the model of bidders fundamental valuation in two subsamples relating to the prevalence of non-GAAP reporting. *High Non-GAAP* relate to all auctions in the two industries with the highest prevalence of non-GAAP reporting, Health and Business Equipment, following Black et al. (2021). *Low Non-GAAP* are all other industries 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. σ is the variance of the bidders' valuation. Standard errors are block-bootstrapped by deal over 500 draws.

Table 7: 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 corporate takeover auctions under different accounting treatments of goodwill. It compares M&A market outcomes for the current impairment-only regime with 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 the 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 deal value under an alternative accounting regime and the current impairment regime. This calculation takes into account both the change in average deal value and the probability of deals failing. *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 with 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 with 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 deal value under an alternative accounting regime and the current impairment regime. This calculation takes into account both the change in average deal value and the probability of deals failing. *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 with the impairment regime.

Table 8: 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 the 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 deal value under an alternative accounting regime and the current impairment regime. This calculation takes into account both the change in average deal value and the probability of deals failing. Δ*PE Assets* is the percentage difference of total assets acquired by financial acquirers under an alternative accounting regime compared with the impairment regime. Aggregate changes are compared with the impairment regime under the empirically observed competitive environment.