

Shareholder Approval in Mergers & Acquisitions*

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Abstract

This paper provides one of the first large sample studies documenting a positive causal effect of shareholder approval in corporate decision making. Using a hand-collected sample of U.S. mergers and acquisitions (M&As) that involve all-stock payment over the period 1995-2015, we examine whether and how the requirement of shareholder approval affects deal quality. Our identification strategy relies on listing rules of the NYSE, AMEX, and NASDAQ that shareholder approval is *required* when an acquirer *intends* to issue more than 20% new shares to finance a deal. We examine acquirer price reaction to deals in which acquirers *intend* to issue either above or below the 20% threshold by a small margin. The regression discontinuity design works well in all-stock deals due to acquirer management's inability to *precisely* manipulate share issuance and thus provides a clean causal estimate of the effect of shareholder approval on M&As. We find a large and significant 4.3% jump in acquirer announcement returns at the 20% threshold. We further show that this positive value effect is concentrated among acquirers with more effective shareholder monitoring and among acquirers buying target firms with more severe information problems. We provide some suggestive evidence on the underlying economic mechanisms behind this positive value effect: The requirement of shareholder approval commits acquirer management to seek deals with larger synergies and strengthens its bargaining position vis-à-vis target management. Finally, we show that shareholder approval leads to better post-merger operating performance in acquirers with high institutional ownership. We conclude that the requirement of shareholder approval is effective in addressing agency problems.

Keywords: shareholder approval; mergers and acquisitions; acquirer announcement returns; listing rules; regression discontinuity designs

JEL Classification: G32; G34; G38

I. Introduction

Modern corporations are characterized by the separation of ownership and control, and thus shareholder engagement in important corporate decisions is fundamental to the governance process. Despite its importance, evidence on the role of shareholder engagement in one of the most important corporate decisions—mergers and acquisitions (M&As) is limited and mixed. This paper provides one of the first large sample studies documenting a positive causal effect of shareholder approval on corporate M&As.

In general, it is difficult to find a setting in which a firm's governance structure changes exogenously (with the exceptions of regulation- and legislation-induced changes, see, for example, the adoption of SOX and various state-level antitakeover laws). The challenge faced by many empirical studies is the endogeneity of a firm's governance structure. For example, acquirers whose deals require shareholder approval may be fundamentally different from those whose deals do not require shareholder approval. A simple comparison of these two groups of acquirers only suggests possible association between shareholder approval and deal outcome, but does not establish causality.

Our identification strategy relies on listing rules of the NYSE, AMEX, and NASDAQ that shareholder approval is *required* when an acquirer *intends* to issue more than 20% new shares to finance a deal.¹ We examine acquirer price reaction to deals in which acquirers *intend* to issue either above (i.e., the treatment group) or below the 20% threshold (i.e., the control

¹ See Appendix IA1 in the Internet Appendix, the New York Stock Exchange (NYSE) Listed Company Manual, Section 312.00 Shareholder Approval Policy; the American Stock Exchange (AMEX) Company Guide, Section 712 Acquisitions; and the NASDAQ Manual: Marketplace Rules, Section 4350 Qualitative Listing Requirements for NASDAQ National Market and NASDAQ SmallCap Market Issuers Except for Limited Partnerships. These listing rules were first implemented by the NYSE in 1955, followed by the AMEX in 1968, and by the NASDAQ in 1985 (Karmel (2001)). See Appendix IA2 for an example of S-4 where the requirement of acquirer shareholder approval is specified.

group) by a small margin. The regression discontinuity (RD) design allows us to overcome limitations of the standard approach of regressing M&A outcome variables on the requirement of shareholder approval indicator variable. Our empirical strategy essentially compares acquirer price reaction to deals where acquirers intend to issue either above or below the 20% threshold by a small margin. For these “close-call” deals, the requirement of shareholder approval is akin to an independent *random* event (i.e., it is “locally” exogenous) and therefore uncorrelated with (either observed or unobserved) firm and deal characteristics. Put differently, the average firm and deal characteristics for acquirers who intend to issue just above the threshold are similar to those who intend to issue just below the threshold. However, this small difference in the percent of new shares to be issued leads to a discrete change in the requirement of shareholder approval as imposed by the three major exchanges. The RD estimates capture the treatment effect of this discrete change in the requirement of shareholder approval at the 20% threshold. Importantly, these estimates do not incorporate any observed or unobserved confounding factors as long as their effect is continuous around the threshold. In a nutshell, the RD estimates are able to provide a clean causal estimate of the effect of shareholder approval on M&As.

