Sacred Hurdle Rates and Bargaining Power

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Abstract

CFOs report using elevated hurdle rates that average 6.6 percentage points above the cost of capital. Managers take elevated hurdles as given (consider them sacred), and we show that negotiating to earn an elevated required return conveys a bargaining advantage over counterparties in project development and M&A. This benefit can exceed the opportunity cost of forgone projects, preserving firm value. Consistent with our model, bidders' elevated hurdle rates in M&A deals associate with higher surplus capture ex post; in CFO survey data, hurdle rate buffers negatively relate to ex ante bargaining power, and realized returns cluster just above elevated hurdle rates.

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"If I set a higher hurdle rate, my people go out and get better deals on contracts they negotiate."

CFO of NYSE listed energy firm.

1. Introduction

When making investment decisions, most companies set their required (hurdle) rate of return well above their cost of capital. We conduct six CFO surveys that show that 78% of companies use elevated hurdle rates, and among these firms the average buffer is 6.6 percentage points. This confirms estimates in the previous literature.[1] Also consistent with prior work, our surveys explain why hurdle rate buffers are used: due to perceived or real financial constraints, idiosyncratic risk, uncertainty about the true cost of capital, agency problems within the firm, managerial time constraints, or for real options effects.[2]

The purpose of this paper is to study how using elevated hurdle rates ultimately affects corporate investment, M&A activity, and firm value. We show that, regardless of the underlying reason hurdle rate buffers exist, they provide a commitment mechanism that allows firms to obtain a greater share of the surplus when they negotiate with counterparties during both M&A transactions and corporate investments, ultimately improving firm value.

Our evidence shows that hurdle rates within firms are persistent, are set by upper-level management, and are considered to be "sacred."[3] The latter means that, when CFOs proffer hurdle rate instructions, it is commonplace that managers accept them without question or verification. As a result, inflated hurdle rates become a focal point of corporate action.

[1] We find that while the average firm has a WACC of 8.15%, they use a hurdle rate of 14.73% for investment purposes. Poterba and Summers (1995), Jagannathan et al. (2016), and Gormsen and Huber (2024a) find similar estimates.

[2] See, respectively, financial constraints (Graham, 2022); idiosyncratic risk (Décaire, 2024); uncertainty about the cost of capital (Bessembinder and Décaire, 2021; Krüger et al., 2015); agency problems (Harris et al., 1982; Harris and Raviv, 1996, 1998; Chen and Jiang, 2004); managerial constraints (Jagannathan et al., 2016); and real options (McDonald, 2000). Section 2 describes these papers in detail.

[3] Our survey evidence shows that hurdle rates are chosen by upper-level management in the vast majority of cases, with middle-level managers included in setting hurdle rates in only 3.8% of firms; and that hurdle rates remain persistent within firms even across changing interest rate environments. Section 3 provides empirical evidence of persistence. Also, CFO interviews from Graham (2022) illustrate that the hurdle rate is indeed "sacred," providing a benchmark to facilitate decisions by mid-level employees.

Consistent with this, we provide novel evidence that the distribution of ex post return on investment capital (ROIC, estimated using Compustat) aligns with ex ante hurdle rates that CFOs provide in our surveys. Interestingly, a portion of the mass of the ROIC distribution is shifted from just below the hurdle rate to just above it. Thus, managers appear to exhibit a commitment to "meet or beat" hurdle rate benchmarks. Moreover, the realized ROIC is typically several percentage points greater than the WACC.

We show that this "meet or beat" behavior has important consequences. We study this commitment to achieving the hurdle rate in both project development and M&A deals. M&A transactions are an ideal setting to examine whether hurdle rate buffers influence outcomes because bargaining power is central (e.g., Ahern, 2012) and we can observe both the outcome of the negotiation and the hurdle rate used during the deal.[4] Using data on M&A deals, we find a statistically significant negative relation between the use of a hurdle rate buffer and the premium paid to the target. We also find that the buffer is positively related to the bidder's cumulative abnormal return (CAR) and is negatively related to the target's CAR (though the latter is statistically insignificant). The combined firm CAR is unrelated to the buffer, so acquirers that use a buffer do not appear to pick opportunities with better synergies – they simply get better deal terms, consistent with better bargaining.

Investment projects developed inside firms are also acquisitions that change the boundary of the firm. Moreover, the commitment mechanism described above is natural in a corporate investment setting. Thus, we develop a theoretical model of delegated bargaining during project development and characterize the optimal hurdle rate buffer in several settings. A key result is that inflated hurdle rates may persist and preserve firm value because they are part of an equilibrium trade-off between the gains to trade from greater bargaining power and losses that arise when forfeiting moderately positive NPV projects. So, while some opportunities may be bypassed when a hurdle rate buffer is used, overall this can still create

[4]As shown by Dessaint et al. (2021), the discount rate data used in fairness opinions reliably measures the bidder's hurdle rate.

value due to the bargaining advantage the firm enjoys when negotiating the projects that the firm does undertake.

This result encourages us to reconsider classic textbook tutelage, which argues that capital budgeting with inflated hurdle rates should ultimately destroy substantial value as firms bypass positive NPV projects ("leave money on the table").[5] The underlying reason for the departure from textbook intuition is that project *development* is distinct from project *evaluation*. By the latter we mean the capital budgeting steps prescribed by textbooks where inputs are exogenous, while the former is broader and involves bargaining with trading partners. So, investment costs are *endogenous* during project development. For example, suppose that building a new plant requires land (which is part of up-front investment costs C_0). This cost is not exogenous. The price at which the land sells can also depend on the future value of project inflows and will result from bargaining between the firm's managers and the owners of the property.

Finally, we use the CFO survey data to empirically explore the primary implications from the model, on both the extensive and intensive margins. We use firm-level data on supplier-customer relationships (e.g., FactSet Revere) to construct measures of bargaining power in negotiations and show that buffer use is negatively related to a firm's ex ante bargaining advantage over its trading partners. This is consistent with the model's implication that firms that already have strong bargaining power have less incentive to use buffered-up hurdle rates to further enhance bargaining power. Empirically, we confirm this relation of firm's bargaining power relative to 1) suppliers, 2) customers, and 3) relative supplier-customer price markups. Moreover, as one would expect, the relations are strongest among asset classes most likely subject to negotiation (such as when assets are not readily redeployable).

We emphasize that the purpose of this paper is not to propose "one more explanation" for

[5]The magnitudes in our surveys imply that firms impose a negative bias of 5.7% for one-year cash flows and a 45% decrease for perpetual cash flows. Among firms that use a hurdle rate buffer, the average hurdle rate and WACC are 14.73% and 8.15%, respectively. Each dollar of perpetual cash flow is worth $6.79 in present value under the hurdle rate, and $12.27 under the cost of capital. This represents a decrease in value of 45% attributable to the buffer.

the use of elevated hurdle rates or to run a horse race among all the explanations. Our goal is to explore hurdle rates that are elevated (for any reason) and their effects on project development and acquisitions, and why buffers persist over time. As such, our rationale for the persistence of buffers co-exists with and complements the reasons given in the literature, which we describe in Section 2.[6] Nonetheless, as we show, our model and empirical evidence provide new and different implications than those predicted by traditional explanations of buffers.

The rest of the paper is organized as follows. In the next section, we describe the contributions of our paper in the context of the existing literature. In Section 3, we describe the survey and other data that we use, and establish a number of new stylized facts about hurdle rate buffers. In Section 4, we analyze delegated bargaining theoretically and characterize the empirical implications about IRR buffers that arise from the model. The proofs are contained in the Appendix. In Section 5, we develop a set of hypotheses and test the model using data from six CFO surveys and archival data. Section 6 concludes.

2. Literature Review

The discrepancy between hurdle rates and WACC has been appreciated for decades. Starting with Poterba and Summers (1995), the authors surveyed CEOs from Fortune 1000 companies and showed that hurdle rates often exceed both the equityholders' average rates of return and the cost of debt. Many of the firms in their study were in manufacturing, where long-term capital budgeting is commonplace. Unlike our study, though, they did not ask their subjects whether a different WACC was also computed though not used for project development. While the authors did not compute an explicit IRR buffer as we do, their findings suggest that the hurdle rates used were indeed inflated.

Since that time, many explanations have been proposed for the use of elevated hurdle

[6]We repeat this point for emphasis: Even if firms do not "strategically" choose a high hurdle rate to aid negotiations, but instead the hurdle rate is high for traditional "non-strategic" reasons, the key point of our paper still holds: a high hurdle rate aids bargaining. Thus, our message neither competes with nor rejects traditional rationales; rather, our argument complements traditional hurdle rate buffer rationales by offering an explanation for how large, long-lasting buffers might continue to exist.

rates. Harris and Raviv (1996) provide a theory of internal capital allocation in which there is decentralized information about projects and agency problems within the firm. The goal of headquarters is to manage the tendency for a division to over-invest in new projects. This may arise because divisional managers can employ less effort if more capital is invested (Harris et al., 1982), or because managers are either optimistic or have private benefits when projects are undertaken. Harris and Raviv (1996) posit that a mixture of capital constraints and oversight can help ameliorate these frictions.

Bernardo et al. (2001) investigate these issues in the context of contracting and show that only high-quality projects get funded, and that managers of these receive greater incentive compensation. This stems from information asymmetries between CFOs (headquarters) and divisional managers. Chen and Jiang (2004) show that asymmetric information is not necessary to cause use of higher hurdle rates. They show that use of an IRR buffer solves an agency problem in which the divisional manager is required to exert costly, non-contractible effort to collect information. In both cases, headquarters must commit to the allocation and compensation schemes. Chen and Jiang (2004) surmise this could arise from the rigidity of the capital budgeting process. The analysis that we provide in our theoretical model supports this claim – and we furthermore show that such commitment that arises when the CFO (headquarters) dictates the elevated hurdle rate and project managers take it as given without verification can lead to bargaining benefits and higher overall valuations.

More recently, other explanations have been offered for the pervasive use of IRR buffers. Jagannathan et al. (2016) posit that IRR buffers arise because of real (or perceived) managerial constraints. They demonstrate this to be the case using survey data. They also quantify the wedge between the hurdle rate and the firm's WACC. Their magnitudes are consistent with the results from our surveys, which is reassuring. Further, our more recent surveys confirm that elevated hurdle rates remain important for managers. However, one still wonders whether firms are leaving money on the table by not finding a way to resolve the managerial constraint, such as by training more managers. Our paper addresses this issue both theoretically and empirically by showing that on net, elevated hurdle rates can preserve or even create value.

Décaire (2024) shows that firms use an IRR buffer when they face higher idiosyncratic risk. Bessembinder and Décaire (2021) show that uncertainty about discount rates (systematic risk) causes an upward bias in estimated NPVs, leading to higher corporate investment; such a bias should cause firms to adjust their hurdle rates. These predictions are considered in our model. We also show that they are present in the data, confirming these studies as well as predictions from our model; we control for these forces when investigating the other implications of our model.

Relatedly, a recent literature has studied the real effects of managers using imprecise or over-simplified discount rates. Krüger et al. (2015) analyze the practice of using a single firm-wide discount rate (see Graham and Harvey, 2001) and show that companies value high-risk projects using discount rates that are too low and vice versa; this leads to over-investment (under-investment) in relatively risky (safe) projects. They further show that this practice leads to lost value – in the context of acquisitions, when the bidder's beta is lower than the target's beta, the bidder's announcement returns are significantly lower.

Dessaint et al. (2021) study a different mechanism – managers and the market may arrive at different acquisition valuations if managers (over-)rely on CAPM-estimated discount rates. This stems from the well-documented observation that the empirical security market line is too "flat" relative to CAPM-implied estimates. They show that managers who rely on the CAPM tend to overvalue low-beta targets and undervalue high-beta targets relative to the market.[7] Together, these papers highlight additional real consequences of the use of imprecise WACC in corporate finance, which we incorporate into our model and empirical analysis.

Our paper is also related to Gormsen and Huber (2024a), who document time-varying

[7] Our analysis of the relation between hurdle rate buffers and acquisition premia in Section 5.1 also relates to Dessaint et al. (2021). We show that hurdle rate buffers are negatively related to acquisition premia paid by bidders and positively related to bidder abnormal returns post-announcement. Our results are consistent with the use of a hurdle rate buffer conveying a bargaining advantage in M&A, another example of the real effects of capital budgeting and project development practices.

wedges between hurdle rates and the cost of capital disclosed in earnings calls. Despite our having much different data sources, the magnitude of the hurdle rate buffers is similar between our paper and theirs. Gormsen and Huber (2024a) also show that the hurdle rate wedges are negatively related to investment, providing new evidence on the real effects of inflated discount rates.

A key contribution of our paper relative to the prior work on the buffer is that we show that a buffer can actually be value-enhancing. McDonald (2000) posits a very different mechanism that relates buffer use to increases in value. In that paper, a buffer serves as a heuristic that approximates solving a real options problem. Managers have the option to wait to start projects and thus choose when to optimally exercise an American option. If the option is sufficiently in the money, they do not wait; this is akin to the project return exceeding a high hurdle rate.

Importantly, our model shows that large buffers have the added benefit of increasing the bargaining surplus the project will achieve if the firm uses an elevated hurdle rate for any of the rationales discussed above. This finding helps explain the persistent and widespread use of hurdle rate buffers.

Our paper adds to the extant bargaining literature. The model explored in Rubinstein (1982) and Rubinstein and Wolinsky (1985) is sequential, in which two parties take turns making take-it-or-leave-it offers. Bargaining takes place over time, as long as an agreement has not been reached. Each party has a discount rate, which proxies for their eagerness to get to a negotiated deal faster. The solution involves an equilibrium split whereby a higher discount rate yields lower surplus. Our model yields the opposite intuition: having a higher discount rate increases a party's (perceived) walkaway value because the outside option is more valuable.

The organizational structure in our model gives rise to decentralization in which the CFO reports the hurdle rate and the manager develops projects. This is in the spirit of Schelling (1956), Crawford and Varian (1979), and Sobel (1981) who explore how advantage can be gained by distorting the impression or beliefs of a counterparty during negotiation. Explicitly, this can be done via delegation in which a party commits to using a representative without the ability to renegotiate suboptimal outcomes (Jones, 1989; Fershtman et al., 1991; Burtraw, 1993; Segendorff, 1998). The structure of our theoretical construct shares this feature, which we use to model typical organizational behavior.

3. Data Description and the Hurdle Rate Buffer

In this section, we describe our data sources, discuss the reasons that firms set their hurdle rate above their cost of capital, and describe variation in the hurdle rate buffer across observable dimensions. We discuss the main variables covered by our CFO surveys in Section 3.1, discuss the origins of the buffer in Section 3.2 and consider the connection between sacred hurdle rates, commitment and project development in Section 3.3. Table A.1 provides variable definitions and Appendix C.1 provides more detail on the CFO Survey.

3.1. CFO Survey Data

Our primary data source comes from six CFO surveys conducted by Duke University. These surveys have been conducted quarterly for decades; the most recent surveys were conducted jointly with the Federal Reserve Banks of Richmond and Atlanta. Several of the surveys asked CFOs directly for both their hurdle rate and their weighted average cost of capital.

One advantage of gathering data via surveys is that we obtain information directly from each firm's primary financial decision-maker. Another advantage is that we are able to gather data via questions that precisely define hurdle rates and other variables versus having to infer or approximate the variables. We ascertain the firms' weighted average cost of capital by asking CFOs "what do you estimate is your firm's overall weighted average cost of capital (WACC)?" To obtain data on hurdle rates, we ask "what is your firm's hurdle rate (the rate of return that an investment must beat in order to be adopted)?" Similar questions appeared in each of the six CFO surveys that we analyze and the consistent wording of these questions gives us confidence that our measures capture what we intend.[8] For sample inclusion, we require that the CFO supply a value for their WACC and hurdle rate. From there, we compute the hurdle rate buffer as the difference between the hurdle rate and WACC.

Figure 1 summarizes key characteristics of the survey firms. Panel A shows that firms in our sample are distributed across industries and that manufacturing firms comprise the largest portion of the sample. Panel B conveys that the sample includes large firms (revenue greater than $1 billion), as well as smaller firms. Panel C shows that our sample is composed of both private and public firms. Panel D shows that our sample is relatively evenly distributed across six different surveys that asked CFOs about their hurdle rates.

Table 1, Panel A displays summary statistics of variables related to the hurdle rate and cost of capital. The average hurdle rate in our sample is 13.88% and the average WACC is 8.77%, giving rise to an average buffer of just over 5%. Nearly 78% of companies use a hurdle rate buffer, and among the firms that have a non-zero buffer, the average buffer is 6.6%. The size of the buffer is consistent with other research (Jagannathan et al., 2016; Graham, 2022; Gormsen and Huber, 2024a).

3.2. Exploratory Analysis of the Hurdle Rate Buffer

In this section, we establish stylized facts about why firms use buffers and explore the cross-sectional and time series variation in the intensive and extensive margins of the buffer.[9]

3.2.1. Why Do CFOs Set Hurdle Rates Above the Cost of Capital?

Various frictions may lead a company to set its hurdle rate above the cost of capital. Companies may use a buffer to ration capital, so that they pursue just the highest expected

[8] The surveys are 2011q1, 2012q2, 2017q2, 2017q3, 2019q1 and 2022q2. Appendix C.1 provides detail on the data collection process and the questions posed to CFOs concerning their hurdle rate and cost of capital.

[9] The extensive margin of the buffer refers to the use of a positive buffer (an indicator equal to one if the firm's hurdle rate is greater than WACC). The intensive margin refers to the difference between the hurdle rate and WACC. Much of our analysis of the intensive margin includes firms that have buffer = 0, which is the same sample used for the extensive margin analysis and therefore enhances comparability. The intensive margin analysis is robust to deleting buffer = 0 firms and focusing on firms with a positive buffer (see Table 2), and in unreported results, is also robust to using a Tobit specification (to account for zero-inflation).

return projects of a given class. This may arise due to constraints on funding, managerial time, non-managerial labor availability, or production capacity (Jagannathan et al., 2016; Graham, 2022). A second set of forces may lead CFOs to set a hurdle rate equal to their perceived cost of capital plus a "fudge factor," which serves to offset complications from idiosyncratic risk or difficulties in estimating the true cost of capital (Décaire, 2024; Bessembinder and Décaire, 2021), because of agency issues or adverse selection problems within the firm, or because of behavioral forces that lead managers to use overly-optimistic cash flow forecasts as they pitch their projects to upper management (Harris et al., 1982; Harris and Raviv, 1996, 1998; Chen and Jiang, 2004). Third, using a buffer may approximate decision-making that accounts for real options motivations (McDonald, 2000).

To explore these possibilities, on three of the CFO surveys we asked CFOs "Why do you set your hurdle rate above WACC?", allowing respondents to choose among a list of reasons representing the forces mentioned above (or to write in other explanations). The available choices varied somewhat between surveys but always included choices related to five of the traditional explanations mentioned above: (i) financing constraints, (ii) managerial/resource constraints, (iii) project prioritization, (iv) idiosyncratic risk/uncertainty, and (v) over-optimism/agency. We classify CFO responses concerning why their hurdle rate exceeds WACC under these five qualitative groupings, in order to ascertain the relative importance of each in explaining the buffer.

Figure 2 presents the proportion of CFOs that selected reasons that fall within each of the five categorizations of why companies use hurdle rate buffers. Table A.2 describes how we group responses across each survey. Panel A of Figure 2 displays the importance of each category across the three surveys. There is reasonable support for each of the five categories. For example, about 42% of respondents indicate that they implement a buffer due to project prioritization and about 60% indicate that risk or uncertainty in estimating the cost of capital or unmeasured risks lead to buffers. Panel B displays the importance of each reason by survey year. The importance of financing and resource constraints dipped in

2019 when the economy was in a relatively strong position (relative to 2011, where the after-effects of the 2008 crisis were still present; and relative to 2022, with a tight labor market and rising borrowing costs). To emphasize a point made earlier, the key implication of our model that using an elevated hurdle rate provides a bargaining advantage holds whether the CFO increases the hurdle rate buffer for any of the "non-strategic" reasons reflected in Figure 2 or sets the hurdle rate strategically to gain negotiating advantage.

Panel C displays the results conditional on firm size (large firms being those with revenue weakly greater than $1 billion). Financing and resource constraints are relatively more important for small firms. Interestingly, idiosyncratic project risk or uncertainty about WACC, the discount rate, or other unmeasured risks are more important for large firms. This may be because large firms are more likely to have numerous diverse projects, with different idiosyncratic risk, and are more likely to use equity markets or issue debt, potentially adding complexity to estimating the cost of capital and the return required by investors. The information in Figure 2 helps us create empirical proxies to measure these buffer explanations, both to explore these explanations directly and to control for these reasons when we explore empirical predictions from the model.

3.2.2. Variation in Hurdle Rate Buffers

By comparing a time-series of surveys back to the 1980s, it becomes clear that hurdle rates are, on average, relatively stable across time – suggesting that buffers also retain this consistency, or have even growing through time (Graham, 2022; Sharpe and Suarez, 2021; Jagannathan et al., 2016; Poterba and Summers, 1995). Figure 3 investigates the cross-sectional and time series properties of the hurdle rate, cost of capital and buffer. Panel A displays industry averages. The black error-caps on each bar display the within-group inter-quartile range.[10] It is noteworthy that there is substantial variation *within* each industry, which is consistent with our model in which the value impact of using a buffer is affected

[10]For example, the average buffer in Mining/Construction is approximately 6%, and the inter-quartile range is 0% to roughly 9%.

by a firm's position within its industry. It is also clear that the variation in the buffer does not arise solely from differences across industries. Leveraging our data's finer industry classifications, Table A.3 displays average hurdle rate, cost of capital, and the intensive and extensive margins of the buffer across NAICS-2 and CFO survey industries.