The key identification assumption of valid RD designs is that agents cannot *precisely* manipulate the “running variable”. In our setting, the running variable is the percent of new shares an acquirer *intends* to issue to finance a deal. If acquirer management—even while having *some* influence—is unable to *precisely* manipulate the running variable, a consequence of this is that the variation in treatment near the 20% threshold is *randomized* as though from a *randomized* experiment (Imbens and Lemieux (2008), McCrary (2008), Lee and Lemieux (2010), and Roberts and Whited (2013)).

We argue that the key identification assumption of valid RD designs is satisfied in *all-stock* deals (i.e., the entire purchase price is paid in stock) used in our analysis. It is true that acquirer management has some control over methods of payment—all-stock, all-cash, or a combination of stock and cash payment—and in the last case, over the fraction of payment in stock. However, it is highly unlikely, if not impossible, that in *all-stock* deals, acquirer management could have *precise* control over the running variable to avoid the requirement of shareholder approval due to a number of exchange rules and (unforeseen) circumstances associated with M&As: 1) the NYSE clearly states, “The issuance of shares from treasury is considered an issuance of shares for purposes of Section 312.03” and hence is counted as part of the new shares to be issued for the requirement of shareholder approval, preventing acquirer management from bypassing shareholder approval through the usage of treasury shares (see Appendix IA1 in the Internet Appendix); 2) the ever-changing bargaining power during the lengthy negotiation process directly affects the purchase price and hence the amount of shares to be issued (Ahern (2012)); and 3) (multiple) fairness opinions sought by target firms (and sometimes by acquirers) during the negotiation process also affects the purchase price and hence the amount of shares to be issued (Kisgen, Qian, and Song (2009)). We show that the frequency distribution of the running variable in *all-stock* deals reveals no evidence of (excess) manipulation by acquirer management around the 20% threshold. A formal density test for smoothness of the running variable (McCrary (2008)) further confirms the validity of our RD design.

Using a hand-collected sample of U.S. M&A deals that involve all-stock payment over the period 1995-2015, we examine whether and how the requirement of shareholder approval affects deal outcome. We find a large and significant 4.3% jump in acquirer announcement

returns at the 20% threshold. Given that the average acquirer in our sample has a market capitalization of \$3.3 billion, a 4.3% jump in stock price around the merger agreement announcement corresponds to value creation of \$140 million for acquirer shareholders, suggesting an economically significant value effect. We further show that this positive value effect is concentrated among acquirers with more effective shareholder monitoring as proxied by high institutional ownership, particularly high quasi-indexer ownership, and among acquirers buying target firms with more severe information problems, such as unlisted targets or targets with low analyst coverage. We provide some suggestive evidence on the underlying economic mechanisms behind this positive value effect: The requirement of shareholder approval commits acquirer management to seek deals with larger synergies and strengthens their bargaining position vis-à-vis target management. Finally, we show that shareholder approval leads to better post-merger operating performance in acquirers with high institutional (quasi-indexer) ownership.

We conduct a battery of robustness checks and our main findings remain. First, we employ quadratic polynomial models on both sides of the threshold to estimate the average treatment effect. Second, we incorporate pre-determined firm and deal characteristics in estimation in order to reduce the sampling variability in the RD estimates (Lee and Lemieux (2010)). Third, we conduct falsification tests, estimating the treatment effect around some pseudo thresholds (say, 15%) other than the regulatory threshold of 20% (Lee and Lemieux (2010) and Roberts and Whited (2013)). We find that using pseudo thresholds does not generate the same significant treatment effect as that with the 20% threshold. Finally, we generalize the treatment effect beyond a narrow band around the 20% threshold (Angrist and Rokkanen (2015)), and find that the treatment effect remains in a broader sample.

Our paper contributes to the literature in a number of dimensions. First, our paper contributes to the small but growing finance literature that studies the efficacy of (mostly nonbinding) shareholder voting in various corporate matters. Some studies find that shareholder voting is not effective in improving firm performance (e.g., Karpoff, Malatesta, and Walkling (1996), Del Guercio and Hawkins (1999), Cai, Garner, and Walkling (2009), Kamar (2011), and Agrawal (2012)), while others find shareholder voting is beneficial in some corporate governance contexts (e.g., Black (1992), Gordon and Pound (1993), Del Guercio, Seery, and Woidtke (2008), Hsieh and Wang (2008), Balachandran, Joos, and Weber (2012), Cuñat, Gine, and Guadalupe (2012, 2015), and Becht, Polo, and Rossi (2016)). Using a meta-analysis approach based on studies from 23 countries (including U.S.), Holderness (2016) finds that when shareholders must approve equity issuances, average announcement returns are positive; when management unilaterally issues equity, returns are negative. He concludes that shareholder approval reduces agency costs in equity issuances. Our paper conducts one of the first large sample studies that establish a positive causal effect of (mandatory) shareholder voting in U.S. M&As.

Second, our paper contributes to the large literature on the monitoring role of institutional investors (see, for example, theoretical work by Shleifer and Vishny (1986), and Maug (1998), empirical evidence from Hartzell and Starks (2003), Chen, Harford, and Li (2007), and Iliev, Lins, Miller, and Roth (2015), and surveys by Gillan and Starks (2000) and Yermack (2010)). Complementary to these studies, we show that one powerful tool at the disposal of monitoring institutional investors is the requirement of shareholder approval in corporate M&As. In particular, we show that the positive treatment effect of shareholder approval is concentrated among acquirers with high institutional ownership, leading to better post-merger operating

performance. Our paper thus provides new insight into how institutional investors help create firm value—their scrutiny leads to their portfolio firms making value-enhancing deals and reinforces the important connection between the sophistication of shareholders and major corporate decisions (Holderness (2016)).

Finally, our paper contributes to the literature on acquisitions of non-public targets. The question of why we observe positive acquirer announcement returns in acquisitions of private or subsidiary targets is still not fully answered. Possible explanations include information uncertainty (Officer, Poulsen, and Stegemoller (2009)), liquidity provision (Fuller, Netter, and Stegemoller (2002), Officer (2007), and Greene (2015)), and block formation in the acquirer due to stock payment (Chang (1998)). Complementary to prior studies, we show that the requirement of acquirer shareholder approval leads to greater scrutiny and shareholder value creation in acquisitions of non-public targets.

Our paper is closely related to a number of prior studies focusing on the role of shareholder voting in M&As. Hsieh and Wang (2008) find that acquirers with higher M/B ratios and higher institutional ownership are less likely to be associated with shareholder voting rights, and that deals requiring acquirer shareholder approval are associated with higher synergistic gains and outperform in the long run, while bids requiring shareholder approval are associated with a lower probability of completion. In contrast, Kamar (2011) reports no significant association between the requirement of shareholder approval and acquirer announcement returns, offer premiums, or deal completion. Focusing on U.K. where shareholder approval is mandatory for large deals, Becht, Polo, and Rossi (2016) show that mandatory voting is associated with higher acquirer announcement returns and lower offer premiums. Using international data (outside U.S.), Iliev, Lins, Miller, and Roth (2015) find that greater dissent voting from U.S.

institutional investors is associated with higher director turnover and more M&A deal withdrawals.

Different from prior studies, we hand collect information on the running variable to ensure accuracy and on whether shareholder approval is required through comprehensive searches of SEC filings (including S-4, S-4/A, 8-K, DEFM 14, DEFM 14/A, DEF 14A, 425, DEFS14A, PRES14A, PRER14A, 10-K, and 10-Q). We note that SDC misses information on the running variable for more than a fifth of stock deals, and that sometimes SDC reports the number of new shares actually issued (particularly for public targets) rather than the number of new shares to be issued relevant for firms to comply with exchange listing rules. More importantly, we employ the RD analysis to help identify a positive causal effect of shareholder approval in M&As. Further, we provide fresh evidence on the heterogeneity in the treatment effect and some suggestive evidence on underlying economic mechanisms.

II. Theoretical Framework and Hypothesis Development

Shareholder voting on major corporate decisions (such as approving equity-based compensation plans,² authorizing new equity issues,³ and amending a firm's articles of incorporation) is fundamental to the governance process. From a legal perspective, Easterbrook and Fischel (1983, p. 427) write, "common law rules of shareholders voting can, in the main, be analyzed as attempts to reduce agency costs." Coffee (1984) proposes that all acquisitions require shareholder approval. From a finance perspective, Fama and Jensen (1983) point out that a major way to curb agency costs is for shareholders to retain the right to ratify major proposals

² Both the NYSE and NASDAQ made shareholder approval of equity-based compensation plans a listing requirement since 2003 (Balachandran, Joos, and Weber (2012)).

³ Both the NYSE and NASDAQ require shareholder approval of any private placement of more than 20% of a firm's outstanding equity if the offer is priced at a discount to the exchange price (Park (2014)).

by management. Despite its importance, shareholder voting may be value neutral due to a number of tradeoffs.