Panel B shows that the size of the average buffer is relatively stable through time. Panel C shows that there is a clear difference in the size of the buffer for small versus large firms. For firms with less than $1 billion in sales revenue, the average buffer is 5.8%, whereas for firms with revenue above $1 billion, it is 3.8%. Though not shown in the figure, among firms with a non-zero buffer, the average buffer for small/large firms is 6.9%/5.3%. Panel D shows that the buffer is remarkably similar across regions of the world, despite variation in the hurdle rate and the cost of capital (see also Gormsen and Huber, 2024a).[11]

We explore the determinants of the hurdle rate buffer in a multivariate analysis in Table 2. Panel A explores the extensive margin and Panel B the intensive margin. Overall, the results show that both the probability of using a buffer and the size of the buffer itself are strongly negatively related to the cost of capital. As we will explain, this robust relation is consistent with our model: the magnitude of the hurdle rate is what determines negotiation outcomes, so companies with an already high cost of capital do not need to add as much buffer to achieve the same hurdle-rate-driven walkaway value. Appendix C.2 presents a detailed analysis of the other relations shown in Table 2.

3.3. Sacred Hurdle Rates, Commitment and Project Development

CFO interviews in Graham (2022) establish that the hurdle rate is often considered "sacred" at firms (accepted without question or verification by managers), providing a clear benchmark to facilitate decision-making by employees. A recent 2024q4 CFO survey supports this: we asked CFOs who determines the hurdle rate at their company, and only 3.6%

[11] We separately examine the properties of the extensive margin of the buffer in Figure A.1. The extensive margin patterns in the appendix figure are very similar to the just-discussed intensive margin results shown in Figure 3.

reported that middle management had a say in its determination. All else equal, hurdle rates that do not change much from year to year are more likely to be accepted as sacred throughout the company. In fact, this persistence (stickiness) is an important characteristic of hurdle rates.[12] In this subsection, we first establish the stickiness of hurdle rates, and later we explore the relation between hurdle rates, realized returns and project development.

Figure 4 explores the degree of stickiness in our data. Analyzing CFOs that appear in the survey at least twice, the figure displays a binned scatter plot illustrating the autocorrelation in hurdle rates while controlling for the common determinants of the hurdle rate explored in Table 2. The figure reveals a high degree of persistence in hurdle rates. Quantifying this persistence, nearly half of CFOs did not change their firm's hurdle rate on consecutive surveys.

To be clear, our model and the arguments of our paper do not require that hurdle rates are persistent – we only require that managers commit to the CFO-provided hurdle rate in their decision-making. An environment in which hurdle rates are persistent, which is what we document in the data, is conducive to hurdle rates being accepted as sacred by managers. Next, we provide novel evidence that realized returns align with ex ante hurdle rates. This implies that achieving the target hurdle rate is an important corporate objective, indicating that a *commitment* to achieving the hurdle rate permeates corporate decision-making.

3.3.1. Ex Ante Hurdle Rates versus Realized Returns

Companies use hurdle rates as a benchmark against which expected returns of projects are compared. If realized and expected returns align, we would expect hurdle rates to influence the distribution of realized project returns. In particular, we would expect to observe excess mass in the realized return distribution directly above the benchmark hurdle rate. We do

[12] Graham (2022) and Sharpe and Suarez (2021) show that average hurdle rates are remarkably stable across time, with little variation from 1985 to 2022, even as interest rates fell dramatically. Graham (2022) also shows that, among firms responding to the CFO survey in 2019, nearly 40% of firms had not changed their hurdle rate in 10 years. In a recent 2024q4 survey, we document that the average hurdle rate remained near-constant from 2019 to 2024q4, a period over which market interest rates increased by about 400 basis points. Further, analysis by the Bank of England shows that hurdle rates of UK firms have been insensitive to the recent (2022-2024) increases in corporate borrowing rates. Fukui et al. (2024) study the implications of sticky hurdle rates for macroeconomic models, without delving into the capital budgeting process.

not observe project-level returns in our data; however, for public firms in Compustat that appear in our surveys, we can calculate a measure of realized return based on the return on invested capital (ROIC), which is an aggregation of the firm's return on all projects.

If commitment to the hurdle rate dictates project development, managers of marginal projects (those with expected returns close to or just below the hurdle rate) are incentivized to push these projects over the line. This could occur via the specific mechanism in our paper (bargaining over project inputs), but could also occur via some other aspect of project development. The important thing is that the hurdle rate acts as a *commitment device*, around which projects (including those with trading partners) are developed.

A direct empirical consequence of this would be bunching of ROIC just above the hurdle rate, or a shift in a portion of the ROIC distribution from just below to just above the hurdle rate. Empirically, we search for this discontinuity in the distribution using a simple application of density manipulation testing (Cattaneo et al., 2018). We test for a discontinuity at zero in the distribution of the variable $Excess\ ROIC = ROIC - Hurdle$, which measures the firm's ROIC earned in excess of its hurdle rate.

Figure 5 displays the density of excess ROIC centered at zero. The light blue and orange bars display observed frequencies and indicate that occurrences just above zero (ROIC just greater than the hurdle rate) are much more frequent than directly below: about 9% of relevant observations are in the +0.5% bin, whereas about 3.5% are in the −0.5% bin.[13] The shaded area and lines overlaid on the histograms display the estimated density of excess ROIC (Cattaneo et al., 2018), revealing a distinct discontinuity at zero.[14]

[13] As stated in the caption of Figure 5, we linearly interpolate between observed hurdle rates for Compustat firms in our sample. For example, if the hurdle rate is 10% in 2012q2 and 11% in 2012q4, we assume a hurdle rate of 10.5% in 2012q3. Given the stickiness of hurdle rates as shown in Graham (2022), we feel that this assumption is reasonable. We confirm the primary findings of our analysis in Figure 5 by alternatively using "stair-step" interpolation, where we keep the hurdle rate constant between consecutive observation until data from a future survey reveals a change in the hurdle. For the example just given, we would assume that the firm's hurdle rate remained at 10% in 2012q3. Results are very similar.

[14] We follow the data-driven bandwidth selection methodology to estimate the density, and set the order of the local polynomial to 3. In Table A.4, we vary the order of the local polynomial and the size of the bandwidth for local estimation and show that the implications of Figure 5 are quite robust, though the discontinuity attenuates as the size of the bandwidth increases.

The findings in Figure 5 provide evidence consistent with companies choosing projects to beat their hurdle rates. Moreover, if companies are choosing projects based on hurdle rates, rather than the cost of capital, one would not expect to find ROICs bunched just above the WACC. This is exactly what we find in Figure A.3, where we undertake a similar exercise to Figure 5, testing instead for discontinuity in the density of ROIC at firms' costs of capital. We find no statistical or visual evidence of bunching in ROIC directly above WACC, suggesting that firms target their hurdle rates as opposed to WACC.[15]

One takeaway from these figures is explicit confirmation, for the first time in the literature to our knowledge, of the importance of hurdle rates as a commitment device (more so than the cost of capital) in project development, as well as "beat-the-benchmark" bunching just above the hurdle rate. Burgstahler and Dichev (1997) find beat-the-benchmark behavior for earnings per share targets, a highly visible external benchmark. Our finding shows similar behavior for the hurdle rate benchmark, a number which is internal to the firm and not generally known publicly, suggesting strong beat-the-benchmark corporate incentives.

These findings also help validate the quality of the hurdle rate data gathered via the CFO surveys – and indicate that elevated hurdle rates play a greater role than simply offsetting inflated cash flow projections. The analysis also suggests that firms are committed to investing at their hurdle rate. This commitment has value within-firm as a coordination and project selection tool. We embed hurdle rate buffer commitment into a model of bargaining and project development and show that this leads to a bargaining advantage when bargaining with trading partners.

The evidence in this section confirms four empirical features of hurdle rate buffers. First, firms use buffers for different reasons, for example to ration project choice because of con-

[15] In appendix Figure A.3, we use the same sample of firms as in Figure 5. In nearly all of our analyses, we require the respondent to supply both a hurdle rate and a WACC. However, for Figure 5 we maximize our sample size to include firms that only supply their hurdle rate. For this expanded sample, because CFOs do not always provide a WACC number along with their hurdle rate, in Figure A.3 only, we estimate WACC using Compustat data and the CAPM. We do this to facilitate comparison between the role of the hurdle rate vs. WACC in determining the distribution of ROIC.

straints or to counteract frictions in the firm's organizational structure (Figure 2). Second, there is considerable variation in buffers across firms even though average hurdle rates are stable through time, confirming that the buffer is not an artifact of differences in financial practice across, e.g., industries (Figure 3). Third, hurdle rates are persistent, which creates an environment that is conducive to them being accepted as sacred, and thus acting as a coordination device (Figure 4). Fourth, realized returns are associated with the hurdle rate, which is consistent with hurdle rate commitment influencing outcomes in project development (Figure 5). These four facts motivate and discipline the model in Section 4 and subsequent empirical analyses in Section 5.

4. The Model

4.1. Preliminaries

Consider a firm F that employs a CFO who is tasked with calculating and reporting a hurdle rate for its activities. The CFO uses an asset pricing model to compute the cost of capital $W_F = 1 + r^F_{wacc}$. She then reports a hurdle rate H_F to other employees in the firm, which is taken at face value and is not verified. As such, the CFO has discretion to report the real $H_F = W_F$, or she may use an IRR buffer and report a higher gross hurdle rate $H_F = \tau_F > W_F$ to others in the firm.

Reasons for reporting $\tau_F > W_F$ may be to compensate for a lack of precision in estimating W_F, conservatism, or managerial and financial constraints. We consider the consequences of this, assuming that the CFO is not purposefully taking advantage of the delegated-bargaining organizational structure of the firm (described shortly) and is not considering similar actions by other parties in the market. Following that, we endogenize the hurdle rate choice, when the CFO also considers delegated bargaining and competitive effects.

Employees within the firm who identify and develop projects are called *delegates*. For any given project, we begin by considering that it is necessary for the firm to acquire one asset from an outside business partner (e.g., land, a building, or equipment). If the delegate fails to secure the necessary asset, the entire project becomes infeasible. Later, we extend this to N outside entities/assets.

The outside business partner, O, also has a CFO and a delegate who represent its interests. The business partner has its own required rate of return. In the same way, the delegate for the outside business partner is either endowed with their true cost of capital $H_O = W_O = 1 + r^O_{wacc}$ or a gross hurdle rate that includes an IRR buffer $H_O = \tau_O$.

The projects that the primary firm has access to are heterogeneous. Assume that the gross returns from these investment opportunities are distributed according to a continuously-differentiable cumulative distribution function $F(R)$ with associated density function $f(R)$ on the support $[1, \bar{R}]$. We assume that $F(\bar{R}) = 1$ and that $F(R)$ is weakly concave over $[1, \bar{R}]$, which admits common distributions such as the uniform, exponential, and truncated-normal.[16] Assume that both delegates and CFOs have full information about this distribution. Also, to abstract away from other agency or adverse selection problems, assume that the return from any project that is ultimately accepted is ex post verifiable.

When assets are acquired, delegates from both firms report their respective hurdle rates to each other, and a fraction θ of the surplus is allocated to firm F, with $(1 - \theta)$ going to firm O. Assume that the split is a continuously differentiable function $\theta(H_F, H_O)$ on $[0, 1]$, such that $\theta'(H_F) > 0$, $\theta''(H_F) \leq 0$, and $\theta'(H_O) < 0$.

To motivate the effect that hurdle rates have on the bargaining split, consider the following results from standard Nash bargaining, where bargaining maximizes

$$\max_{s} \quad (s_F - d_F)^{\alpha}(s_O - d_O)^{\beta}, \tag{1}$$

where $s \equiv \{s_F, s_O\}$ is the surplus allocated to each party and $d \equiv \{d_F, d_O\}$ is each party's

[16] The normal distribution is concave for realizations that are greater than its mean. This is natural here. For example, suppose a firm faces potential projects with a mean gross return of 1, they would be unlikely to accept any project with a return less than 1. So, analyzing the portion of a normal distribution strictly above $\mu = 1$ is plausible.

disagreement payoff.

Lemma 1. *For any feasible R, suppose that $s = \{\theta R - H_F, (1-\theta)R - H_O\}$, $d = \{0, 0\}$, and $\alpha = \beta = 1$. Then,*

$$\theta = \frac{1}{2} + \frac{H_F - H_O}{2R}. \tag{2}$$

In Lemma 1, firms receive their portion of R minus their opportunity cost. If the two managers walk away, they believe that they can invest their capital in an alternative at their hurdle rate, earning zero NPV. The solution in (2) shows that the split of the surplus depends on each firm's purported hurdle rate - the firm with a higher hurdle rate effectively has more bargaining power. The two parties split the surplus, with a greater proportion going to the party with the higher walkaway value: θ is increasing in H_F and decreasing in H_O.

Lemma 2. *For any feasible R, suppose that $s = \{\theta[R-(H_F+H_O)], (1-\theta)[R-(H_F+H_O)]\}$, $d = \{0, 0\}$, $\alpha = H_F$, and $\beta = H_O$. Then,*

$$\theta = \frac{H_F}{H_F + H_O}. \tag{3}$$

Based on Lemma 2, the θ split is a Tullock contest function (Tullock, 1980) with the interpretation from (Hirshleifer, 1989) that each party gains a share of the project return. In Appendix B, we show that the same Tullock function in (3) can also arise from a stochastic productivity model (Jia, 2008). Later in the paper, we will use a Tullock contest function, which is natural because they are commonly used to characterize the gains from innovation in the rent seeking literature (D'Aspremont and Jacquemin, 1988; Chung, 1996; Baye and Hoppe, 2003; Andrei and Carlin, 2023).[17] For now, we proceed with the general function θ as defined above, but the Tullock function has the same properties that we have assumed.

[17] Chowdhury and Sheremeta (2011) generalize Tullock contest functions to consider linear combinations of effort complementarities in duopoly contests. See also D'Aspremont and Jacquemin (1988), Chung (1996), and Alexeev and Leitzel (1996).

The use of discount rates in θ is in the spirit of Rubinstein bargaining, but distinct. Because Rubinstein bargaining is sequential, the party with less patience (higher discount rate) earns a lower split of the surplus. Here, the opposite occurs since the perceived value of the outside option is based on the hurdle rate. When a delegate is required to earn a higher return, their perceived walkaway value increases, and they earn more surplus if a deal is feasible.

Any firm can increase its bargaining power by reporting a higher hurdle rate. In the equilibria that we derive below, this may make it attractive for both parties to use IRR buffers. As we will see however, the offsetting cost will be that positive NPV projects are lost because of the exaggeration of reported hurdle rates. Define $\underline{R} = H_F + H_O$ as the minimum feasible project return (i.e., the lower bound of $F(R)$). Any project with gross return less than $H_F + H_O$ cannot return sufficient value to meet both purported hurdle rates, so the delegates do not reach agreement.

4.2. Consequences of IRR Buffers

4.2.1. Imprecise Estimation of WACC

According to Bessembinder and Décaire (2021) and Krüger et al. (2015), managers may face the inability to precisely estimate W_F. This can be the result of model uncertainty or inherent estimation error. To account for this, or to be conservative, CFOs may use a buffer, which we denote by b. Without loss of generality, assume that the outside partner exogenously sets $H_O = W_O$.[18]

If firm F does not use an IRR buffer, its split of the total surplus is given by θ_N so that firm value is computed as

$$V_N = \int_{\underline{R}'}^{\bar{R}} \theta_N dF(R) = \theta_N[1 - F(\underline{R}')], \tag{4}$$

[18] A value $H_O > W_O$ that is set exogenously or used for non-strategic reasons does not qualitatively change the results that follow.

where $\underline{R}' \equiv W_F + W_O$. Likewise, if the firm uses the buffer b, its value is

$$V_B = \int_{\underline{R}''}^{\bar{R}} \theta_B dF(R) = \theta_B[1 - F(\underline{R}'')], \tag{5}$$

where $\underline{R}'' \equiv W_F + b + W_O$ and $\theta_B > \theta_N$ is its surplus split.

Lemma 3. *When the CFO uses a buffered hurdle rate $H_F = W_F + b$ to adjust for imprecision in estimating W_F, the value of the firm increases if*

$$V_B > V_N \quad \Leftrightarrow \quad \frac{\theta_B}{\theta_N} > \frac{1 - F(\underline{R}')}{1 - F(\underline{R}'')}. \tag{6}$$

The proof follows from comparing (4) and (5). If the buffer b is sufficiently low, firm value can rise if the bargaining benefit outweighs the loss incurred by discarding marginal positive NPV projects (i.e., $F(\underline{\mathrm{R}})$ does not change much). If the firm already enjoys sufficient bargaining power without a buffer (θ_N is large), it is less likely that using a buffer adds value. In this case, forgoing positive NPV projects may be too costly.

Overall, Lemma 3 illustrates that the bargaining channel can mitigate some or all of the cost of forgoing positive NPV projects, even when the buffer is not set with bargaining in mind. Therefore, even if a CFO uses a buffer to address uncertainty regarding their WACC estimation, the bargaining advantage conveyed by that buffer may preserve or even improve firm value. The same intuition arises with financial and managerial constraints.

4.2.2. Financial and Managerial Constraints

Consider that the CFO chooses a hurdle rate $H_F > W_F$ to accommodate an exogenous constraint that is based on time or financial resources. Suppose that the firm only has financial resources to initiate the fraction f of the potential projects such that $0 < f \leq 1$. Or perhaps, it can only consider a fraction m of the projects due to managerial constraints such that $0 < m \leq 1$. Define $k \equiv min\{f, m\}$. Given this, the value of the firm with a buffer is

$$V_B = \int_{\underline{R}^H}^{\bar{R}} \theta_H dF(R),$$

where $\underline{R}^H$ is a function of k and will be used to derive (7) in the following proposition.

Lemma 4. *When only k fraction of projects can be considered because of constraints, the CFO sets a buffered hurdle rate that solves*

$$F(H_F + W_O) = 1 - k[1 - F(\underline{R}')]. \tag{7}$$

where $\underline{R}'$ is defined when no buffer is used. It follows that

$$V_B > V_N \quad \Leftrightarrow \quad \frac{\theta_H}{\theta_N} > \frac{1}{k}. \tag{8}$$

The results in Lemma 4 are straightforward. First, the hurdle rate is a decreasing function of k. By construction, the less constrained the firm is (higher k), the less of an IRR buffer it needs to use. Second, the use of the IRR buffer due to constraints increases firm value if (8) holds. This will arise when the gain in bargaining power is higher relative to the constraint that needs to be imposed.

4.3. Strategic Use of IRR Buffers

Now, we suppose that the CFO may attempt to capture higher bargaining surplus by altering the firm preferences that outsiders observe about the hurdle rate (Schelling, 1956; Crawford and Varian, 1979; Sobel, 1981; Jones, 1989; Fershtman et al., 1991; Burtraw, 1993; Segendorff, 1998). We begin by examining a one-firm case, and then consider competitive buffers.

4.3.1. Single-firm IRR Buffer

It is instructive to start by assuming that the outside business partner does not use an IRR buffer strategically (i.e., $H_O = W_O$). Later, we allow H_O to be chosen endogenously.

If firm F does not use an IRR buffer, its split of the total surplus is given by θ_N so that firm value is computed as

$$V_N = \int_{\underline{R}'}^{\bar{R}} \theta_N dF(R) = \theta_N[1 - F(\underline{R}')], \tag{9}$$

where $\underline{R}' \equiv W_F + W_O$. As such, $\underline{R}'$ measures the minimum project return so that both parties can receive sufficient surplus to participate.

Now consider that a hurdle rate buffer may be used strategically by the firm when the outsider does not. The firm solves

$$\max_{\tau_F \geq W_F} \quad V_B = \int_{\underline{R}''}^{\bar{R}} \theta_B dF(R), \tag{10}$$

where $\tau_F = H_F$ is the buffered (gross) hurdle rate and $\theta_B > \theta_N$ is the resulting split.

We restrict $\tau_F \geq W_F$ because it is a dominated strategy to choose a lower cost of capital than W_F; in that case the firm would reduce its bargaining power and accept negative NPV projects. So, when a positive IRR buffer is used, $\underline{R}'' \equiv \tau_F + W_O$, which is larger than $\underline{R}'$. The lower limit of the integral increases because some positive NPV projects are rejected and the firm's delegate walks away.

Therefore, the CFO faces a trade-off. Using a higher buffer increases the split of the surplus from θ_N to θ_B, but raises the minimum acceptable project from $\underline{R}'$ to $\underline{R}''$: bargaining power increases, but positive NPV projects are discarded.

Proposition 1. *When the firm uses a positive IRR buffer and the outsider does not, there exists a unique optimal buffered hurdle rate τ^* that solves*

$$\frac{\frac{\partial \theta_B(\tau^*)}{\partial \tau}}{\theta_B(\tau^*)} = \frac{f(\underline{R}'')}{1 - F(\underline{R}'')}, \tag{11}$$

and the resulting value to the firm is given by

$$V_B^* = \frac{\partial \theta_B(\tau^*)}{\partial \tau} \frac{[1 - F(\underline{R}'')]^2}{f(\underline{R}'')}. \tag{12}$$

The change in value resulting from use of the buffered hurdle rate is strictly positive if

$$\frac{\partial \theta_B(\tau^*)}{\partial \tau} \frac{[1 - F(\underline{R}'')]^2}{f(\underline{R}'')} > \theta_N[1 - F(\underline{R}')]. \tag{13}$$

According to Proposition 1, the optimal buffered hurdle rate solves (11), where the right-hand side can be considered a hazard rate and the left-hand side a reverse hazard rate. The intuition is that at the optimum, the marginal benefit of increasing the hurdle rate to raise bargaining power equals the cost of losing an incremental project. Also, (13) characterizes when a buffered hurdle rate is optimal:when 1) the marginal benefit to raising bargaining power is higher; 2) the exclusion of marginal positive NPV projects is not too costly; 3) the firm's starting bargaining power is low; and 4) the range of feasible projects under no buffers is smaller.

While the results in Proposition 1 are general, we can further characterize the results with some simplifications. Let us first assume that project gross returns are uniformly distributed on $[1, \bar{R}]$. Further, let us consider that the θ split results from a Tullock contest function (Tullock, 1980)

$$\theta = \frac{H_F}{H_F + H_O}, \tag{14}$$

with the interpretation from Hirshleifer (1989) that each party gains a share of the return from the project. Given this,

$$\theta_N = \frac{W_F}{W_F + W_O} \qquad \theta_B = \frac{\tau_F}{\tau_F + W_O}. \tag{15}$$

Proposition 2. *When the firm uses a positive IRR buffer and the outsider does not, the* *optimal buffered hurdle rate is given by*

$$\tau_F^* = \sqrt{\bar{R}W_O} - W_O, \tag{16}$$

and the resulting value to the firm is given by

$$V_B^* = \bar{V} + W_O - 2\sqrt{\bar{R}W_O}. \tag{17}$$

The change in value resulting from use of the buffered hurdle rate is strictly positive, that is,

$$\Delta V = V_B^* - V_N = \frac{W_O \bar{R}}{W_F + W_O} + (W_F + W_O) - 2\sqrt{\bar{R}W_O} > 0. \tag{18}$$

ΔV *is increasing in* $\bar{R}$ *and decreasing in* W_F*.*

As in the general case, the CFO faces a trade-off. Using a higher buffer increases the split of the surplus from θ_N to θ_B, but raises the minimum acceptable project from $\underline{R}'$ to $\underline{R}''$: Bargaining power increases, but some positive NPV projects are discarded.

We can use (16) to determine a condition that characterizes when a positive buffer is used (extensive margin), that is when $\tau_F > W_F$. A positive buffer is used if

$$(1 - \theta_N)\bar{R} > W_F + W_O. \tag{19}$$

The firm is more likely to use the buffer when its starting bargaining power (i.e., their initial split of the surplus, θ_N) is lower, its own cost of capital (W_F) is lower, and when there are more high potential project values ($\bar{R}$). The upper bound of the project values $\bar{R}$ can also be considered a proxy for the uncertainty faced by managers, since the variance of the distribution increases with $\bar{R}$. If (19) is not satisfied, then the CFO reports the hurdle rate as equal to the true WACC.

As a specific example, Figure 6 displays the value implications from the model. We calibrate parameters so the optimal hurdle rate buffer $b^* = 5.11\%$, the unconditional average value in the CFO Survey data. On the right y-axis, we plot the change in value implied by a standard capital budgeting model, where we only consider the value lost from forgoing positive NPV projects. At b^*, the implied "traditional" change in value is about -4.4%. On the left y-axis, we incorporate the value benefit from bargaining and plot the model-implied percentage increase in firm value from using a hurdle rate buffer.[19] This equals $+0.11\%$. While this may seem small, it does imply that firm value is preserved even with a large buffer. The difference in value creation between traditional assumptions and the bargaining model is quantitatively large at 4.5 percentage points.

Also according to Proposition 2, if an IRR buffer is used, the intensive margin implications are that buffers are more attractive for high potential project values and less attractive when there is a higher cost of capital. The relationship is more subtle between ΔV and W_O. This stems from a non-monotonic relationship between the use of the IRR buffer (τ_F^*) and W_O. Taking the following derivative

$$\frac{\partial \tau^*}{\partial W_O} = \frac{\bar{R}}{2\sqrt{\bar{R} W_O}} - 1$$

demonstrates that the relationship is positive only if $\bar{R} > 2\underline{R}'$. When the surplus gained from a larger share of projects is greater than the value lost from forgoing positive NPV projects, the firm's IRR buffer is increasing in W_O. Otherwise, if $\bar{R} < 2\underline{R}'$, the cost of lost positive NPV projects dominates and the buffer is smaller.

[19]The difference between the two axes is the bargaining split. On the left y-axis, θ_B is allowed to change with b, so $V_B = \theta_B \bar{V} - (W_F + b)$ and the bargaining split increases with b. On the right, we hold the surplus split fixed, so $\tilde{V}_B = \theta_N \bar{V} - (W_F + b)$, with θ_N displayed in (15).

4.3.2. Competitive IRR Buffers

Now consider that each player $i \in \{F, O\}$ chooses an IRR buffer to maximize

$$\max_{\tau_F} \quad V_F = \int_{\underline{R}''}^{\bar{R}} \theta dR$$

and

$$\max_{\tau_O} \quad V_O = \int_{\underline{R}''}^{\bar{R}} (1-\theta) dR,$$

conditional on their counterparty acting optimally as well. Now, the lower limit of integration is defined as $\underline{R}'' = \tau_F + \tau_O$, which is the purported minimum project value that can meet both parties' required returns under the buffered IRR hurdle rates.

Proposition 3. *There exists a unique symmetric Nash equilibrium in pure strategies in which the optimal buffered hurdle rates are given by*

$$\tau_F^* = \frac{\bar{R}}{4} \qquad \tau_O^* = \frac{\bar{R}}{4} \tag{20}$$

and the value for each firm is

$$V_F^* = V_O^* = \frac{\bar{R}}{4}. \tag{21}$$

Compared to the case in which hurdle rate buffers are infeasible, the deadweight loss is

$$Loss = \frac{\bar{R}}{2} - (W_F + W_O). \tag{22}$$

According to Proposition 3, hurdle rate buffers are used by both firms. This arises based on the best-response functions, which are derived in (B.19) and (B.20) in the appendix. If one firm uses an equilibrium buffer, it is suboptimal for their counterparty to truthfully use their true cost of capital. Additionally, (B.19) and (B.20) are violated for any other set of symmetric strategies $\tau_F^* = \tau_O^* = \frac{\bar{R}}{n}$ for $n \neq 4$. This assures uniqueness of the symmetric equilibrium.

It is important to note that, even though the equilibrium is symmetric in purported hurdle rates (i.e., $\tau_F^* = \tau_O^*$), it is not necessarily symmetric with regard to the buffers that are used. If one party has a higher WACC than the other, it will use a smaller buffer as each counterparty attempts to gain bargaining power (which ends up symmetric). Additionally, the WACC for any one firm may change over time. But, the buffer can change commensurately to maintain a persistent hurdle rate τ^*. While this model is about acquisitions during project development, where the counterparties may have different underlying costs of capital, it would also apply in an M&A setting, though we expect both parties there to use the same risk-adjusted cost of capital of the target.

Also, while there is an equilibrium deadweight loss, this is not necessarily a Prisoner's dilemma. Let us compare each party's value when both use an IRR buffer to the case where neither (are allowed to) do so.

$$\Delta V_F = \bar{R}\left(\frac{1}{2} - \theta_N\right) - (\tau_F - W_F) \tag{23}$$

$$\Delta V_O = \bar{R}\left(\theta_N - \frac{1}{2}\right) - (\tau_O - W_O). \tag{24}$$

The first term in both expressions is the change in value due to a gain or loss in bargaining power. By inspection, it is clear that one party gains and one loses. The second term is negative for both parties and represents the loss of otherwise feasible positive NPV projects. So, one party unequivocally loses value, but the other may gain based on the underlying parameters. From (23), firm F is net positive with hurdle rate buffers if

$$\frac{\bar{R}}{4} - \theta_N \bar{R} + W_F > 0 \qquad \Leftrightarrow \qquad \frac{\bar{R}}{4\theta_N} - (\bar{R} - \underline{R}) > 0.$$

This is more likely to be the case if the firm starts with low bargaining power when IRR buffers are not used (feasible). The corresponding condition for the outsider is

$$\frac{\bar{R}}{4} - (1-\theta_N)\bar{R} + W_O > 0 \qquad \Leftrightarrow \qquad \frac{\bar{R}}{4(1-\theta_N)} - (\bar{R} - \underline{R}) > 0.$$

We conclude this section by considering that n parties take part in the investment, and each may act strategically. The primary firm is indexed as $i = 1$, and remainder are in $\{2, \ldots, n\}$. We assume that each party's share of the project is

$$\theta_i = \frac{H_i}{\sum_{j \in N} H_j}, \tag{25}$$

where $N \equiv \{1, \ldots, n\}$. As such, θ_i is a higher-dimensional Tullock contest function.

Proposition 4. *There exists a unique symmetric Nash equilibrium in which the optimal buffered hurdle rates are given by*

$$\tau^* = \frac{(n-1)\bar{R}}{n^2} \tag{26}$$

and the value for each counterparty is

$$V^* = \frac{\bar{R}}{n^2}. \tag{27}$$

The structure of the equilibrium in Proposition 4 resembles that of Proposition 3, except that we now have a comparative static on the number of counterparties at the bargaining table: the equilibrium IRR buffer is strictly decreasing in n.

5. Bargaining Power and Elevated Hurdle Rates: Empirical Evidence

In this section, we test empirical predictions from the models described in Section 4. To explore the key implications of the model, we examine how elevated hurdle rates interact with two separate but highly related components of the negotiation process: ex post bargaining outcomes and ex ante bargaining power.

We first study whether firms' hurdle rates influence the outcome of their negotiations with business partners; that is, the share of the pie they receive. This analysis focuses on a situation in which negotiation is central (M&A) and shows that hurdle rate buffers influence the outcome of negotiation between counterparties. Indeed, M&A is one of the only settings in corporate finance where one can study how hurdle rates influence surplus splits between bargaining partners.[20]

Second, we test the model prediction that a firm's choice of hurdle rate is directly affected by its ex ante bargaining power relative to suppliers and customers. To conduct this analysis, we develop measures of relative bargaining power in customer-supplier relationships (via FactSet Revere, for example) and study their impact on the size and use of hurdle rate buffers.

5.1. Buffer use and Acquisition Premia

Bargaining power is a fundamental determinant of M&A outcomes (e.g., Ahern, 2012), making M&A a natural setting to evaluate the predictions of our model. Our model predicts that, as long as a firm can credibly commit to an elevated hurdle rate during negotiations, the hurdle rate buffer will influence M&A bargaining outcomes. An implication is that bidders that rely on elevated hurdle rates should extract more surplus in M&A negotiations.

For our predictions to hold in an M&A setting, it is important that the bidder can credibly commit to a hurdle rate above the cost of capital in negotiation. If the bidder does not treat the hurdle rate as a walkaway value in a negotiation, we would not expect to find an empirical relation between acquisition premia and buffers. Anecdotal evidence suggests that in the M&A context, bidders commit to using a "sacred," elevated hurdle rate. For example, the CEO of Eaton Corporation stated in 2016: "*[I]n the context of M&A we're not going to lose our pricing discipline. We're going to price at 300 basis points over the cost of capital.*" And, in 2020: "*We continue to use roughly 11% to 12% return as the target for our*

[20] It is important to stress this point. M&A may be the only case where one can observe both a hurdle rate buffer and a measure of surplus split between bargaining partners. Indeed, there are a select few data sources (of which the CFO survey is an example) where one can even observe hurdle rates, as they are often closely held by the firm's chief financial decision-makers.

acquisitions [8% to 9% cost of capital plus 300bps excess return]".[21] Both quotes strongly suggest commitment to an M&A hurdle rate above the cost of capital. Because it is unlikely that all bidders have the discipline to walk away if they can not achieve their target hurdle rate in negotiations, our analysis is a test of the joint hypothesis that bidders commit to target hurdle rates and that doing so leads to a greater share of deal surplus.

We test our predictions using a sample of takeovers from Refinitiv's SDC Platinum M&A database. As shown by Dessaint et al. (2021), in the subset of deals with fairness opinions, the fairness opinion discount rate reliably proxies for the bidder's hurdle rate. Before describing our analysis, we note that the (non-elevated) discount rate in a takeover should reflect the cash flow characteristics of the target, so the appropriate discount rate for the bidder to use is the target's company-wide discount rate (WACC), to which the bidder will often add a buffer to create the hurdle rate used in deal negotiations. Further, in our data and in Dessaint et al. (2021), the discount rates available in fairness opinions closely resemble buffered-up versions of the target's WACC.

We define the bidder's hurdle rate as the average between the maximum and minimum discount rate from the fairness opinion. We define the implied buffer as the difference between the bidder's hurdle rate and the target's WACC.[22] The average M&A implied buffer is about 4.7 percentage points, similar to our survey data.

In Table 3, Panel A, we present results from regressing bidder M&A bargaining outcomes on the implied hurdle rate buffer. Because our predictions rest on being able to commit to a hurdle rate above the target's cost of capital, we control for the target's predicted WACC in the tests. We find a statistically significant negative relation between the size of the buffer and the premium paid to the target (columns 1-2). In other words, firms that use a buffer pay less in an acquisition.

[21] See HBS case Etsy et al. (2021), which we quote directly.

[22] We limit our focus to public-to-public transactions as it allows us to directly estimate the target's WACC, though we note that only a small percentage of fairness opinions concern private targets, so excluding these types of deals does not materially impact the analysis. Appendix C.3 details the M&A sample construction and provides summary statistics for the main variables.

We also find that the buffer is positively related to the bidder's cumulative abnormal return (columns 3-4). This novel evidence suggests that the market positively appraises the bidder's bargaining outcome from the deal when the bidder uses a larger hurdle rate buffer in negotiations, consistent with the model.[23] The estimates in column 4 predict that, relative to not using a buffer (i.e., bargaining at the target's cost of capital), a buffer of 5 percentage points would increase the bidder's CAR by 1.1 percentage points. This is economically significant as the average bidder CAR in our sample is -1.7%.

The Relation Between Elevated Hurdle Rates and Combined Synergy Gains. A potential concern with the preceding analysis is that for unmodeled reasons, acquirers that use elevated hurdle rates could simply be better at evaluating targets. For example, a firm that consistently picks good targets may be incentivized to use a high hurdle rate solely for project selection reasons. If this were the main driver of positive buffers in M&A deals, we would expect combined deal gains to increase with the buffer. In other words, buffers would predict larger overall value creation from the deal, and not just a shift of synergies to the bidder.

In Table 3, Panel B, we test how the bidder's implied buffer relates to the target and combined firm synergy gains. Columns 1-2 show that there is no relation between the target's abnormal returns and the bidder's buffer. Columns 3-4 relate the buffer to the combined-firm CAR (the target + bidder abnormal returns, weighted by each firm's pre-announcement market capitalization size). The relation between the buffer and combined CAR is not statistically different from zero.[24] These findings suggest the buffer does not predict overall improvements from the merger.

Further, for the subsample of our deals in which both the bidder and target abnormal returns are positive, we can define the bidder's share of the total dollar surplus and relate

[23] We use the 4-factor model to estimate abnormal returns, and measure them in the 3-day window $[-1, 1]$ around deal announcement. Table A.5, Panels B and C in the appendix display robustness for the bidder CAR results in Table 3 in which we vary both the model and time window used in CAR estimation.

[24] As Ahern (2012) notes, making inferences about bargaining outcomes from percentage returns may be misleading as bidders are much larger than targets in our M&A sample. In Table A.5, Panel A, we relate the buffer to abnormal dollar returns ($CAR). The findings are similar to our main table.

it to the buffer. This dollar-based approach accounts for differing bidder vs. target size when analyzing acquisition outcomes (Ahern, 2012). In columns 5-6, we find a positive (and statistically significant) relation between bidder's share of the pie and the buffer, further showing that bidders get greater surplus when using a larger buffer.

Finally, we note that target firms' primary bargaining tools in M&A deals are often takeover defense mechanisms (Bates et al., 2008). To hold such effects constant, in all specifications in Table 3, we include controls for whether the target firm has a staggered board structure in place at the time of the deal (Guernsey et al., 2023), and whether the target firm IPO'd with a dual-class share structure (Loughran and Ritter, 2004).

5.2. Bargaining Power in Negotiations and Buffer Use

We now turn our analysis back to the CFO survey data, and use it to test the model's predictions on the systematic relation between the hurdle rate buffer and a firm's ex ante bargaining power. A buffer creates value for a firm only if it improves the split of project surplus sufficiently such that this outweighs the opportunity cost of accepting fewer projects. Firms that would get a sufficiently high split of project surplus without a buffer might not find this trade-off worthwhile. For example, in the simple single-firm version of the model, inspection of (19) shows that the likelihood that a buffer creates value is decreasing in θ_N, a measure of ex ante bargaining power.

Consistent with the model, we predict a negative relation between the size and use of the buffer and a firm's ex ante bargaining power when negotiating with customers and suppliers. This prediction is novel and not in the traditional buffer literature, as there is no immediate analogous prediction related to bargaining power from buffer explanations based on idiosyncratic risk, financial constraints, managerial constraints, or any other extant explanation of the buffer. To test this prediction empirically, we use three measures of relative bargaining power: the firms' supplier concentration, the firms' customer concentration, and a measure of the firms' markups relative to their suppliers' markups. We also consider asset specificity (as proxied by asset *non*-redeployability, Kim and Kung, 2017), as we explore whether the empirical relations (concerning relative bargaining power) predicted by the model are strongest for asset types most likely subject to bargaining.

5.2.1. Supplier Concentration

We first quantify the relative bargaining power of a given company by measuring the industry-sales concentration of its suppliers. If a company's suppliers come from concentrated industries, all else equal, we expect the company to have less bargaining power over those suppliers. This arises because the company's outside supplier option is more limited (or may even be non-existent) when a supplier dominates their particular industry.

Using the FactSet Revere database on customer-supplier relationships, which gives a picture of a particular firm's supplier base, we define supplier concentration as the average of a firm's suppliers' industry-level sales concentration (the Herfindahl–Hirschman Index (HHI) of sales in a supplier's industry, as in Autor et al., 2020). Intuitively, this measure captures how easy it is for a firm to find an alternative supplier: if a firm's suppliers come from concentrated industries, (all else equal) this will reduce the likelihood of finding replacement trading partners. This measure is bounded between zero and one, where a higher value indicates that suppliers have more bargaining power. Therefore, we test whether there is a positive relation between supplier concentration and buffer use.[25]

Table 4 presents the results. Supplier concentration is robustly and positively related to buffer use, both at the extensive and intensive margins. At the extensive margin, a one standard deviation increase in supplier concentration is associated with a 3-4% increase in the probability of using a buffer. At the intensive margin, a one standard deviation increase in supplier concentration is associated with a buffer that is approximately 50bps higher, which is roughly a 10% increase relative to the average buffer size. The results are robust to controls for volatility of sales and beta, as well as survey and characteristic fixed effects. Overall, these results suggest that firms with lower bargaining power (i.e., higher supplier

[25] We match our bargaining power measures to the CFO survey data by survey year and NAICS-3 industry classifications, based on the industries reported by CFOs.

concentration) are more likely to use a buffer and have larger buffers when used.

5.2.2. Customer Concentration

While the model in Section 4 formally examines the bargaining power of a firm relative to its suppliers, predictions of the model would hold for a firm's other trading partners as well. For example, the model could be re-posed with the outsider being a customer, which would yield similar incentives and comparative statics. So, if a particular firm's customers have a high degree of (relative) bargaining power, the model would predict that the firm would use a buffer to improve bargaining position and capture surplus.

To investigate this, we quantify the bargaining power of a firm by measuring it relative to the bargaining power of its customers. We proxy for this based on the level of concentration of the firm's downstream sales, which is distinct from our previous supplier concentration measure of upstream purchases. Disclosure regulation allows us to directly measure whether a firm relies on a few large customers to generate revenues; all else equal, a firm with a concentrated customer base will hold little ex ante bargaining power over its customers.

We use data from the Compustat Segments file to measure firm-level customer sales concentration, which pulls data from company filings about firms' large customers. Specifically, we calculate the HHI of each firm's sales to its corporate customers (Patatoukas, 2012). To match to our survey data, we take quarter $\times$ NAICS-3 averages of this measure and match to each firm in the survey by its industry.

The measure is also bounded between zero and one, but the interpretation differs from the expected relation with respect to supplier concentration. When the customer variable is close to zero, the sales of firms in an industry are spread more evenly across a larger number of corporate customers, indicating more bargaining power for the firm *relative* to its customers. At the other extreme, given that this is a customer-based measure of concentration, when this measure approaches one, the seller firm has less bargaining power, all else equal, because the seller is more reliant on fewer customers to generate revenue.

In Table 5, we relate this measure to survey firms' buffers. Columns 1-3 analyze the extensive margin and columns 4-6 analyze the intensive margin. We find no direct relation between customer concentration and the extensive margin of the buffer.[26] In terms of the intensive margin, columns 4-6 show that a one standard deviation increase in customer concentration leads to about a 0.3 pp increase in the buffer, consistent with the model's prediction. For context, our results predict that moving from the 10th to 90th percentile of customer concentration would increase the size of the buffer by about 0.9 pp.

5.2.3. Supplier Relative Markup

We also explore an alternative proxy for bargaining power based on the markup of the firm relative to the markup charged by their suppliers. Markups are often used to proxy for market power (e.g., De Loecker et al., 2020). However, high absolute markups do not necessarily imply that the firm has bargaining power relative to its suppliers.[27] Therefore, we examine the relation between relative markups and buffer usage, where relative markups are the average ratio of supplier firms' markups to the firm's own markup over its customers. Higher supplier-relative markup means less bargaining power for the firm, and we therefore predict a positive relation with both buffer use and buffer size.[28]

The results from this analysis are presented in Table 6. As with the first two proxies for bargaining power, we observe a negative relation between ex ante bargaining power and buffer usage (and thus a positive estimated coefficient). When suppliers' relative markups are higher, the probability that a buffer is used is higher and the size of the buffer is larger. Specifically, at the extensive margin, a one standard deviation increase in supplier concentration is associated with about a 3 percentage point increase in the probability of using a

[26] In Section 5.2.4, we show that the relation between bargaining power and the buffer is conditional on the types of assets a firm uses in operations. Figure A.5 shows that customer concentration relates positively for firms with low redeployability and high tangibility, as predicted by the model.

[27] In Table A.7, we show results based purely on firm markup levels within the subset of B2B firms (where markups are more likely to represent relative bargaining power with customers.) We find qualitatively similar results.

[28] Similar to our supplier concentration measure, we use FactSet Revere to construct the average markup of a firm's suppliers and take the ratio to the firm's markup. We match NAICS-3 averages to our survey firms based on their industry and the survey year.

buffer. At the intensive margin, a one standard deviation increase in supplier concentration is associated with a buffer that is 40-50bps higher, a roughly 10% increase relative to the average buffer size. These results are similar in magnitude to those for the other measures of bargaining power.