On the cost side, first of all, shareholders lack specific information about the firm and/or lack the sophistication to understand the intricacy involved in running a modern corporation. As a result, their voting decisions may deviate from superior choices that managers, with better information and expertise, might make on their own. Aghion and Tirole (1997) and Burkart, Gromb, and Panunzi (1997) point out key costs of shareholders retaining the power to second-guess managers' business decisions—managers reduce their effort, information supply, and “initiatives” that are potentially value-enhancing, and that a dispersed ownership commits shareholders not to exercise excessive control. Using a case study based on the 1971 Alaska Native Claims Settlement Act, Karpoff and Rice (1989) show that managers facing frequent shareholder votes spend large amounts of time campaigning and pursuing frivolous short-term policies that cater to blocs of voters but compromise long-term firm value.

Second, some shareholders have ulterior motives and/or business ties that make their votes conflict with shareholder value maximization. Del Guercio and Hawkins (1999) examine the motivation and impact of public pension fund activism and find significant heterogeneity across funds in activism objectives, tactics, and impact on target firm value. Agrawal (2011) studies proxy votes of union funds and finds that these funds pursue worker interests, rather than maximize shareholder value. Davis and Kim (2007) show that mutual funds' business ties with their portfolio firms make these funds more likely to vote with firm management.

Third, the very process of shareholder voting is complex, costly, time-consuming, and uncertain, and might delay timely business decision making (Kahan and Rock (2008) and Kamar (2011)).

On the benefit side, first of all, large shareholders as monitors have the potential to address agency problems (see, for example, Shleifer and Vishny (1986), Admati, Pfleiderer, and Zechner (1994), Huddart (1993), Maug (1998), and Noe (2002)). One key rationale is that because all shareholders benefit from the actions of a monitoring shareholder without incurring the costs, only large shareholders have sufficient incentives to effectively monitor. Empirical evidence from Gillan and Starks (2000), Hartzell and Starks (2003), Parrino, Sias, and Starks (2003), Chen, Harford, and Li (2007), and Iliev, Lins, Miller, and Roth (2015) largely supports this proposition and finds that large shareholder monitoring is value enhancing.

Second, a number of recent institutional and regulatory changes to the process of shareholder voting make it a more effective governance mechanism (see, for example, Bebchuk (2005), Yermack (2010), and Levit and Malenko (2015)). These include a shift from plurality to majority voting, easier proxy access, and the elimination of the broker vote (which typically side with management).

Third, there are also a number of recent developments in technology and ownership structure that make shareholder voting a more prominent tool and facilitate shareholders participation in corporate decision making (Yermack (2010)): cheaper communication and voting (especially in the Internet age), rising ownership concentration towards institutional investors who actively seek to exploit the value of their voting power, rising importance of proxy advisory firms, and growing public outrage (in response to corporate scandals during the post-Enron era and the financial crisis of 2007-2009).

In our setting of shareholder approval in M&As, we expect the benefits to dominate the costs in the following ways. First, deals that require shareholder approval, as per exchange listing rules, are large and important to acquirers, and hence attract greater attention from acquirer

shareholders. These significant deals motivate acquirer shareholders to scrutinize and to be more involved in the decision-making process. Second, the growing importance of institutional ownership and shareholder proxy advisory firms suggests that shareholders have the expertise and resources to vote informatively. Finally, despite the fact that most shareholder votes are supportive of management proposals (see, for example, Yermack (2010) and Becht, Polo, and Rossi (2016)), the threat of a failed vote is real and costly because a defeated merger proposal may flag shareholders' lack of confidence in management and could potentially result in management turnover (Burch, Morgan, and Wolf (2004)).⁴ Taken together, we expect that the requirement of shareholder approval commit acquirer management to make value-enhancing deals and/or strengthen their bargaining position against target management. This treatment effect is only present under our RD setting as the great uncertainty associated with the running variable (due to the lack of precise manipulation by acquirer management) leads to random assignment of deals into the treatment and control. In contrast, outside our RD setting, whether shareholder approval is required or not becomes an endogenous choice as acquirer management has a lot of latitude in managing the running variable (such as substituting cash for stock, and only proposing deals that shareholders are more likely to approve). The above discussions lead to our first hypothesis:

H1: Shareholder approval leads to value-enhancing M&As.

Prior literature has shown that institutional investors as a group are quite active in improving corporate governance practices and addressing agency problems (see the survey by Gillan and Starks (2003) and Yermack (2010)). Cuñat, Gine, and Guadalupe (2012) and Iliev,

⁴ For example, the CEO of VNU was ousted after his proposed merger with IMS Health was voted down by shareholders (see WSJ 11/17/2005).