5.2.4. Bargaining Power and Asset Specificity

We examine the interaction between bargaining power and the specificity of a firm's assets. Implicit in our model is the assumption that project inputs are from markets that are not perfectly competitive. That is, there is some ability to bargain over the project in the first place. For example, if all of a project's inputs were commodities available in liquid markets, there would be no advantage to bargaining and using a buffer would merely cut off a set of good projects. We therefore extend our analysis of buffer use and bargaining by conditioning on asset type, given that bargaining is more likely for certain types assets.

To do this, we test the relation between bargaining power and buffer use, conditional asset redeployability from Kim and Kung (2017). Redeployability measures the proportion of firms (or industries) that use a specific asset type, and the industry-level measure captures the re-usability of assets, both within and across industries. Redeployability ranges from 0 to 1: less redeployable assets are more specific-to-use (and more likely to be subject to bargaining); we thus predict that the bargaining-buffer relation will be stronger when redeployability is low.

We present the asset specificity analyses in Figure 7. The effect of bargaining on the buffer is stronger when asset redeployability is lower, as predicted. For example, the figure shows that the effect of a one standard deviation change in supplier concentration on the buffer is about 0.9 percentage points higher at 25% redeployability relative to 75% redeployability (Panel A).[29] In Figure A.4, we display the analysis based on asset tangibility, where we predict that the buffer-bargaining relation will be stronger for high tangibility industries. To the extent that tangibility reflects specificity, this analysis corroborates the results in Figure 7.

[29]Figure A.5 in the appendix shows similar patterns for the extensive margin of the buffer.

6. Conclusion

Hurdle rate buffers are commonly used and economically large. Several explanations for the use of these buffers have been provided in the literature, but the consequences of their use is still an open question. Textbook theory suggests that buffers lead to underinvestment, and as a result, we would not expect them to persist. On the contrary, we document that elevated hurdle rates are persistent, with this persistence determined at the C-suite level within the firm. Hurdle rates are thus considered to be "sacred" by employees, and our evidence shows that they are indeed a focal point of corporate actions: realized project returns align with these elevated rates, suggesting they are a binding feature of firm-level capital budgeting.

The sacred nature of hurdle rates allows them to serve as a commitment device during project negotiations, conveying a bargaining advantage when firms enter into discussions with counterparties. We provide evidence consistent with this channel in the context of M&A. Hurdle rate buffers are positively related to merger outcomes for bidders (lower premiums and higher returns): firms that use elevated hurdle rates receive a larger portion of deal surplus.

Motivated by these insights and the fact that projects often require negotiations with customers and suppliers, we build a model that highlights a trade-off that occurs from using an inflated hurdle rate: passing up projects with moderately positive net present value versus earning a higher share in negotiations from the smaller set of projects. We explore these issues in several settings, including where firms set inflated hurdle rates (i) for non-bargaining reasons, (ii) strategically to gain bargaining power, and (iii) where firms and their trading partners both use hurdle rates for bargaining.

We test predictions from the model using CFO survey data, and our empirical findings support the connection between elevated hurdle rates and bargaining power. We find that several proxies for ex ante bargaining power in customer/supplier relationships negatively correlate with hurdle rate buffers (as predicted by our model), suggesting a previously unforeseen connection between capital budgeting, bargaining power, and project development.

Finally, our paper highlights the fact that capital budgeting decisions often require more than screening and selection. The relation between hurdle rates and bargaining outcomes is just one insight that comes from recognizing the more complex nature of firms' project decisions. The implications of project development more generally (and not just capital budgeting evaluation) are potentially quite rich and provide opportunities for future research.

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Figure 1: Sample Demographics

This figure displays demographic information for all CFOs that provide both a hurdle rate and cost of capital (WACC) in the Duke CFO Survey.

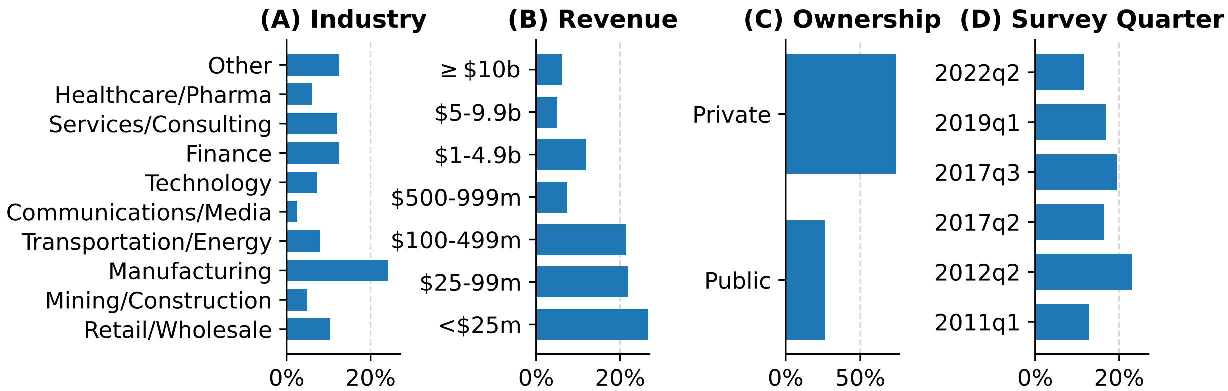


Figure 2: Reasons that Companies Set Hurdle Rates Above the Cost of Capital

This figure displays qualitative reasons why firms set their hurdle rates above WACC (i.e., use a hurdle rate buffer). Results are taken from three editions of the Duke CFO survey (2011q1, 2019q1, 2022q2) which asked CFOs "Why do you set your hurdle rate above WACC?" Possible answers vary by survey, so we group them into five distinct reasons. Table A.2 displays these groupings and provides further detail on how the question was asked on each survey. "Rationing" refers to cases when managers prioritize projects, for example due to limited capital resources. "Fudge Factor" refers to cases when managers add a (positive) buffer to their discount rate to account for, e.g., idiosyncratic risk of specific projects (Brealey and Myers, 1996; Décaire, 2024). Panel A displays the percentage of CFOs that fall within each category, Panels B and C displays the results split by survey year and size (revenue above/below $1 billion).

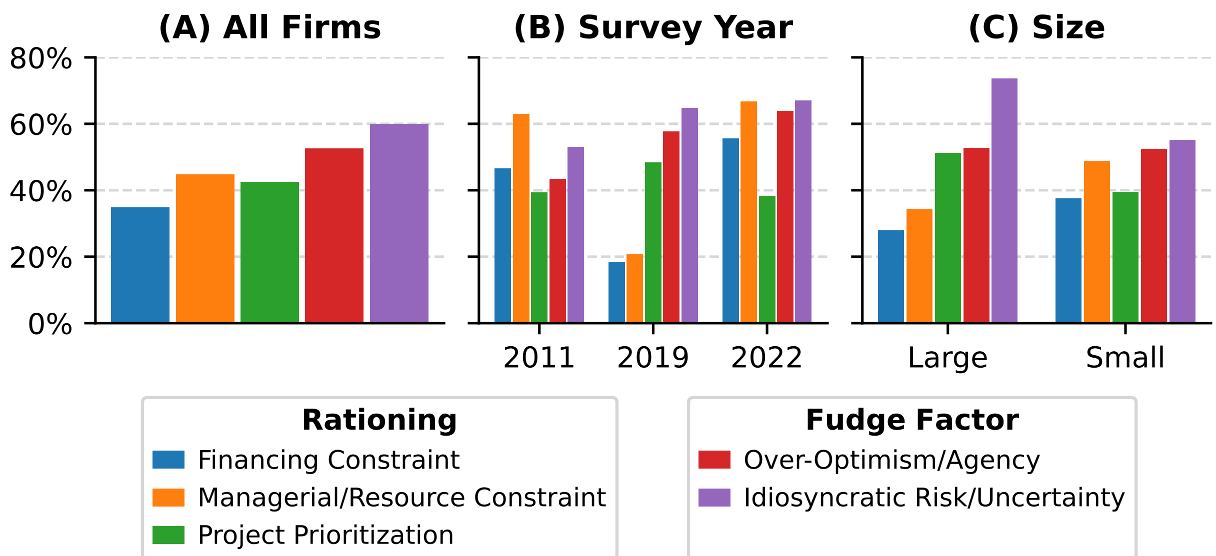


Figure 3: Time Series and Cross-Sectional Variation in Hurdle Rates and the Cost of Capital

This figure displays the within-group average and interquartile range (IQR) of CFO survey company hurdle rates, WACCs and hurdle rate buffers across several observable characteristics. For example, Panel A displays the statistics across CFO survey industries; the average buffer for firms in Mining/Construction is about 6%, and the 25th and 75th percentiles within-group are roughly 0% and 9%, respectively.

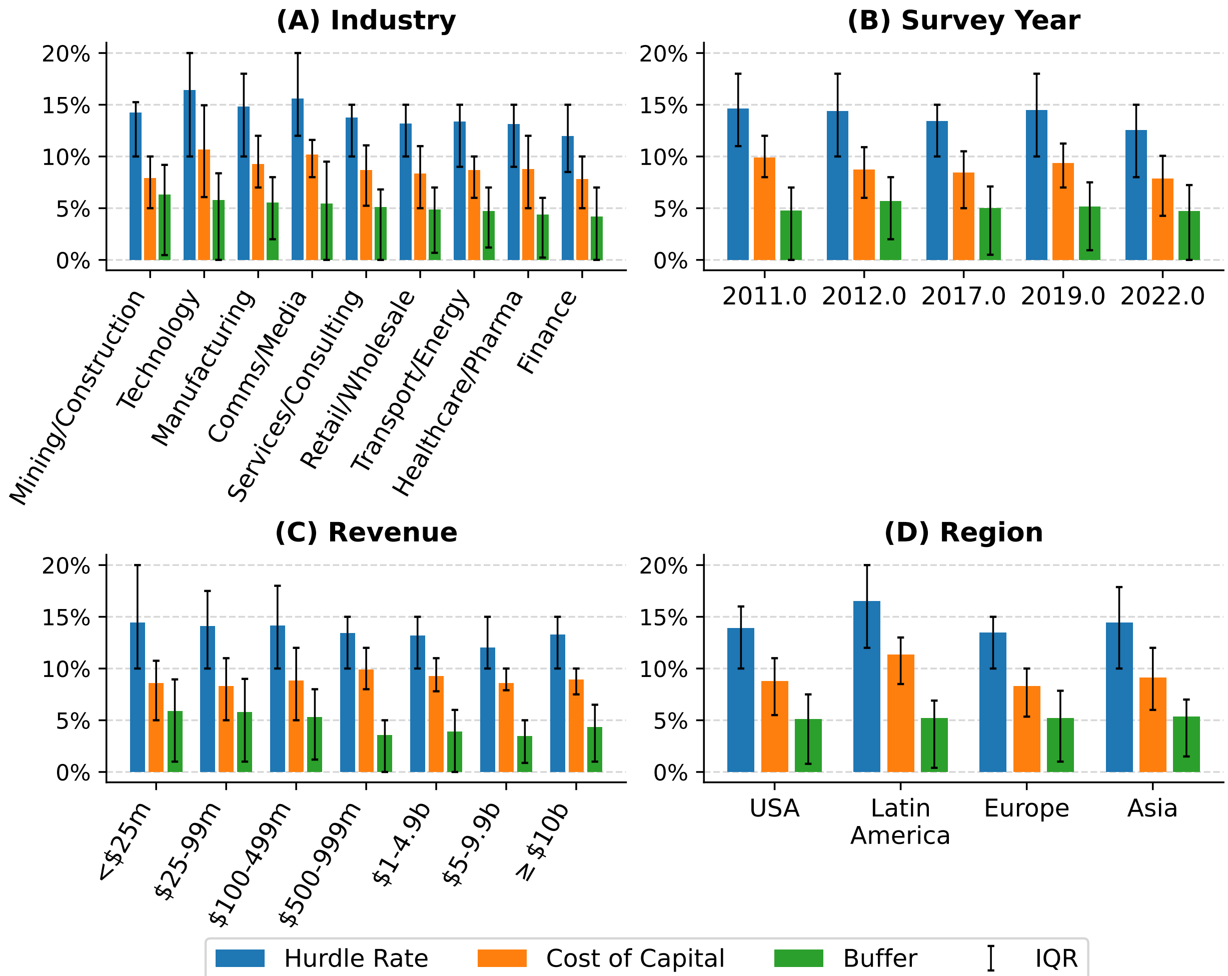


Figure 4: Sticky Hurdle Rates

This figure displays persistence of hurdle rates within-firm in our CFO survey data by displaying a binned scatterplot of the current hurdle rate regressed on the lagged hurdle rate. To be included in this analysis, a CFO must appear in at least two of the six surveys we use in our analysis. The slope coefficient is about 0.84, and we include beta volatility, sales volatility controls, along with industry, year and size category fixed effects in the regression.

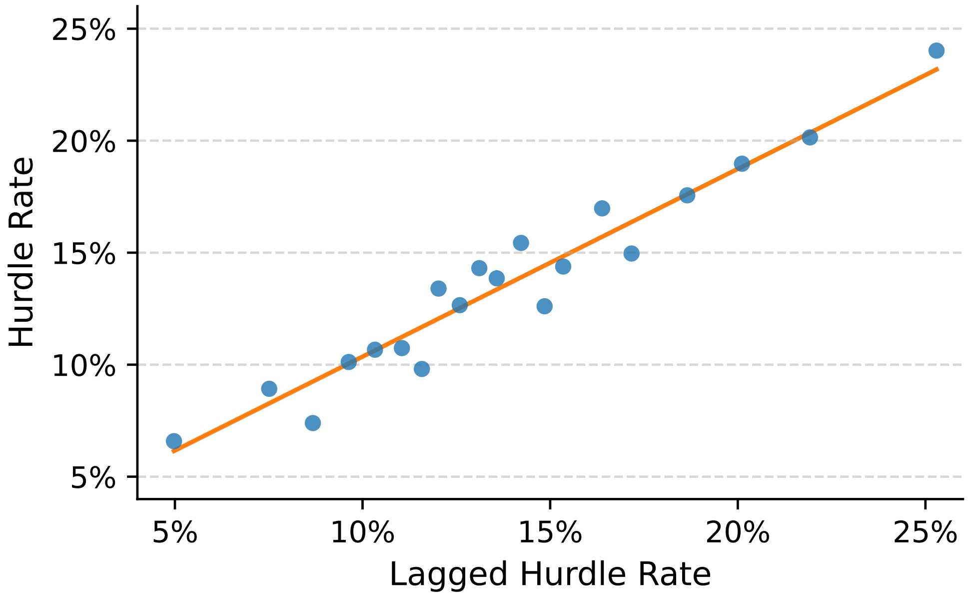


Figure 5: Density Manipulation in Excess ROIC at the Hurdle Rate

This figure displays the results of testing for density manipulation of return on invested capital (ROIC) around the hurdle rate, following the methodology described in Cattaneo et al. (2018). The sample is CFO survey firms that also appear in Compustat quarterly, for which we observe a hurdle rate. We first linearly interpolate firms' hurdle rates between two consecutive appearances in Compustat. For example, if a firm's hurdle rate in 2012q2 were 10%, and in 2012q4 it were 11%, we would assume that the value of the hurdle rate in 2012q3 were 10.5%. Given stickiness in hurdle rates (as in, e.g., Graham, 2022), this assumption seems reasonable. ROIC is defined as $ROIC_{i,t} = EBIT_{i,t}(1 - tax_{i,t})/ICAPT_{i,t-1}$, where $ICAPT$ is the firm's invested capital (i.e., the sum of long-term book debt and equity). We take trailing four-quarter sums of $EBIT(1 - tax)$, and divide by $ICAPT$ from the previous fiscal year. Next, we define our variable of interest, "Excess ROIC," as a firm's ROIC above its hurdle rate, i.e. for firm i in quarter t,

$$Excess\ ROIC_{i,t} = ROIC_{i,t} - Hurdle_{i,t}$$

We focus on observations of Excess ROIC with an absolute value less than 25%. The sample is 470 observations. We are interested in testing for density manipulation of Excess ROIC at 0. The blue and orange bars display observed frequencies of Excess ROIC in 0.5% bins ranging from -10% to $+10\%$ (though the densities estimated use the full range of observations). The blue and orange lines (and shaded areas) display the estimated local-polynomial densities as described in Cattaneo et al. (2018). To estimate the densities, we set the order of the local polynomial (and the order of the bias-corrected density estimator) equal to 3. The bandwidths for the local polynomial estimator are chosen via the "data-driven" methodology described in Section 2.5 of Cattaneo et al. (2018), and are $\{h_-, h_+\} = \{7.449\%, 6.199\%\}$. The shaded areas display 90% confidence intervals. Table A.4 displays robustness where we vary the size of the bandwidth and the order of the polynomials. The figure displays a discontinuity of the ROIC density at the hurdle rate, with some mass of the ROIC density shifting from just below to just above the hurdle rate.

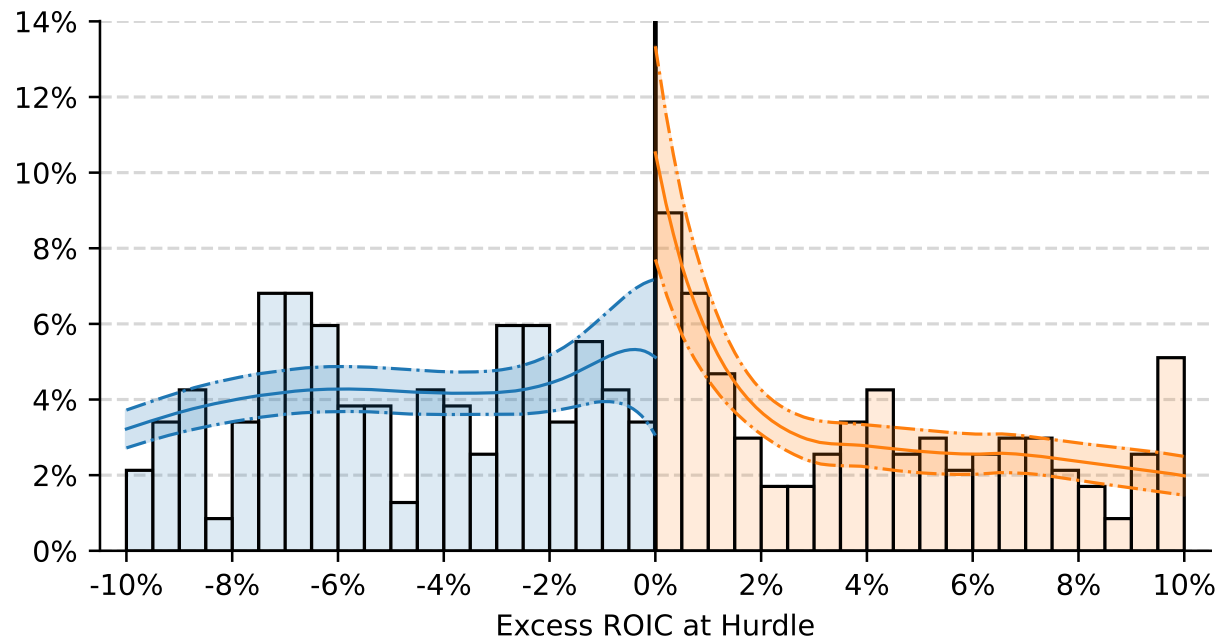


Figure 6: Implications for Firm Value from the Delegated Bargaining Model

This figure plots the model-implied change in firm value from using a hurdle rate buffer and the change in firm value from using a buffer as implied by a standard capital budgeting model. Using Proposition 2, we calibrate our model such that $r_F^{WACC} = 8.77\%$ and $r_O^{WACC} = 13.88\%$, the mean and 90th percentile WACC in the CFO Survey data. We choose remaining parameters such that the optimal hurdle rate buffer $b^* = 5.11\%$, which is the average buffer in our sample (given r_F^{WACC} and r_O^{WACC}, $\underline{R} = 2.226$ and we set $\bar{R} = 4.555$, about $2 \times \underline{R}$) Under these parameters, the percentage increase in firm value from the no-buffer case to the optimal buffered hurdle rate, $V_B^*/V_N - 1 \approx 0.11\%$, and is displayed in blue relative to the left y-axis. Displayed on the right y-axis is the percentage change in value if we were to ignore the benefits from bargaining (and only consider the value lost from forgoing positive NPV projects), which is roughly -4.4%. Thus, the difference in value implications once we consider the effects of bargaining is about 4.5 percentage points.

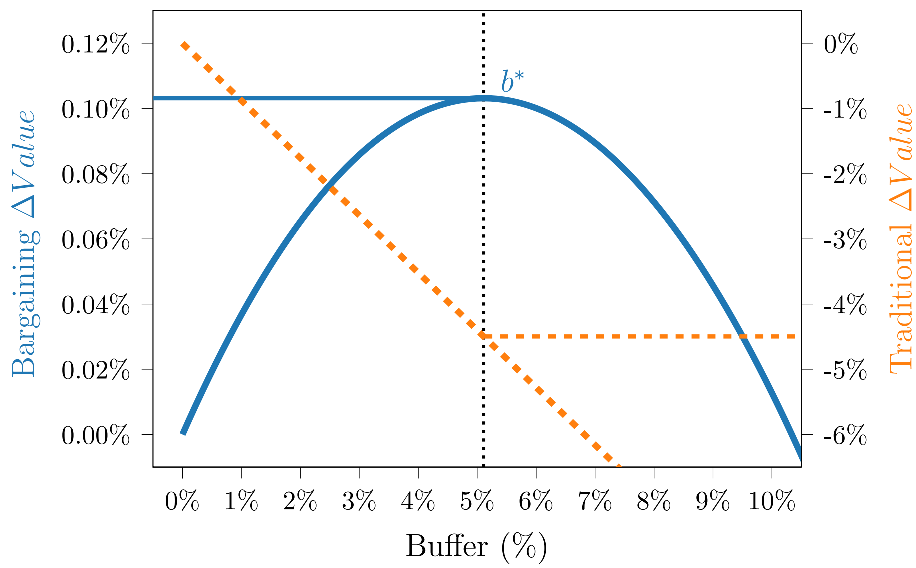


Figure 7: The Relation Between the Buffer and Bargaining Power by Asset Specificity

This figure displays how the relations between the buffer and our measures of bargaining power vary across the degree of industry-level asset redeployability. Firms are more likely to bargain over assets that more specific-to-use, or less redeployable, so the relation between the buffer and bargaining power should be stronger in low-redeployability industries. For bargaining power measure, we estimate a regression of the buffer (intensive margin) on an interaction between bargaining power and industry level redeployability, using the same fixed effects and controls as in Tables 4-6. We then plot the predicted effect of a one-standard deviation increase in bargaining power BP on the buffer, conditional on redeployability. In each plot, we also display the main effect from the regression, when redeployability is at the mean. Standard errors are clustered by survey industry $\times$ survey quarter. Table A.8 Panel A displays the regressions used to estimate each figure (columns 4-6 map to this figure).

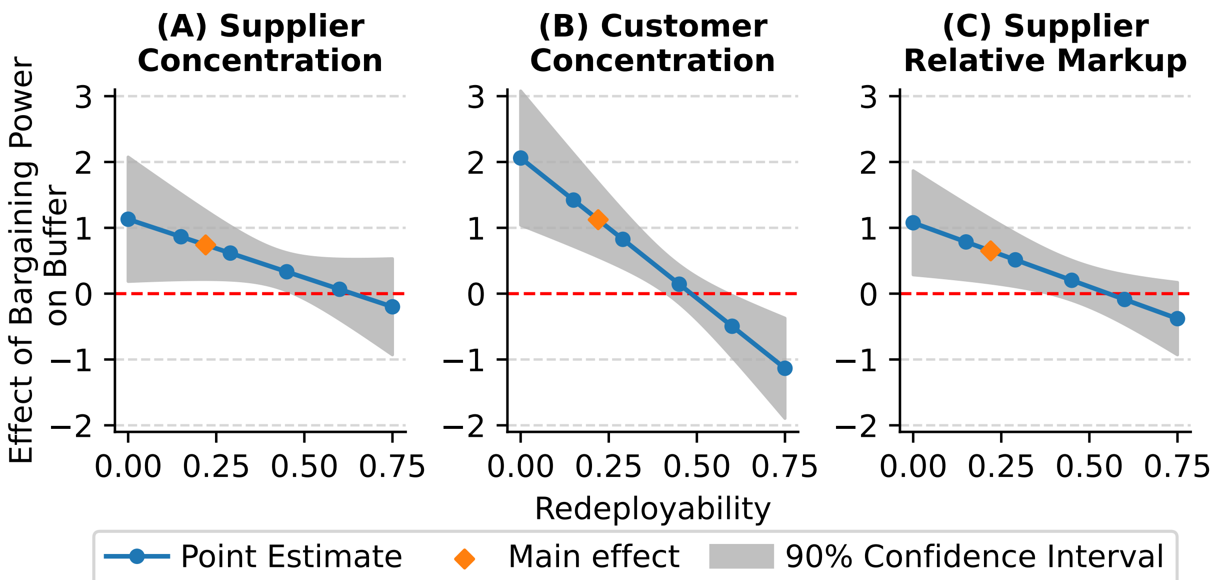


Table 1: Summary Statistics

This table displays the number of observations, averages, standard deviations, and quartiles of key empirical variables. Panel A displays statistics for variables related to the hurdle rate and the cost of capital. Panel B displays summary statistics for the industry-level variables we explore in Section 5. Summary statistics for markup variables are displayed only for firms in non-consumer-facing industries. Detailed variable definitions are available in Table A.1.

	N	Mean	Std Dev	25%	50%	75%
Panel A: CFO Survey Variables						
Hurdle Rate	1,232	13.879	5.977	10	12.750	16
Cost of Capital (WACC)	1,232	8.769	4.211	5.500	8.800	11
Buffer (Extensive Margin)	1,232	0.777				
Buffer (Intensive margin)	1,232	5.111	5.376	0.787	4	7.500
Hurdle Rate | Buffer > 0	957	14.732	6.072	10	15	18
WACC | Buffer > 0	957	8.153	3.905	5	8	10
Buffer | Buffer > 0	957	6.579	5.248	3	5	9.500
Panel B: Industry-Level Variables						
Beta Volatility	1,232	0.686	0.234	0.535	0.687	0.834
Sales Volatility	1,232	0.120	0.053	0.088	0.120	0.154
Supplier Concentration	1,066	0.246	0.066	0.204	0.249	0.282
Customer Concentration	1,066	0.305	0.191	0.136	0.333	0.428
Supplier Relative Markup	1,066	-0.066	0.080	-0.089	-0.071	-0.022
Asset Redeployability	1,232	0.440	0.128	0.346	0.476	0.516

Table 2: Determinants of the Extensive and Intensive Margins of the Hurdle Rate Buffer

This table explores the determinants of the extensive and intensive margins of the hurdle rate buffer. In Panel A (B), we focus on the extensive (intensive) margin. In Panel A, columns 1-5 (6-9) display ordinary least squares (logistic) regressions. The variables Beta Volatility, Sales Volatility, Firm Optimism US Optimism and Firm Beta are standardized to mean zero, unit variance. Variables are defined in Table A.1. In columns 5 and 9 (5 and 10) of Panel A (B), we focus on public firms. Standard errors are clustered at survey industry × survey quarter and displayed in parentheses below the coefficient. The R^2 in columns 6-9 of Panel A is the pseudo-R^2 from the logistic regression. ***, **, * denote significance at 1%, 5%, 10%.

Panel A: Extensive Margin of Buffer

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	Linear Probability Model					Logit			
Cost of Capital	-0.027***	-0.028***	-0.029***	-0.029***	-0.034***	-0.025***	-0.026***	-0.028***	-0.038***
	(0.003)	(0.003)	(0.003)	(0.004)	(0.009)	(0.003)	(0.003)	(0.004)	(0.012)
Beta Volatility		0.031***	0.031***	0.013	0.005		0.031***	0.015	0.007
		(0.011)	(0.011)	(0.011)	(0.019)		(0.011)	(0.011)	(0.021)
Sales Volatility		0.010	0.009	0.015	0.037		0.010	0.015	0.037
		(0.015)	(0.015)	(0.016)	(0.032)		(0.016)	(0.016)	(0.032)
Large Firm		-0.077**					-0.085**	-0.067	-0.164***
		(0.036)					(0.039)	(0.044)	(0.063)
Public Firm		0.079*					0.065*	0.045	0.069
		(0.044)					(0.038)	(0.038)	(0.153)
Has Credit Rating		-0.012					-0.016	-0.061**	0.092
		(0.029)					(0.030)	(0.029)	(0.104)
Firm-Level Optimism				0.033*				0.033*	
				(0.018)				(0.018)	
US Economy Optimism				-0.001				-0.015	
				(0.018)				(0.018)	
Firm Beta					0.067**				0.083***
					(0.027)				(0.029)
Observations	1,232	1,232	1,232	947	186	1,232	1,232	947	186
R-squared	0.075	0.086	0.122	0.129	0.133	0.068	0.080	0.105	0.083
Survey Quarter FE			Yes	Yes	Yes				
Size FE			Yes	Yes	Yes				
Ownership FE			Yes	Yes	Yes				
Credit Rating FE			Yes	Yes	Yes				

Table 2: Continued

Panel B: Intensive Margin of Buffer

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
	All CFOs					Buffer > 0				
Cost of Capital	-0.307***	-0.311***	-0.314***	-0.319***	-0.532***	-0.194***	-0.181***	-0.180***	-0.166**	-0.393
	(0.045)	(0.045)	(0.045)	(0.058)	(0.191)	(0.054)	(0.055)	(0.057)	(0.069)	(0.247)
Beta Volatility		0.432***	0.431***	0.325*	0.334		0.295*	0.289*	0.307	0.367
		(0.148)	(0.145)	(0.175)	(0.274)		(0.165)	(0.166)	(0.196)	(0.304)
Sales Volatility		0.395**	0.375**	0.561***	0.499*		0.438***	0.420***	0.580***	0.303
		(0.163)	(0.167)	(0.173)	(0.286)		(0.151)	(0.155)	(0.171)	(0.284)
Large Firm		-1.246***					-1.033**			
		(0.391)					(0.448)			
Public Firm		-0.040					-0.610			
		(0.462)					(0.521)			
Has Credit Rating		-0.142					-0.077			
		(0.292)					(0.373)			
Firm-Level Optimism				0.520**					0.436*	
				(0.210)					(0.235)	
US Economy Optimism				-0.371					-0.476	
				(0.267)					(0.313)	
Firm Beta					1.252***					1.208***
					(0.330)					(0.379)
Observations	1,232	1,232	1,232	947	186	957	957	957	750	141
R-squared	0.058	0.083	0.099	0.120	0.188	0.021	0.048	0.064	0.083	0.248
Survey Quarter FE			Yes	Yes	Yes			Yes	Yes	Yes
Size FE			Yes	Yes	Yes			Yes	Yes	Yes
Ownership FE			Yes	Yes	Yes			Yes	Yes	Yes
Credit Rating FE			Yes	Yes	Yes			Yes	Yes	Yes

Table 3: Hurdle Rate Buffers and Negotiation Outcomes: Evidence from M&A Deals

This table presents analysis of the relation between a bidder's use of a buffer and bidder bargaining outcomes in M&A deals. The sample is public-to-public M&A deals with maximum and minimum discount rates used in fairness opinions on proposed deals. Following Dessaint et al. (2021), we compute the average of the maximum and minimum discount rate used in the fairness opinion. The variable Implied Buffer is the difference between the fairness opinion average discount rate and the target's predicted WACC (constructed using the average asset beta from a firm's 3-digit SIC × year, see Dessaint et al., 2021). In Panel A, Premium is the percentage premium of the bid-implied equity value over the target's market capitalization in the year prior to the bid. Bidder CAR is the bidder's cumulative abnormal return relative to the 4-factor model over the 11 days around deal announcement ($t \in [-1, 1]$). In Panel B, Target CAR is the same for the target. Combined CAR is the combined-firm CAR, weighted by the bidder and target market capitalization in the year prior to the bid, Bidder Share $CAR refers to the bidder's share of the total dollar abnormal return (Ahern, 2012), which is only well-defined for deals with weakly positive abnormal returns for both firms. Year FE refers to the year the deal was announced. Bidder/target Industry FE refers to the bidder/target Fama-French 49 industry code. Bidder/target controls are log market capitalization in the year prior to bid, market-to-book, return on assets, leverage, and cash/assets. Deal controls are relative size (deal value to bidder market cap), toehold (percent owned by bidder before bid), indicators for deal type (cash, stock, mixed), hostile, same industry, tender offer and poison (See Dessaint et al. (2021) for variable definitions of controls). Detailed variable definitions are in Table A.1. Standard errors are clustered by 3-digit target SIC industry and displayed below the coefficient. ***, **, * denote significance at 1%, 5%, 10%.

Panel A: Elevated Hurdle Rates, Deal Premia and Bidder CAR

	(1)	(2)	(3)	(4)
	Premium		Bidder CAR	
Implied Buffer	-1.456***	-1.219***	0.210**	0.221***
	(0.446)	(0.405)	(0.085)	(0.081)
Predicted Target WACC	-1.155	-0.900	-0.100	-0.082
	(0.918)	(0.823)	(0.235)	(0.243)
Observations	736	736	736	736
R-squared	0.406	0.460	0.225	0.242
Year FE	Yes	Yes	Yes	Yes
Bidder & Target Industry FE	Yes	Yes	Yes	Yes
Bidder & Target Controls	Yes	Yes	Yes	Yes
Target Takeover Defense Controls	Yes	Yes	Yes	Yes
Deal Controls		Yes		Yes

Panel B: Elevated Hurdle Rates and Combined Synergy Gains

	(1)	(2)	(3)	(4)	(5)	(6)
	Target CAR		Combined CAR		Bidder Share $CAR	
Implied Buffer	-0.040	-0.033	0.131	0.164	1.374**	1.234*
	(0.444)	(0.415)	(0.152)	(0.147)	(0.650)	(0.624)
Predicted Target WACC	-0.452	-0.329	-0.377	-0.332	0.681	0.655
	(0.645)	(0.652)	(0.339)	(0.332)	(1.782)	(1.789)
Observations	736	736	736	736	284	284
R-squared	0.363	0.390	0.276	0.296	0.518	0.528
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Bidder & Target Industry FE	Yes	Yes	Yes	Yes	Yes	Yes
Bidder & Target Controls	Yes	Yes	Yes	Yes	Yes	Yes
Target Takeover Defense Controls	Yes	Yes	Yes	Yes	Yes	Yes
Deal Controls		Yes		Yes		Yes

Table 4: The Buffer and Supplier Concentration

This table explores how the bargaining power of a firm over its suppliers affects the buffer. If a company's suppliers come from concentrated industries, all else equal the company has less bargaining power. Our measure of supplier bargaining power is supplier concentration: the average of a firm's suppliers' industry-level sales concentration (Autor et al., 2020). We use Revere data on customer-supplier relationships to identify a firm's major suppliers. We aggregate to NAICS-3 by year level and match to our CFO survey data by their industries. Columns 1-3 focus on the extensive margin; columns 4-6 focus on the intensive margin. The variables Supplier Concentration, Beta Volatility and Sales Volatility are standardized to mean zero, unit variance. All variables are defined in detail in Table A.1. Table A.6 provides robustness where we use different measures of industry-level concentration. Standard errors are clustered at survey industry × survey quarter and displayed in parentheses below the coefficient. ***, **, * denote significance at 1%, 5%, 10%.

	(1)	(2)	(3)	(4)	(5)	(6)
	Extensive Margin			Intensive Margin		
Supplier Concentration	0.038***	0.034**	0.030**	0.473***	0.426***	0.505***
	(0.014)	(0.014)	(0.013)	(0.143)	(0.132)	(0.139)
Cost of Capital	-0.027***	-0.027***	-0.028***	-0.312***	-0.320***	-0.315***
	(0.003)	(0.003)	(0.003)	(0.046)	(0.046)	(0.047)
Beta Volatility		0.027**	0.029**		0.478***	0.454***
		(0.012)	(0.013)		(0.168)	(0.169)
Sales Volatility		0.012	0.012		0.451***	0.396**
		(0.016)	(0.016)		(0.149)	(0.156)
Observations	1,066	1,066	1,066	1,066	1,066	1,066
R-squared	0.086	0.091	0.121	0.070	0.084	0.112
Survey Quarter FE			Yes			Yes
Size FE			Yes			Yes
Ownership FE			Yes			Yes
Credit Rating FE			Yes			Yes

Table 5: The Buffer and Customer Concentration

This table explores how the bargaining power of a firm's customers affects the buffer. If a company's customers are concentrated, all else equal the company has less bargaining power; and vice versa. Our measure of customer bargaining power is customer concentration: the HHI of a firm's sales to corporate customers (Patatoukas, 2012). We aggregate to NAICS-3 by year level and match to our CFO survey data by their industries. Columns 1-3 focus on the extensive margin; columns 4-6 focus on the intensive margin. The variables Customer Concentration, Beta Volatility and Sales Volatility are standardized to mean zero, unit variance. All variables are defined in detail in Table A.1. Standard errors are clustered at survey industry × survey quarter and displayed in parentheses below the coefficient. ***, **, * denote significance at 1%, 5%, 10%.

	(1)	(2)	(3)	(4)	(5)	(6)
	Extensive Margin			Intensive Margin		
Customer Concentration	0.009	0.004	0.006	0.461***	0.333***	0.352**
	(0.015)	(0.014)	(0.015)	(0.148)	(0.124)	(0.134)
Cost of Capital	-0.027***	-0.027***	-0.028***	-0.316***	-0.322***	-0.317***
	(0.003)	(0.003)	(0.003)	(0.047)	(0.047)	(0.047)
Sales Volatility		0.009	0.010		0.366**	0.313**
		(0.016)	(0.016)		(0.146)	(0.154)
Beta Volatility		0.032**	0.033**		0.512***	0.500***
		(0.012)	(0.013)		(0.164)	(0.164)
Observations	1,066	1,066	1,066	1,066	1,066	1,066
R-squared	0.078	0.084	0.117	0.069	0.081	0.107
Survey Quarter FE			Yes			Yes
Size FE			Yes			Yes
Ownership FE			Yes			Yes
Credit Rating FE			Yes			Yes

Table 6: The Buffer and the Relative Markup of Suppliers

This table explores how the relative bargaining power of a firm's suppliers affects the buffer. To measure the relative bargaining power of suppliers, we use the average ratio of supplier firms' markups to the firm's own markup over its customers. We use Revere data on customer-supplier relationships to identify a firm's major suppliers, and we use the "accounting" markup from Baqaee and Farhi (2020) as a proxy for the firm's bargaining power. For a given firm i, the Supplier Relative Markup is the simple average of the ratio of each supplier's markup to the firm's own markup over its customer. We aggregate to NAICS-3 by year level and match to our CFO survey data by their industries. Columns 1-3 focus on the extensive margin; columns 4-6 focus on the intensive margin. The variables Supplier Relative Markup, Beta Volatility and Sales Volatility are standardized to mean zero, unit variance. All variables are defined in detail in Table A.1. Standard errors are clustered at survey industry $\times$ survey quarter and displayed in parentheses below the coefficient. ***, **, * denote significance at 1%, 5%, 10%.

	(1)	(2)	(3)	(4)	(5)	(6)
	Extensive Margin			Intensive Margin		
Supplier Relative Markup	0.034**	0.028*	0.028*	0.532***	0.388**	0.367**
	(0.017)	(0.016)	(0.014)	(0.157)	(0.157)	(0.163)
Cost of Capital	-0.028***	-0.028***	-0.028***	-0.324***	-0.327***	-0.322***
	(0.003)	(0.003)	(0.003)	(0.046)	(0.047)	(0.047)
Beta Volatility		0.027**	0.029**		0.475***	0.467***
		(0.012)	(0.013)		(0.167)	(0.167)
Sales Volatility		0.005	0.007		0.365**	0.322**
		(0.015)	(0.015)		(0.148)	(0.158)
Observations	1,066	1,066	1,066	1,066	1,066	1,066
R-squared	0.084	0.088	0.121	0.072	0.083	0.108
Survey Quarter FE			Yes			Yes
Size FE			Yes			Yes
Ownership FE			Yes			Yes
Credit Rating FE			Yes			Yes

A. Appendix Figures and Tables

Figure A.1: Time Series and Cross-Sectional Differences in the Extensive Margin of the Hurdle Rate Buffer

This figure displays the proportion of firms that use a positive buffer (i.e., their hurdle rate exceeds their cost of capital) across several observable characteristics of the CFO survey sample.

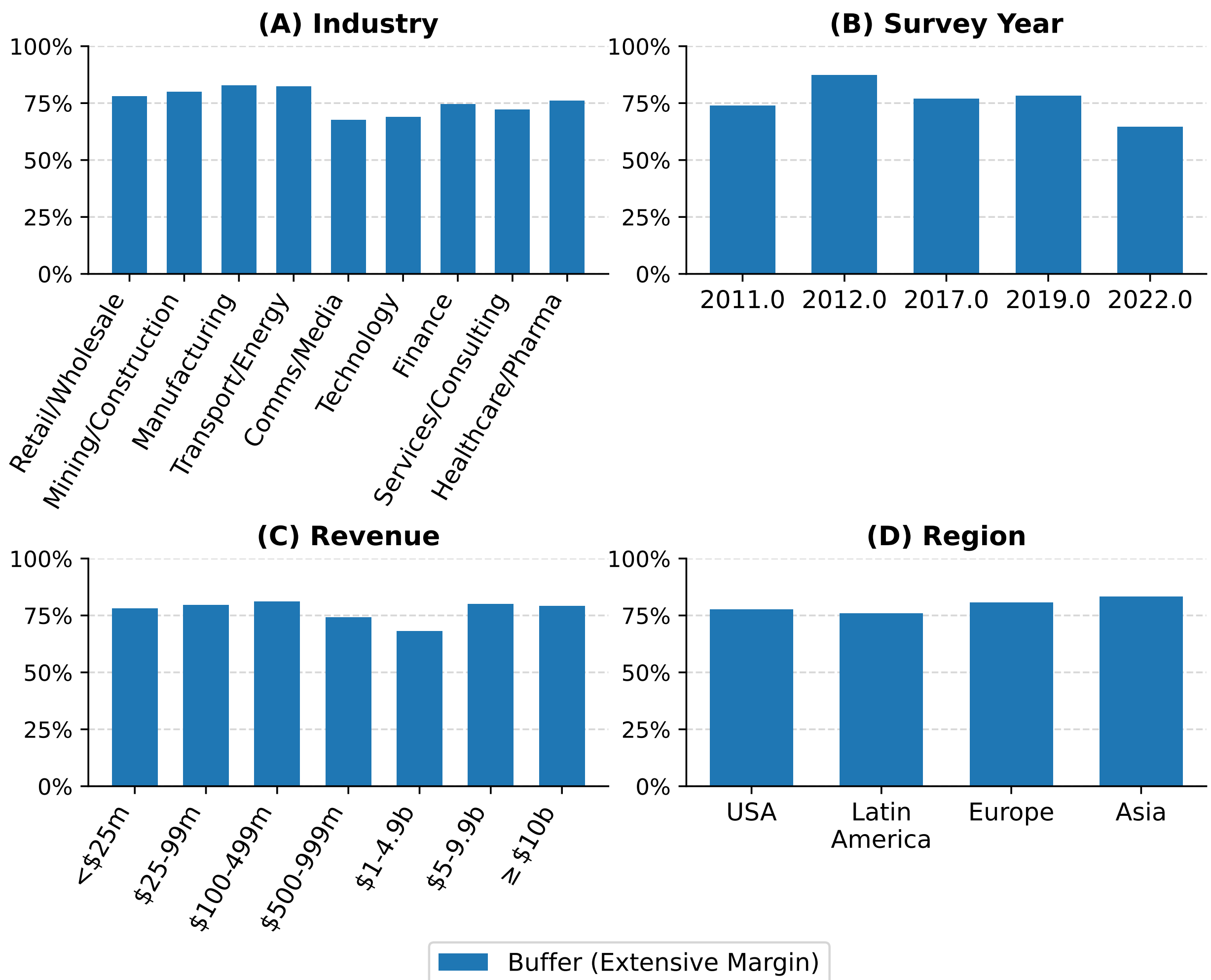


Figure A.2: Cross-Correlations of Main Variables

This figure shows the pair-wise correlations among the main variables. Dark blue indicates strong positive correlations, and dark red indicates strong negative correlations. Detailed variable definitions are available in Table A.1.

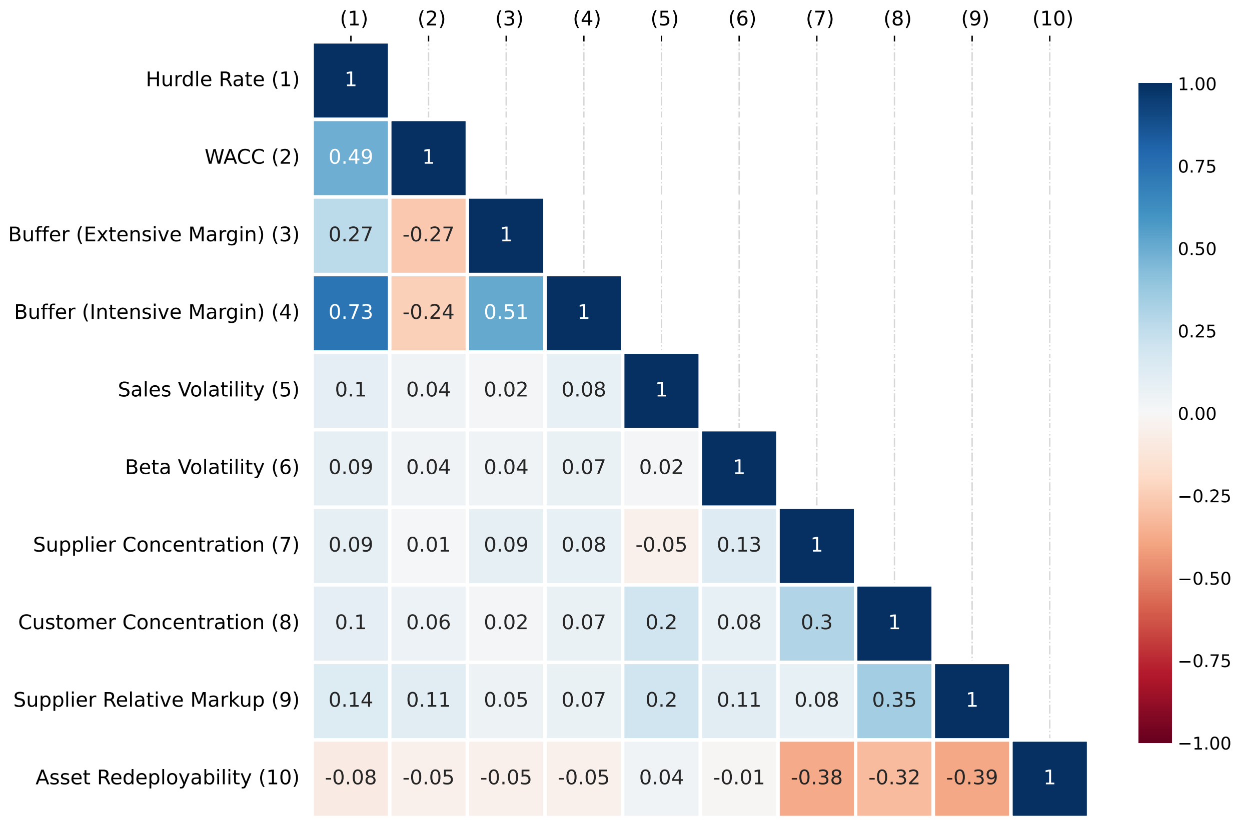


Figure A.3: Density Manipulation in Excess ROIC relative to WACC

This figure displays robustness for Figure 5. In particular, we test for density manipulation of ROIC around the cost of capital, as opposed to the hurdle rate. The sample is the same as in Figure 5. We define $Excess\ ROIC^{WACC}_{i,t} = ROIC_{i,t} - WACC_{i,t}$ as excess ROIC relative to the firm's cost of capital (as opposed to the hurdle rate as in Figure 5). We implement the same test and look for excess bunching in ROIC directly above the firm's WACC; we do not find a discontinuity in the density at WACC (the test returns a t-statistic of -1.013).

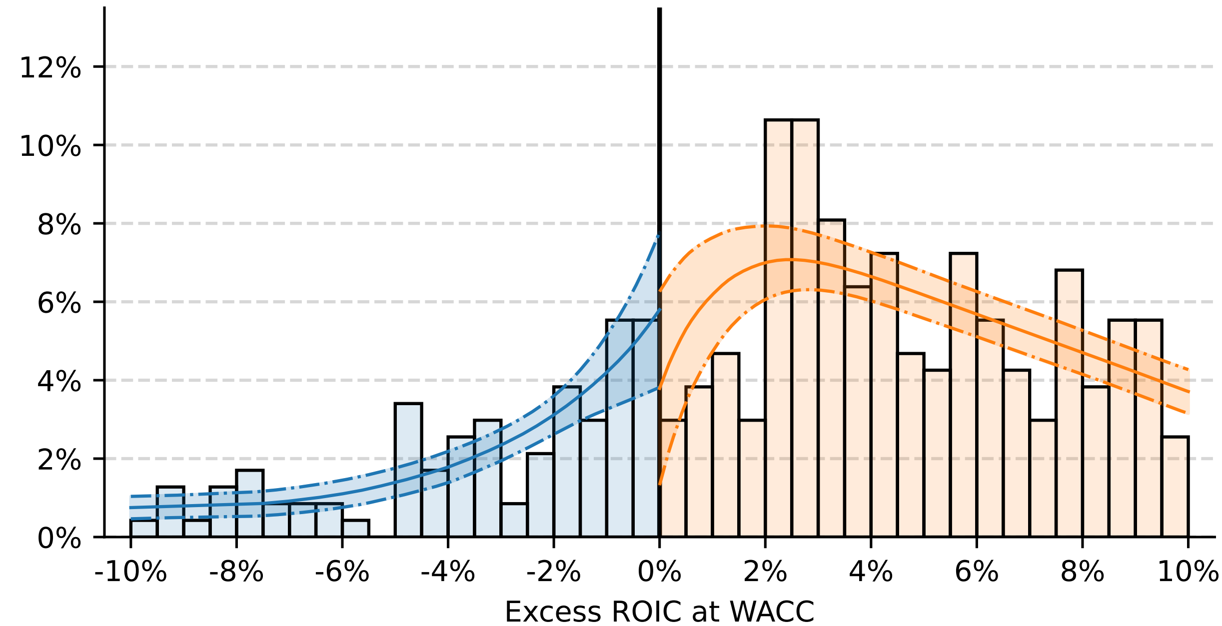


Figure A.4: The Relation Between the Intensive Margin of the Buffer and Asset Tangibility

This figure displays the same analysis as Figure 7, where we use asset tangibility as a measure of specificity (instead of asset redeployability).

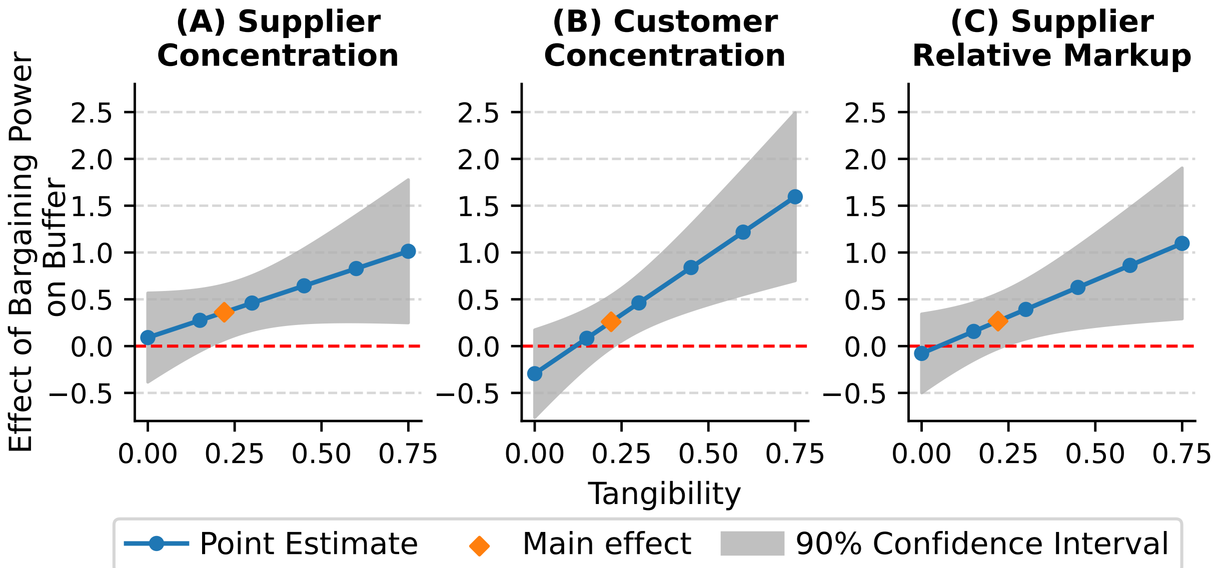
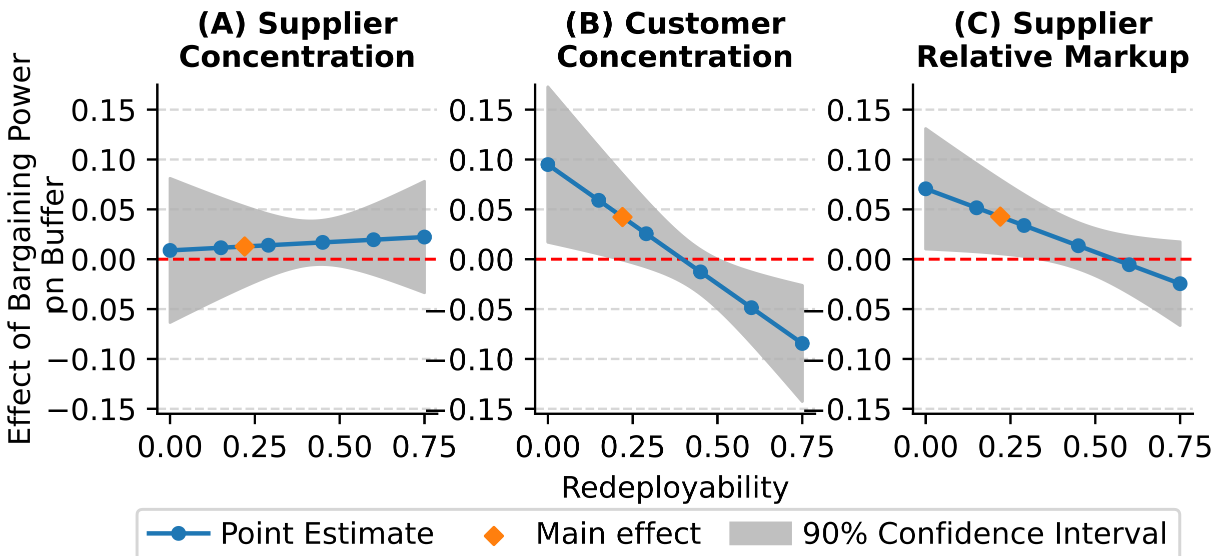


Figure A.5: The Relation Between the Extensive Margin of the Buffer and Bargaining Power by Asset Tangibility and Redeployability

This figure is robustness for Figures 7, and displays the equivalent result for the extensive margin of the buffer. See Table A.8 Panel A and B for the regressions used to estimate each figure panel (columns 1-3 of each table panel).

Panel A: Asset Redeployability



Panel B: Asset Tangibility

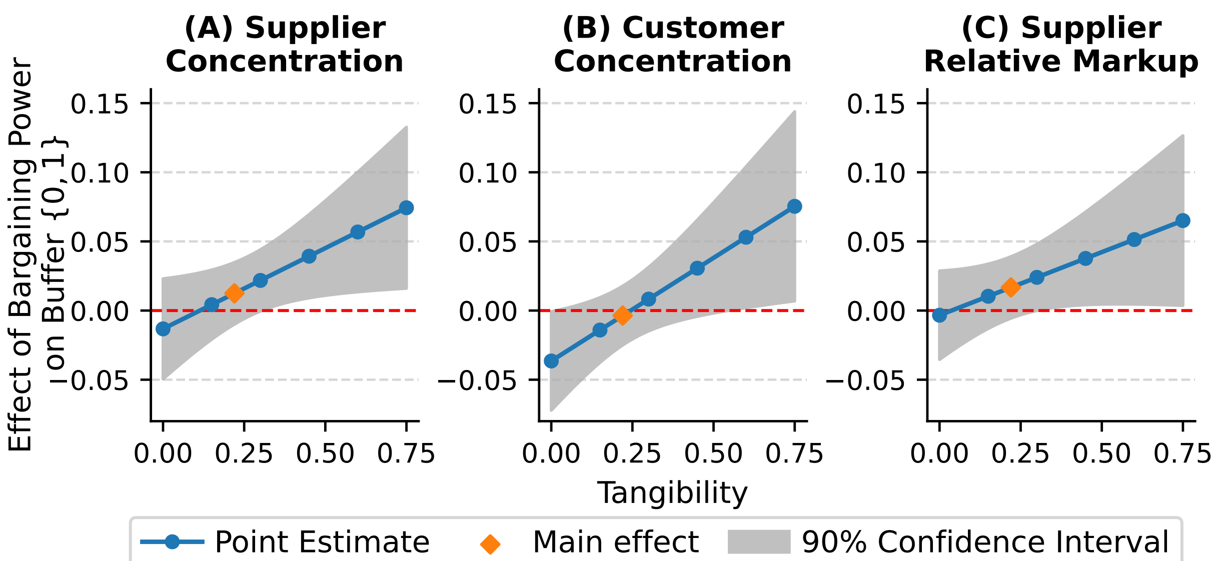


Table A.1: Empirical Variable Definitions

This table gives definitions, details on construction and sources for each empirical variable used in the paper. Appendix C.1 contains additional details on the survey data and other data sources.

Variable	Description	Source
Hurdle Rate	The minimum rate of return required to pursue a project.	CFO Survey
Cost of Capital/WACC	The firm's weighted average cost of capital.	CFO Survey
Buffer (Extensive Margin)	Indicator variable taking a value of one if the firm's hurdle rate exceeds its cost of capital; i.e., the extensive margin of the buffer.	CFO Survey
Buffer (Intensive Margin)	The difference between hurdle and WACC, i.e. the intensive margin of the buffer.	CFO Survey
Buffer | Buffer > 0	The intensive margin of the buffer for firms that use a positive buffer. This differs from the definition above as it excludes Buffer $= 0$ observations.	CFO Survey
Survey Industry	Industry of firm, as supplied by respondent to the CFO survey, roughly equivalent to 1-digit SIC. The 10 categories are Retail/Wholesale Trade, Mining/Construction, Manufacturing, Transportation/Energy, Communications/Media, Technology, Finance, Servces/Consulting, Healthcare/Pharma, Other.	CFO Survey
Has Credit Rating	Indicator variable equal to one if the firm states it has a credit rating (and zero for all other firms)	CFO Survey
Size	Categorical variable tracking firm size by revenue. Categories are $< \$25m$, $\$25-99m$, $\$100-499m$, $\$500-900m$, $\$1-4.9b$, $\$5-9.9b$ and $\geq \$10b$. Often included as a fixed effect in analysis.	CFO Survey
Large Firm	Indicator variable equal to one if the firm's sales revenue is weakly greater than \$1 billion.	CFO Survey
Public Firm	Indicator variable equal to one if the firm is publicly traded.	CFO Survey
Firm-Level (US) Optimism	Answer to the question: "Rate your optimism about your firm (or in a separate question, the US economy) on a scale from 0-100, with 0 being the least optimistic and 100 being the most optimistic."	CFO Survey
Return on Invested Capital	ROIC is $EBIT_t \times (1 - tax_t)/ICAPT_{t-1}$ where $ICAPT$ is Invested Capital. Invested Capital is the sum of long-term debt (total) and common equity (total). We take trailing four-quarter sums of $EBIT(1 - tax)$, and divide by the invested capital from the end of the previous fiscal year to derive our final measure.	Compustat
Sales Volatility	We adapt methodology in Décaire (2024) to estimate a measure of industry idiosyncratic sales volatility. We estimate $sales/(lagged\ assets)_{i,j,t,q} = \alpha_j + \alpha_t + \alpha_q + \varepsilon_{i,j,t,q}$ for firm i, industry j, calendar quarter t and $q \in \{1, 2, 3, 4\}$. We take residuals $\varepsilon_{i,j,t,q}$ as a quarterly firm-level measure of idiosyncratic risk. To net out short-run, firm-specific shocks, we take trailing 2-year averages of firm idiosyncratic risk as our final firm-level measure. The final measure is the standard deviation of the firm-level measure for firms in a given NAICS-4 industry and calendar quarter.	Compustat
Beta Volatility	Standard deviation of the CAPM beta within a quarter and 4-digit NAICS industry.	Compustat & CRSP

Supplier Concentration	Average of firms' suppliers' industry concentrations within a year and NAICS-3 industry. For a given customer firm i in Revere, we take the average of their j suppliers' industry-level sales concentration as the measure of supplier (industry) concentration. Industry-level sales concentration is taken from publicly available 2017 Census data on the HHI of sales at the NAICS-4 industry level. Results are similar using simple averages to aggregate to the firm-level, or by weighting by supplier size (sales). To match to the CFO survey data, we take NAICS-3 $\times$ year averages of Supplier Concentration. We limit to firms in non-consumer-facing industries as our bargaining analysis pertains to B2B firms.	Revere & U.S. Census Bureau (2017)
Customer Concentration	Average of firms' corporate customer sales HHI within a year and NAICS-3 industry. For firm i and customer firm(s) j, $HHI_i^{sales} = \sum_j \left(\frac{sales_{i,j}}{sales_i}\right)^2$. To measure HHI, we use the Compustat Segments Customers file (which itself is created using SEC filings), focusing on corporate customers. See, e.g., Patatoukas (2012), for more details. We limit to firms in non-consumer-facing industries as our bargaining analysis pertains to B2B firms.	Compustat & SEC filings
Relative Markup	Average of firms' supplier-to-own relative markup (see accounting markup below) within a year and NAICS-3 industry. For a given customer firm i in Revere, we take the average of the ratio of j firm's markup to firm i markup ($rel\ markup_i = \|J_i\|^{-1} \sum_j \frac{markup_j}{markup_i}$) as a measure of firm-level (relative) bargaining power over suppliers. To match to the CFO survey data, we take NAICS-3 $\times$ year averages of Relative Markup. We limit to firms in non-consumer-facing industries as our bargaining analysis pertains to B2B firms.	Revere & Compustat
Markup	We follow the "accounting markup" from Baqaee and Farhi (2020) (BF). At the firm-level, we measure profits as operating income after depreciation (OIBPD-DP). The firm-level markup is μ_i comes from the following relation: $\text{profits}_i = \left(1 - \mu_i^{-1}\right) \text{sales}_i$. To net out the effects of year-specific shocks, we take four-year trailing averages of μ_i within-firm. Following BF, we take NAICS-3 by year averages of μ_i as our industry measure. See Appendix C.2.1 of BF details, and Baqaee and Farhi (2019) for details on replication.	Compustat
Consumer-Facing	Indicator variable taking a value of one if a firm is in GICS sectors 25 or 30 ("Consumer Discretionary" or "Consumer Staples").	GICS
Asset Tangibility	We calculate firm-level tangibility as the ratio of property, plant and equipment to total fixed assets (PPENT/AT). Because there is very little time variation in tangibility (a regression of firm tangibility on NAICS-4 fixed effects produces an R^2 of 0.62, adding year fixed effects produces an R^2 of 0.635), we take simple NAICS-4 averages of firm-level tangibility for our industry measure.	Compustat
Asset Redeployability	See Kim and Kung (2017). Asset redeployability (at the asset level) is the proportion of industries that use a given asset. Industry-level asset redeployability is the value-weighted average of redeployability based on how important assets are to an industry. We use the publicly available data from Kim and Kung (2017) and match to our survey firms at the NAICS-2 level.	Kim and Kung (2017), BEA
Average Discount Rate	Average between the maximum and minimum discount rate used in fairness opinions on M&A deals.	SDC

Predicted Target WACC	Target's WACC, with r_A estimated using the average CAPM asset beta in the target firm's 3-digit SIC industry the year before deal announcement and r_D estimated as the firm's average cost of debt and average tax rate. See Dessaint et al. (2021).	SDC, CRSP & Compustat
Premium	Percentage premium of the bid-implied equity value (EV) of the target to the target's market capitalization (MV) in the year prior to the bid. If EV is missing, then EV is the deal value divided by the percentage of equity acquired in the deal (for uncompleted deals, the percentage of equity sought). Final measure is $\log(EV/MV)$.	SDC, CRSP & Compustat
Bidder/Target CAR	Bidder's or Target's cumulative abnormal return relative to the four-factor model in the 3 trading days around deal announcement ($t \in [-1, 1]$). We use a 252 trading day window to estimate the expected return (requiring a minimum of 100 trading days to estimate), and include a 60 trading day gap between the end of the estimation window and the start of the event window.	SDC & CRSP
Combined CAR	The weighted average (by pre-deal market capitalization) of the bidder and target CAR.	SDC & CRSP
Bidder/Target $CAR	The $\$CAR$ measure from Ahern (2012), where the abnormal dollar return to the firm is scaled by the sum of the market capitalizations of both firm before deal announcement	SDC & CRSP
Bidder Share $CAR	Bidder's share of total $CAR, for deals in which the both the bidder and target have non-negative abnormal returns	SDC & CRSP

Table A.2: Reason Aggregation for Figure 2

This table displays how we produce Figure 2. The possible responses that CFOs can give for the reason(s) that they set their hurdle above WACC vary by survey. We categorize possible reasons into five qualitative groupings.

Panel A: 2011

Financing Constraint	1. Shortage of funding
Managerial/Resource Constraint	1. Shortage of employees 2. Shortage of management time and expertise 3. Shortage of production capacity
Project Prioritization	1. We do not pursue some positive net present value projects because we think others will earn even higher returns
Over-Optimism/Agency	1. Some projects only appear to be attractive due to optimistic projections but may not be successful 2. Project might reduce earnings per share
Idiosyncratic Risk/Uncertainty	1. There is too much uncertainty about some projects 2. The risk of the project is too high

Panel B: 2019

Financing Constraint	1. Because we face funding constraints
Managerial/Resource Constraint	1. Because we have scarcity of managerial time/expertise
Project Prioritization	1. So that we choose only the best available projects
Over-Optimism/Agency	1. So that we choose projects that are profitable 2. To provide a buffer in case the project underperforms
Idiosyncratic Risk/Uncertainty	1. To account for riskiness of the projects being evaluated 2. To account for costs not captured by WACC 3. To provide a margin of error in calculations and assumptions

Panel C: 2022

Financing Constraint	1. Our firm cannot fund all profitable projects
Managerial/Resource Constraint	1. Scarcity of non-management labor 2. Scarcity of management times
Project Prioritization	1. To limit the total number of projects we take on 2. Saves resources in order to preserve the option to invest in future projects that might earn higher return
Over-Optimism/Agency	1. Helps offset possible over-optimism in project evaluation 2. Builds in a buffer, to reduce the odds we will have to cancel a project that we have already started should a negative surprise occur
Idiosyncratic Risk/Uncertainty	1. Provides a margin of error in calculations and assumptions 2. Accounts for project-specific risks not reflected in WACC

Table A.3: Hurdle Rates, Costs of Capital and Buffers by Industry

This table displays industry-level averages of hurdle rates, costs of capital and the intensive and extensive margins of the buffer. Panel A sorts by NAICS-2 industries, Panel B sorts by survey industries (i.e., the industry the CFO stated on the survey), which approximately align with one-digit SIC codes. The final column of both panels displays the average buffer conditional on using a positive buffer. See Table A.1 for detailed definitions.

Panel A: NAICS-2 Averages

Code	Description	Percent of Sample	Hurdle	WACC	Buffer Intensive Margin	Buffer Extensive Margin	Buffer | Buffer > 0
11	Agri, Forestry, Fish	0.32	11.875	9.250	2.625	0.750	3.500
21	Mining, Oil/Gas	2.03	18.020	10.140	7.880	0.960	8.208
22	Utilities	0.97	8.892	7.075	1.817	0.667	2.725
23	Construction	5.19	13.575	8.322	5.253	0.734	7.153
31-33	Manufacturing	21.59	14.616	9.197	5.418	0.805	6.735
41-42	Wholesale Trade	7.22	13.553	8.576	4.977	0.775	6.419
44-45	Retail Trade	5.11	14.374	8.910	5.465	0.778	7.026
48-49	Transportation/Warehouse	1.95	13.562	9.017	4.546	0.833	5.455
51	Information	4.38	15.398	9.645	5.753	0.778	7.397
52	Finance/Insurance	9.42	11.693	7.723	3.970	0.733	5.418
53	Real Estate	3.9	12.964	8.383	4.580	0.729	6.281
54	Professional/Scientific Services	9.66	15.708	9.936	5.771	0.756	7.631
55	Management of Companies	0.73	10.267	6.839	3.428	0.556	6.170
56	Admin/Waste Management	2.76	15.294	8.751	6.543	0.824	7.945
61	Educational Services	1.38	8.444	6.368	2.076	0.529	3.922
62	Healthcare	3.98	11.849	7.658	4.191	0.837	5.009
71	Arts/Entertainment	0.49	11.383	9.550	1.833	0.667	2.750
72	Accommodation/Food	1.46	16.744	9.386	7.358	0.833	8.830
81,91-92	Other Services, Public Admin	2.68	11.955	6.564	5.391	0.848	6.354
Unknown	Unknown	14.77	13.848	8.903	4.945	0.775	6.383

Panel B: Survey Industry Averages

Industry	Percent of Sample	Hurdle	WACC	Buffer Intensive Margin	Buffer Extensive Margin	Buffer | Buffer > 0
Mining/Construction	4.87	14.212	7.894	6.317	0.800	7.897
Technology	7.31	16.394	10.638	5.756	0.689	8.356
Manufacturing	24.11	14.803	9.276	5.527	0.828	6.673
Communications/Media	2.52	15.581	10.165	5.416	0.677	7.995
Services/Consulting	12.01	13.764	8.664	5.100	0.723	7.055
Retail/Wholesale	10.39	13.170	8.320	4.851	0.781	6.209
Transportation/Energy	7.87	13.349	8.654	4.696	0.825	5.694
Healthcare/Pharma	6.09	13.128	8.763	4.365	0.760	5.744
Finance	12.42	11.958	7.790	4.168	0.745	5.594
Other	12.42	13.459	8.274	5.185	0.797	6.503

Table A.4: Excess ROIC Density Manipulation Test Robustness

This table displays robustness the results of the density manipulation test described in Figure 5. We alter both order of the local polynomial estimator, as well as the bandwidth for the local estimation. For each polynomial order p, the bias-corrected density estimator is set to be $q = p + 1$, which is the default setting. In each column, we display the difference in the estimated density immediately above and immediately below the cutoff. In the notation of Cattaneo et al. (2018), we display $\hat{f}_{+,p}(h) - \hat{f}_{-,p}(h)$, where $\hat{f}_{\pm,p}(h)$ is derived via local polynomial density estimation. Below the estimated difference in density, we display standard errors. Column 1 displays the results when the bandwidths for estimation are chosen via the data-driven methodology in Section 2.5 of Cattaneo et al. (2018). In column 1, the chosen bandwidths $\{h_-, h_+\}$ are displayed below the standard error. In columns 2-5, we fix the bandwidth to be equal on both sides. ***, **, * denote significance at 1%, 5%, 10%.

		(1)	(2)	(3)	(4)	(5)
			Bandwidth			
		Data-Driven	2.5	5	7.5	10
Polynomial Order	1	0.057***	0.083***	0.030*	0.004	0.002
		(0.021)	(0.027)	(0.017)	(0.012)	(0.010)
		$\{4.422, 3.432\}$				
	2	0.051**	0.108**	0.097***	0.036*	0.012
		(0.023)	(0.048)	(0.028)	(0.021)	(0.017)
		$\{7.926, 6.038\}$				
	3	0.125***	0.136*	0.118***	0.113***	0.046*
		(0.034)	(0.077)	(0.041)	(0.030)	(0.025)
		$\{7.449, 6.199\}$				

Table A.5: Cumulative Abnormal Return Robustness for Table 3

This table displays robustness for our M&A analysis where we vary the estimation method for the abnormal returns. In Panel A, we estimate the model using the $CAR as in Ahern (2012), where $CAR is the (bidder or target) dollar abnormal return, scaled by the sum of the pre-deal target market capitalization of both firms. In Panel B, we vary the model to estimate Bidder CAR (all $t \in [-1, 1]$). In Panel C, we vary the window over which we estimate Bidder CAR (all using 4-factor model).

Panel A: Abnormal Dollar Returns

	(1)	(2)	(3)	(4)
	Bidder $CAR		Target $CAR	
Implied Buffer	0.104**	0.116**	0.028	0.048
	(0.049)	(0.048)	(0.156)	(0.153)
Predicted Target WACC	-0.096	-0.083	-0.281	-0.249
	(0.136)	(0.142)	(0.364)	(0.362)
Observations	736	736	736	736
R-squared	0.211	0.228	0.326	0.347
Year FE	Yes	Yes	Yes	Yes
Bidder & Target Industry FE	Yes	Yes	Yes	Yes
Bidder & Target Controls	Yes	Yes	Yes	Yes
Target Takeover Defense Controls	Yes	Yes	Yes	Yes
Deal Controls		Yes		Yes

Panel B: Alternative Bidder CAR Models

	(1)	(2)	(3)	(4)	(5)	(6)
	3-Factor		CAPM		Market-Adjusted	
Implied Buffer	0.207**	0.217***	0.194**	0.205**	0.181*	0.195**
	(0.086)	(0.082)	(0.088)	(0.085)	(0.099)	(0.095)
Predicted Target WACC	-0.129	-0.112	-0.109	-0.091	-0.101	-0.078
	(0.230)	(0.237)	(0.209)	(0.217)	(0.216)	(0.225)
Observations	736	736	736	736	736	736
R-squared	0.228	0.245	0.230	0.248	0.227	0.247
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Bidder & Target Industry FE	Yes	Yes	Yes	Yes	Yes	Yes
Bidder & Target Controls	Yes	Yes	Yes	Yes	Yes	Yes
Target Takeover Defense Controls	Yes	Yes	Yes	Yes	Yes	Yes
Deal Controls		Yes		Yes		Yes

Panel C: Alternative Bidder Estimation Window

	(1)	(2)	(3)	(4)	(5)	(6)
	$[-2, 2]$		$[-3, 3]$		$[-5, 5]$	
Implied Buffer	0.232**	0.229**	0.218*	0.201*	0.280**	0.259**
	(0.101)	(0.094)	(0.113)	(0.108)	(0.118)	(0.121)
Predicted Target WACC	-0.175	-0.171	-0.227	-0.244	-0.139	-0.179
	(0.241)	(0.244)	(0.270)	(0.279)	(0.304)	(0.312)
Observations	736	736	736	736	736	736
R-squared	0.225	0.238	0.207	0.220	0.193	0.207
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Bidder & Target Industry FE	Yes	Yes	Yes	Yes	Yes	Yes
Bidder & Target Controls	Yes	Yes	Yes	Yes	Yes	Yes
Target Takeover Defense Controls	Yes	Yes	Yes	Yes	Yes	Yes
Deal Controls		Yes		Yes		Yes

Table A.6: The Buffer and Concentration of Supplier Industries (Alternative Measures)

This table display robustness tests for Table 4, in which we use alternative measures of industry-level sales concentration to construct the measure of supplier concentration (Autor et al., 2020). We use the same FactSet Revere data to aggregate supplier (industry) concentration to the firm-level, and we again aggregate to NAICS-3 by year level and match to our CFO survey data by their industries. Columns 1-4 (5-8) display results using the percentage of sales accounted for by the top four, eight, 20 and 50 firms in an industry as supplier industry concentration, respectively. Columns 1-4 focus on the extensive margin; columns 5-8 focus on the intensive margin. All displayed variables standardized to mean zero, unit variance, and the controls are the same as Table 4. Standard errors are clustered at survey industry × survey quarter and displayed in parentheses below the coefficient. ***, **, * denote significance at 1%, 5%, 10%.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Extensive Margin				Intensive Margin			
Supplier Top 4 Sale Share	0.015				0.643***			
	(0.015)				(0.158)			
Supplier Top 8 Sale Share		0.022				0.651***		
		(0.015)				(0.161)		
Supplier Top 20 Sale Share			0.023				0.554***	
			(0.016)				(0.175)	
Supplier Top 50 Sale Share				0.020				0.444**
				(0.016)				(0.189)
Observations	1,066	1,066	1,066	1,066	1,066	1,066	1,066	1,066
R-squared	0.118	0.118	0.119	0.118	0.112	0.113	0.111	0.108
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Survey Quarter FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Size FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Ownership FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Credit Rating FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Table A.7: The Buffer and Price Markups in B2B Industries

This table explores how a firm's level bargaining power affects the buffer. The proxy for a firm's bargaining power in this table is the price markup of firms operating in non-consumer-facing industries, i.e., firms whose operations are predominantly (business-to-business) B2B. Higher price markups on a firm's customers would be a direct consequence of bargaining power, all else equal. Our measure of price markup is the "accounting" markup from Baqaee and Farhi (2020), which we aggregate to NAICS-3 by year level and match to our CFO survey data by their industries. Because our model makes no prediction on the relation between the buffer and markup for consumer-facing firms, we remove consumer-facing industries from the analysis. Specifically, we follow Gofman et al. (2020) and define an industry as consumer-facing if it falls in GICS sector "Consumer Discretionary" or "Consumer Staples" (GICS codes 25 and 30, respectively); 166 of our 1232 observations are firms operating in consumer-facing industries. Columns 1-3 focus on the extensive margin; columns 4-6 focus on the intensive margin. The variables Markup, Beta Volatility and Sales Volatility are standardized to mean zero, unit variance. All variables are defined in detail in Table A.1. Standard errors are clustered at the survey industry × survey quarter and displayed in parentheses below the coefficient. ***, **, * denote significance at 1%, 5%, 10%.

	(1)	(2)	(3)	(4)	(5)	(6)
	Extensive Margin			Intensive Margin		
Markup	-0.031***	-0.024**	-0.026*	-0.698***	-0.527***	-0.559***
	(0.011)	(0.011)	(0.013)	(0.148)	(0.162)	(0.163)
Cost of Capital	-0.027***	-0.028***	-0.028***	-0.326***	-0.328***	-0.324***
	(0.003)	(0.003)	(0.003)	(0.047)	(0.047)	(0.047)
Sales Volatility		0.003	0.004		0.284*	0.222
		(0.015)	(0.015)		(0.145)	(0.153)
Beta Volatility		0.027**	0.028**		0.426**	0.408**
		(0.013)	(0.013)		(0.167)	(0.165)
Observations	1,066	1,066	1,066	1,066	1,066	1,066
R-squared	0.083	0.087	0.120	0.079	0.086	0.113
Survey Quarter FE			Yes			Yes
Size FE			Yes			Yes
Ownership FE			Yes			Yes
Credit Rating FE			Yes			Yes

Table A.8: The Relation Between the Buffer and Bargaining by Asset Specificity

This table displays the regressions used to estimate Figures 7 and A.5. In each column, we interact the measure of bargaining power BP with the measure of specificity (tangibility in Panel A, redeployability in Panel B). Each measure of bargaining power is standardized to mean-zero unit variance. Tangibility and redeployability are both $\in [0, 1]$, and not standardized. Thus, the coefficient on the main effect of each bargaining power is interpreted as the effect of a one-standard deviation increase in bargaining power for a firm in a zero-tangibility (redeployability) industry. All variables are defined in detail in Table A.1. Standard errors are clustered at survey industry × survey quarter and displayed in parentheses below the coefficient. ***, **, * denote significance at 1%, 5%, 10%.

Panel A: Bargaining Power by Asset Redeployability

	(1)	(2)	(3)	(4)	(5)	(6)
	Extensive Margin			Intensive Margin		
Supplier Concentration	0.009			1.131**		
	(0.044)			(0.574)		
Supplier Concentration × Redeploy	0.018			-1.774		
	(0.097)			(1.274)		
Customer Concentration		0.095**			2.060***	
		(0.047)			(0.619)	
Customer Concentration × Redeploy		-0.239**			-4.259***	
		(0.104)			(1.362)	
Supplier Relative Markup			0.071*			1.077**
			(0.037)			(0.481)
Supplier Relative Markup × Redeploy			-0.127*			-1.942**
			(0.073)			(0.963)
Redeployability	-0.266***	-0.409***	-0.325***	-2.741**	-4.655***	-4.021***
	(0.101)	(0.104)	(0.107)	(1.325)	(1.366)	(1.403)
Observations	1,066	1,066	1,066	1,066	1,066	1,066
R-squared	0.127	0.131	0.129	0.117	0.121	0.116
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Survey Quarter FE	Yes	Yes	Yes	Yes	Yes	Yes
Size FE	Yes	Yes	Yes	Yes	Yes	Yes
Ownership FE	Yes	Yes	Yes	Yes	Yes	Yes
Credit Rating FE	Yes	Yes	Yes	Yes	Yes	Yes

Table A.8: Continued

Panel B: Bargaining Power by Asset Tangibility

	(1)	(2)	(3)	(4)	(5)	(6)
	Extensive Margin			Intensive Margin		
Supplier Concentration	-0.013			0.091		
	(0.022)			(0.289)		
Supplier Concentration × Tangibility	0.117*			1.229		
	(0.067)			(0.882)		
Customer Concentration		-0.036*			-0.295	
		(0.022)			(0.284)	
Customer Concentration × Tangibility		0.149**			2.520**	
		(0.076)			(0.995)	
Supplier Relative Markup			-0.003			-0.078
			(0.020)			(0.256)
Supplier Relative Markup × Tangibility			0.091			1.567*
			(0.065)			(0.854)
Tangibility	0.152*	0.271***	0.224***	0.990	2.565**	2.183**
	(0.089)	(0.080)	(0.082)	(1.166)	(1.047)	(1.081)
Observations	1,066	1,066	1,066	1,066	1,066	1,066
R-squared	0.129	0.128	0.128	0.115	0.117	0.113
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Survey Quarter FE	Yes	Yes	Yes	Yes	Yes	Yes
Size FE	Yes	Yes	Yes	Yes	Yes	Yes
Ownership FE	Yes	Yes	Yes	Yes	Yes	Yes
Credit Rating FE	Yes	Yes	Yes	Yes	Yes	Yes

B. Selected Proofs

Proof of Lemma 1

If $s = \{\theta R - H_F, (1-\theta)R - H_O\}$, $d = \{0, 0\}$, and $\alpha = \beta = 1$, then (1) becomes

$$\max_{\theta} \quad \Big(\theta R - H_F\Big)\Big((1-\theta)R - H_O\Big). \tag{B.1}$$

Expansion yields

$$\theta(1-\theta)R^2 - \theta R H_O - (1-\theta)RH_F + H_F H_O.$$

Taking first-order conditions,

$$(1-2\theta)R^2 + RH_F - RH_O = 0.$$

Solving for the Nash split yields

$$\theta = \frac{1}{2} + \frac{H_F - H_O}{2R}.$$

■

Proof of Proposition 1

Integrating (10) over all incentive compatible gross returns ($\underline{R}'$ to $\bar{R}$) yields

$$V_B = \theta_B[1 - F(\underline{R}')].$$

Taking the derivative with respect to τ yields

$$\frac{\partial V_B}{\partial \tau} = \frac{\partial \theta_B}{\partial \tau}[1 - F(\underline{R}')] - \theta_B f(\underline{R}') = 0.$$

The optimal τ is therefore given by (11). Uniqueness can be shown by defining

$$H(\tau) = \frac{\theta_B}{\frac{\partial \theta_B}{\partial \tau}} - \frac{[1 - F(\underline{R}')]}{f(\underline{R}')}$$

By inspection,

$$\lim_{\tau \to 0} H(\tau) < 0$$

and

$$\lim_{\tau \to \infty} H(\tau) > 0.$$

Taking the derivative

$$\frac{\partial H(\tau)}{\partial \tau} = \frac{\left[\frac{\partial \theta_B}{\partial \tau}\right]^2 - \frac{\partial^2 \theta_B}{\partial \tau^2}\theta_B}{\left[\frac{\partial \theta_B}{\partial \tau}\right]^2} - \frac{-[f(\underline{R}')]^2 + [1 - F(\underline{R}')]\frac{\partial^2 F}{\partial \tau^2}}{[f(\underline{R}')]^2} \tag{B.2}$$

$$= 1 - \frac{\frac{\partial^2 \theta_B}{\partial \tau^2}\theta_B}{\left[\frac{\partial \theta_B}{\partial \tau}\right]^2} + 1 - \frac{[1 - F(\underline{R}')]\frac{\partial^2 F}{\partial \tau^2}}{[f(\underline{R}')]^2}. \tag{B.3}$$

Since $\frac{\partial^2 \theta_B}{\partial \tau^2} \leq 0$ and $\frac{\partial^2 F}{\partial \tau^2} \leq 0$, then $\frac{\partial H}{\partial \tau} > 0$.

The change in value, ΔV, from using a buffered hurdle rate is calculated as the difference between V_B and V_N. It is positive as long as (13) holds.

Microfoundation for Tullock Bargaining Structure

We first present a stochastic productivity model (Jia, 2008)[30] and then consider a Nash bargaining solution.

Consider two firms $j \in \{F, O\}$ and two delegates that are each assigned hurdle rate H_j. Suppose that each perceives that there exists an alternative project k_j that characterizes their purported walkaway value. Define

$$k_j(H_j, \theta_j) = H_j\theta_j,$$

where θ_j is stochastic on $[0, \infty)$ according to the distribution function

$$G(z) = \exp\left\{\frac{-\alpha}{z}\right\}.$$

The corresponding probability density function is

$$g(z) = \frac{\alpha}{z^2}\exp\left\{\frac{-\alpha}{z}\right\}.$$

By construction, there is some probability that the outside project would ultimately be rejected (i.e., $k_j \leq H_j$).

We derive the Tullock function (Tullock, 1980) as a probability of winning a contest, with the interpretation from (Hirshleifer, 1989) that each party gains a share of the surplus from the project.

$$F_i(H_i, H_j) = P(H_i\theta_i > H_j\theta_j) = P\left(\theta_j < \frac{H_i}{H_j}\theta_i\right) \tag{B.4}$$

$$= \int_0^\infty P\left(\theta_j < \frac{H_i}{H_j}\theta_i \middle| \theta_i = z\right) g(z)dz \tag{B.5}$$

$$= \int_0^\infty P\left(\theta_j < \frac{H_i}{H_j}\theta_i \middle| \theta_i = z\right) \frac{\alpha}{z^2}\exp\left\{\frac{-\alpha}{z}\right\}dz \tag{B.6}$$

$$= \int_0^\infty \exp\left\{\frac{-H_j\alpha}{H_i z}\right\}\frac{\alpha}{z^2}\exp\left\{\frac{-\alpha}{z}\right\}dz \tag{B.7}$$

$$= \int_0^\infty \frac{\alpha}{z^2}\exp\left\{\frac{-\alpha}{z}\left(\frac{H_j}{H_i}+1\right)\right\}dz \tag{B.8}$$

$$= \int_0^\infty \exp\left\{\frac{-\alpha}{z}\left(\frac{H_j+H_i}{H_i}\right)\right\}d\left(\frac{-\alpha}{z}\right) \tag{B.9}$$

$$= \frac{H_i}{H_i+H_j}. \tag{B.10}$$

We can also motivate the use of this function using Nash bargaining. This is included in the proof of Lemma 2.

Proof of Lemma 2

If $s = \{\theta[R - (H_F + H_O)], (1-\theta)[R - (H_F + H_O)]\}$, $d = \{0, 0\}$, $\alpha = H_F$, and $\beta = H_O$, then (1)

[30] Jia (2008) considers the more general case of stochastic productivity models. We follow Theorem 1 in that paper.

becomes

$$\max_{\theta} \quad \Big(\theta[R - (H_F + H_O)]\Big)^{H_F} \Big((1-\theta)[R - (H_F + H_O)]\Big)^{H_O}. \tag{B.11}$$

Taking first-order conditions,

$$\begin{aligned} H_F[R - (H_F + H_O)]\Big(\theta[R - (H_F + H_O)]\Big)^{H_F - 1}\Big((1-\theta)[R - (H_F + H_O)]\Big)^{H_O} \\ - H_O[R - (H_F + H_O)]\Big(\theta[R - (H_F + H_O)]\Big)^{H_F}\Big((1-\theta)[R - (H_F + H_O)]\Big)^{H_O - 1} = 0 \end{aligned} \tag{B.12}$$

Solving for the Nash split yields

$$\theta = \frac{H_F}{H_F + H_O}.$$

■

Proof of Proposition 2

Integrating (10) over all incentive compatible gross returns ($\underline{R}'$ to $\bar{R}$) yields

$$V_B = \frac{\tau}{\tau + W_O} R \Big|_{\underline{R}'}^{\bar{R}} .$$

Substituting in $\underline{R}' = \tau + W_O$ yields the following:

$$V_B = \frac{\tau}{\tau + W_O} [\bar{R} - (\tau + W_O)] .$$

Simplifying gives the expression for the value of the firm in terms of τ:

$$V_B = \frac{\tau \bar{R}}{\tau + W_O} - \tau . \tag{B.13}$$

Taking the derivative of (B.13) with respect to τ yields the optimal hurdle rate

$$\frac{\partial V_B}{\partial \tau} = \frac{\bar{R}(\tau + W_O) - \tau \bar{R}}{(\tau + W_O)^2} - 1 = 0$$
$$\Rightarrow \quad \bar{R} W_O = (\tau + W_O)^2 .$$

The optimal τ is therefore given by

$$\tau^* = \sqrt{\bar{R} W_O} - W_O , \tag{B.14}$$

which is (16) in the text. It follows that $\tau^* > W_F$ if

$$\sqrt{\bar{R} W_O} > W_F + W_O \Rightarrow \frac{\bar{R} W_O}{W_F + W_O} > W_F + W_O,$$

which is equivalent to the condition in (19). Otherwise, $\tau^* = W_F$.

Plugging (16) into (B.13) for τ gives us the value of the project at the optimal IRR hurdle rate

$$V_B^* = \frac{\bar{R}(\sqrt{\bar{R} W_O} - W_O)}{\sqrt{\bar{R} W_O}} - \sqrt{\bar{R} W_O} + W_O$$

which simplifies to

$$V_B^* = \bar{R} + W_O - 2\sqrt{\bar{R} W_O} .$$

This is (17) in the text.

The change in value, ΔV, from using a buffered hurdle rate is calculated as the difference between V_N from (9) and V_B from (17)

$$\Delta V = \bar{R} + W_O - 2\sqrt{\bar{R} W_O} - \frac{W_F \bar{R}}{W_F + W_O} + W_F$$
$$\Rightarrow = (1 - \frac{W_F}{W_F + W_O})\bar{R} + W_F + W_O - 2\sqrt{\bar{R} W_O} . \tag{B.15}$$

It is straightforward to show that $\Delta V > 0$. We can re-write (B.15) as

$$\Delta V = \frac{W_O \bar{R}}{\underline{R}} + \underline{R} - 2\underline{R}' > 0,$$

or

$$\Delta V = (\underline{R}')^2 + \underline{R}^2 - 2\underline{R}'\underline{R} > 0. \tag{B.16}$$

This expression is of the form $a^2 + b^2 - 2ab$, which is strictly greater than zero for all values of a and b. Therefore, B.16 is always positive.

Finally, the comparative statics are proven by straightforward differentiation.

1.
$$\frac{\partial \Delta V}{\partial \bar{R}} = 1 - \frac{\sqrt{\bar{R} W_O}}{\bar{R}} - \frac{W_F}{W_F + W_O} > 0.$$

To see this, note that $\underline{R}' = \sqrt{\bar{R} W_O}$. Substituting leads to

$$\begin{aligned}
1 - \frac{\underline{R}'}{\bar{R}} - \frac{W_F}{\underline{R}} &> 0 \\
\Rightarrow \bar{R} - \underline{R}' - \frac{\bar{R} W_F}{\underline{R}} &> 0 \\
\Rightarrow \bar{R}\underline{R} - \underline{R}'\underline{R} - \bar{R} W_F &> 0 \\
\Rightarrow \bar{R}\underline{R} - \bar{R} W_F &> \underline{R}'\underline{R} \\
\Rightarrow \bar{R}(\underline{R} - W_F) &> \underline{R}'\underline{R} \\
\Rightarrow \bar{R}(W_O) &> \underline{R}'\underline{R} \\
\Rightarrow (\underline{R}')^2 &> \underline{R}'\underline{R}\,.
\end{aligned}$$

The final expression holds because $\underline{R}' > \underline{R}$.

2.
$$\frac{\partial \Delta V}{\partial W_F} = \left(1 - \frac{\bar{R} W_O}{(W_F + W_O)^2}\right) < 0$$

To see this, note that $\bar{R} W_O = (\underline{R}')^2$ and $(W_F + W_O)^2 = \underline{R}^2$. Substitution leads to

$$\left(1 - \frac{(\underline{R}')^2}{\underline{R}^2}\right) < 0$$

Since $\underline{R}' > \underline{R}$, this expression holds.

■

Proof of Proposition 3

Integrating (10) over all incentive compatible gross returns ($\underline{R}''$ to $\bar{R}$) yields

$$V_F = \frac{\tau_F}{\tau_F + \tau_O} R \Big|_{\underline{R}''}^{\bar{R}} .$$

Substituting in $\underline{R}'' = \tau_F + \tau_O$ yields the following:

$$V_F = \frac{\tau_F}{\tau_F + \tau_O} [\bar{R} - (\tau_F + \tau_O)] .$$

Simplifying gives the expression for the value of the firm in terms of τ_F:

$$V_F = \frac{\tau_F \bar{R}}{\tau_F + \tau_O} - \tau_F . \tag{B.17}$$

Similar calculation for the outside trading partner yields

$$V_O = \frac{\tau_O \bar{R}}{\tau_F + \tau_O} - \tau_O . \tag{B.18}$$

Taking first order conditions with respect to τ_F and τ_O

$$\frac{\partial V_F}{\partial \tau_F} = \frac{\bar{R}(\tau_F + \tau_O) - \tau_F \bar{R}}{(\tau_F + \tau_O)^2} - 1 = 0$$

$$\Rightarrow \quad \bar{R}\tau_O = (\tau_F + \tau_O)^2 , \tag{B.19}$$

$$\frac{\partial V_O}{\partial \tau_O} = \frac{\bar{R}(\tau_F + \tau_O) - \tau_O \bar{R}}{(\tau_F + \tau_O)^2} - 1 = 0$$

$$\Rightarrow \quad \bar{R}\tau_F = (\tau_F + \tau_O)^2 . \tag{B.20}$$

It follows that

$$\bar{R}\tau_F = \bar{R}\tau_O . \tag{B.21}$$

Substituting (B.21) into (B.19) for τ_O gives us

$$\bar{R}\tau_F = 4\tau_F^2$$

$$\Rightarrow \tau_F^* = \frac{\bar{R}}{4} .$$

It follows that $\tau_O^* = \frac{\bar{R}}{4}$ as well.

Taking second order conditions for each party yields

$$\frac{\partial^2 V_F}{\partial {\tau_F}^2} = \frac{-2\tau_O \bar{R}(\tau_F + \tau_O)}{(\tau_F + \tau_O)^4} < 0$$

$$\frac{\partial^2 V_O}{\partial {\tau_O}^2} = \frac{-2\tau_F \bar{R}(\tau_F + \tau_O)}{(\tau_F + \tau_O)^4} < 0,$$

so that τ_F^* and τ_O^* are global maxima.

It is straightforward to show that $\tau_F^* = \tau_O^* = \frac{\bar{R}}{4}$ is a unique symmetric equilibrium. The proof is by contradiction. Suppose that $\tau_F = \tau_O = \frac{\bar{R}}{n}$ for some $n \neq 4$. Then, both best-response functions in (B.19) and (B.20) are violated.

At the optimal buffered discount rates, the value of the project

$$V_F^* = \frac{\tau_F^* \bar{R}}{\tau_F^* + \tau_O^*} - \tau_F^* .$$

Substitution yields

$$V_F^* = \frac{\bar{V}}{4},$$

which is (21) in the text. The same holds for V_O^*.

Finally, the projects that are undertaken when no IRR buffers are used yield an aggregate value of $\bar{R} - (W_F + W_O)$. The aggregate value with competitive IRR buffers is $\bar{R} - \frac{\bar{R}}{2} = \frac{\bar{R}}{2}$. The deadweight loss is the loss of positive NPV projects, which is computed as the difference $\frac{\bar{R}}{2} - (W_F + W_O)$. ∎

Proof of Proposition 4

The value for party i given the actions of the others is

$$V_i = \int_{\underline{R}}^{\bar{R}} \theta_i dR,$$

where $\underline{R} = \sum_{j \in N} H_j \equiv \Sigma$. This implies that

$$V_i = \frac{\bar{R}H_i}{\Sigma} - H_i. \tag{B.22}$$

Taking first-order conditions yields

$$\frac{\partial V_i}{\partial H_i} = \frac{\bar{R}\Sigma - \bar{R}H_i}{\Sigma^2} - 1. \tag{B.23}$$

Second-order conditions confirm that the objective function is strictly concave. Setting (B.23) equal to zero and re-arranging yields

$$\bar{R}\sum_{j \in J} H_j = \Sigma^2,$$

where J are all others except party i. For all pairs of parties i and j, $S \equiv \sum_{k \neq i,j}$ is the same. Therefore,

$$\bar{R}(S + H_j) = \Sigma^2 \tag{B.24}$$

$$\bar{R}(S + H_i) = \Sigma^2, \tag{B.25}$$

which implies that $H_i = H_j = H^*$ for all pairs i, j. Thus,

$$\bar{R}(n-1)H^* = n^2(H^*)^2,$$

or

$$H^* = \frac{(n-1)\bar{R}}{n^2}. \tag{B.26}$$

Plugging (B.26) into (B.22)

$$V_i = \frac{\bar{R}}{n^2}.$$

■

C. Data Appendix

C.1. CFO Survey Data

The CFO survey has asked respondents about their hurdle rate and cost of capital jointly six different times: 2011q1, 2012q2, 2017q2, 2017q3, 2019q1 and 2022q2. The last survey was conducted jointly with the Federal Reserve Banks of Richmond and Atlanta. On each survey, the wording of the hurdle rate question specifically asked CFOs for their investment hurdle rates (the expected rate of return an investment project must exceed in order to be adopted). We similarly asked CFOs to supply their weighted average cost of capital (WACC), not their cost of equity or debt. Figure C.1 displays how we asked CFOs for their hurdle rate and WACC in the 2012q2 survey. The questions for the other surveys can be found at https://cfosurvey.fuqua.duke.edu/ for surveys conducted prior to 2022q2 and https://www.richmondfed.org/cfosurvey/ for the 2022q2 survey.

Figure C.1: Hurdle Rate and WACC Questions in 2012q2 CFO Survey

10a. What do you estimate is your firm's overall weighted average cost of capital (WACC)? (e.g., 11.2%)	10b. What is your firm's 'hurdle rate' (the rate of return that an investment must beat in order to be adopted)?
%	%

A potential concern with survey data is that respondents do not understand the survey questions, or do not respond accurately (Graham, 2022). While we cannot fully address these concerns, we can analyze the accuracy of the CFO survey forecasts for firms that also have archival data in Compustat (about 15% of the sample). Following analysis in Gormsen and Huber (2024b) that relates firms' survey costs of capital to estimated costs of capital, Figure C.2 Panel A displays a binned scatter plot of the WACC as reported on the survey and the WACC we estimate using data from CRSP and Compustat.[31] The slope coefficient from this regression is 0.61 and highly significant, and the R^2 is 0.44. While exploring the relation between perceived and estimated costs of capital is not the point of our paper, we are reassured by the tightness of the relation. Secondly, Figure C.2 Panel B compares the survey-reported revenue categories of these same firms to the equivalent category calculated using Compustat; the proportions line up nearly one-to-one. Finally, recall the analysis of Figure 5, which indicates that ex post realized returns align with survey-provided hurdle rates, again providing assurance that our survey data are reliable.

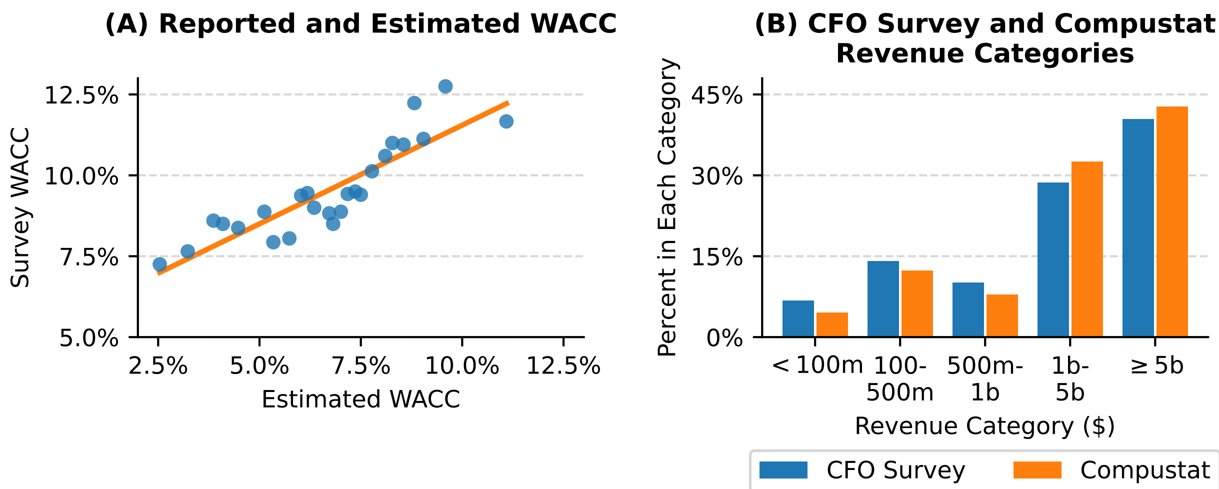
A second concern with survey data is representativeness. Table IAI in the Internet Appendix of Graham (2022)[32] shows that, even though the CFO survey contains a large proportion of private firms, the distributions of employment counts conditional on firm size are quite similar in the CFO survey and Compustat. Thus, we do not detect anomalies that would suggest problems using our data to draw inference relative to well-known samples such as Compustat.

[31] We estimate WACC in the simplest way possible. The cost of equity is derived using the CAPM. The cost of debt is total interest expense to total debt (i.e., the average cost of debt).

[32] See here: https://onlinelibrary.wiley.com/doi/10.1111/jofi.13161.

Figure C.2: Closeness of Data Reported on CFO Survey to Archival Data

This figure analyzes the closeness of survey-reported data and archival data using CFO survey firms that appear in Compustat. We match data from Compustat to the survey firms by survey year and calendar year in Comustat. Panel A displays a binned scatter plot from a regression of reported WACC on estimated WACC. The cost of equity is estimated using the CAPM, cost of debt is total interest expense to total debt. Panel B displays the percentage of these Compustat firms that fall into the stated revenue category on the survey (blue bars) vs. the same categories calculated using archival revenue data (orange bars).



C.2. Further Analysis of the Determinants of the Hurdle Rate Buffer

Section 3 and Table 2 display analyses of the determinants of the extensive and intensive margins of the buffer. We provide further detail on the relations presented in this table.

Prior work shows that estimation error or uncertainty about WACC and/or discount rates affects corporate investment (Krüger et al., 2015; Bessembinder and Décaire, 2021). While not directly related to our bargaining model, this would affect hurdle rate buffers in our data if CFOs include a fudge factor in their discount rates to offset this uncertainty. We use the volatility of the CAPM beta within the CFO survey firm's NAICS-4 industry the quarter previous to the survey quarter to proxy for this uncertainty.[33]

We also include idiosyncratic project risk in our specifications: sales volatility, or the volatility of idiosyncratic firm-level sales within a NAICS-4 industry, is strongly related to the intensive margin of the buffer, but is not significant in the extensive margin. This suggests that, after controlling for estimation uncertainty in WACC, idiosyncratic project risk leads to larger buffers (constistent with, e.g., Décaire, 2024).

Large firms are both less likely to use a positive buffer and have smaller-sized buffers, reinforcing

[33] When this measure is high, firms within an industry vary substantially in the level of return investors require in order to bear the firm's underlying risk. Even for firms not publicly traded, this measure proxies for the required rate of return demanded by investors if the business activities and underlying cash flow risk of private and public firms within an industry are similar.

the findings from Figure 3, Panel C. Public firms are slightly more likely to use a positive buffer, but show no difference in the size of the buffer. Whether or not a firm has a credit rating has no effect on either margin. To the extent that having a credit rating is a reasonable measure of financing constraint (Faulkender and Petersen, 2005), we do not find evidence in our sample that the ability to access public debt markets is a primary determinant of the buffer.

The CFO survey asks CFOs to rate their level of optimism about their own firm's prospects and the US economy more generally.[34] Columns 5 and 8 of Panel A and columns 5 and 9 of Panel B include these variables in our baseline regressions. We find that own-firm optimism is positively related to buffer use and the size of the buffer, even after controlling for US economy optimism. This suggests that CFOs may choose a larger buffer at least in part to offset optimism in other aspects of project development.[35]

Lastly, as a validation exercise of our data, in both panels we zero in on public firms (columns 5 and 9 of Panel A, and columns 5 and 10 of Panel B). We first note that coefficient estimates are similar when limiting to public firms. This also allows us to include the firm's CAPM beta in the regression. We note that betas are strong predictors of buffers, even with the presence of the firm's WACC in the regression, consistent with Jagannathan et al. (2016).

C.3. M&A Sample Construction and Variables

In Section 5.1, we use data on M&A deals to test the prediction that the use of a hurdle rate buffer by bidders in M&A deals leads to better bargaining outcomes for bidders. Our test sample comes from Refinitiv's SDC Platinum M&A database. A subset of M&A deals have data available on the range of discount rates used in fairness opinions (FOs). Findings from Dessaint et al. (2021) suggest that the discount rates used in FOs contain real information about the true discount rate used when valuing a target.

To construct our sample, we focus on the sample of public-to-public M&A deals which have FO discount rate data. We also require data on the target's WACC, the bidders CAR around the deal announcement, and a host of bidder, target and deal controls. Table C.1 Panel A displays the sample selection process, with the last row displaying our final test sample. We define the average discount rate as the average between the maximum and minimum discount rate used in the FO (Dessaint et al., 2021). The implied buffer is the difference between the average discount rate and the target's predicted WACC. The target's WACC is the relevant benchmark rate in this context as it reflects the underlying cost of the capital of the investment project. Table C.1 Panel B displays the summary statistics for the main variables in our test. Figure C.3 displays a binned scatterplot of the implied buffer regressed on the target's predicted WACC. The slope coefficient

[34] The question asks CFOs to rate their level of optimism on a 0-100 scale, with 0 being the least optimistic. The mean firm-level (US) optimism is 68.7 (63.1), with a standard deviation of about 18 (16).

[35] We note that in contrast, if firm-optimism is correlated with higher confidence of project success and this were the dominant effect, we would expect to find a negative relation between optimism and the buffer.

from this regression is -0.365, very similar to the estimates we find using the CFO survey data in, e.g., Table 2 Panel B.

Table C.1: M&A Sample Construction and Summary Statistics

This table displays the sample selection process and summary statistics for the main variables for the analysis in Sections 5.1 and Table 3.

Panel A: Sample Construction

N	Reason for Reduction
2178	All public-public deals with FO data
2166	Missing high/low FO r or average $r > 40\%$
1352	Missing bidder/target GVKEY or PERMNO
1276	Missing deal value or deal value < \$50m (2020 dollars)
800	Missing bidder/target or deal control(s)
769	Missing target WACC
746	Missing bidder CAR

Panel B: Summary Statistics

	N	Mean	Std Dev	25%	50%	75%
Average Discount Rate	746	12.612	4.105	10	12	14.500
Predicted Target WACC	746	7.874	2.136	6.363	7.700	8.989
Implied Buffer	746	4.737	3.737	2.331	3.858	6.096
Bidder CAR	746	-1.680	9.324	-5.934	-0.922	3.723
Target CAR	746	24.222	24.126	8.014	19.570	34.601
Combined CAR	746	2.089	7.100	-2.662	1.780	6.319

Figure C.3: Binned scatterplot of implied buffer on the target predicted WACC

This figure displays a binned scatterplot of the implied buffer on the predicted target WACC using the sample in Table C.1.