Lins, Miller, and Roth (2015) highlight a channel through which this happens—shareholder voting. Further, institutional investors are also heterogeneous, with quasi-indexers characterized by low turnover, high diversification, and a long-term investment horizon (Boone and White (2015)). Several studies show that passively indexing institutional investors play a key role in influencing portfolio firms’ disclosure and governance choices, leading to better long-run performance (Boone and White (2015) and Appel, Gormley, and Keim (2016)). In our setting, the sheer complexity and volume of relevant information associated with large M&A deals make it unlikely that an average individual shareholder could perform a thorough analysis and vote informatively. In contrast, institutional investors have the expertise and resources to conduct due diligence, engage in behind-the-scenes interventions, and vote informatively and/or to seek recommendation from proxy advisory firms (Burch, Morgan, and Wolf (2004) and McCahery, Sautner, and Starks (2016)). We thus expect that the value impact of shareholder approval is concentrated among acquirers with a strong presence of institutional investors.

Because information asymmetry may exacerbate any underlying agency problems in M&As by making it more difficult to detect, we expect that the need for shareholder scrutiny is greater and hence the potential for value creation is larger, in deals involving opaque targets, such as unlisted targets or targets with low analyst coverage. Put differently, an opaque target firm with greater valuation uncertainty presents acquirer shareholders a much more valuable opportunity to access and analyze otherwise hard-to-obtain information about the target than a transparent one. The above discussions lead to our second hypothesis:

H2: The value impact of shareholder approval in M&As is concentrated among acquirers with greater institutional ownership and/or among acquirers buying targets with more severe information problems.

III. Sample Formation and Overview

A. Sample formation

We start with all announced M&A transactions from the Thomson One Banker SDC database for the period from January, 1, 1995 to December 31, 2015. We impose the following filters to obtain our final sample: 1) the deal is classified as “Acquisition of Assets (AA)”, “Merger (M),” or “Acquisition of Majority Interest (AM)” by the data provider;^{5,6} 2) the acquirer is a U.S. public firm listed on the NYSE, AMEX, or NASDAQ; 3) the acquirer holds less than 50% of the shares of the target firm before deal announcement and ends up owning 100% of the shares of the target firm through the deal; 4) the target firm is a public firm, a private firm, or a subsidiary; 5) the deal value is at least \$1 million (in 1995 dollar value); 6) basic financial and stock return information is available for the acquirer; 7) the relative size of the deal (i.e., the ratio of transaction value over book value of acquirer total assets) is at least 1%; 8) the number of new shares to be issued is greater than zero; and 9) Limited Partnerships are excluded as the requirement of shareholder approval does not apply to them. We end up with an initial sample of 4,282 deals.

We note that the Thomson One Banker SDC database is generally accurate about whether a deal is financed by stock (including cases with mixed payment), but often misses the information on the number of new shares to be issued for deals financed by stock.⁷ We identify a total of 1,230 such deals and add them back to our initial sample. We then collect share issuance

⁵ According to Netter, Stegemoller, and Wintoki (2011), these three deal forms capture about 98% of M&A deals covered by the Thomson One Banker SDC database during the period 1992-2009.

⁶ An acquisition can take place through a variety of complicated structures, one of which involves an acquirer’s wholly-owned “acquisition subsidiary” merged into the target. Regardless of state laws and corporate charters, as long as the payment includes common shares of the parent, deals via the use of acquisition subsidiaries still need to comply with listing rules regarding shareholder approval.

⁷ Through our data collection, we note that 22% of the stock deals have no information on share issuance in SDC; 84% of those deals involve non-public targets.

information for these 5,512 deals via searches of SEC filings on EDGAR. The running variable is computed as the number of new shares to be issued divided by the number of shares outstanding one day prior to the merger announcement.⁸ We further remove deals where the percent of new shares to be issued exceeds 100% because in these cases, the acquirer is *de facto* the target after consummation of the deal. We also note that there are (67) cases where the running variable is less than 20% but shareholder approval is required;^{9, 10} and that there are also (47) cases where the running variable is more than 20% but shareholder approval is not required because they have requested exemption from the exchange.¹¹ We exclude those deals from our sample.¹²

Figure 1 provides the timeline of major developments leading to the public announcement of a deal.¹³ Assuming efficient markets, acquirer announcement returns capture deal quality based on the market's assessment.

Table 1 lists steps taken to form our sample of stock deals. Appendix IA4 in the Internet Appendix provides detailed description of our data collection effort to obtain information on the running variable and on the requirement of shareholder approval. Our sample consists of 5,233

⁸ For three quarters of stock deals involving public targets, we note that the running variable that we collected via various SEC disclosures is higher than the percent of new shares actually issued as reported by SDC, suggesting that acquirers are more likely to register more shares than they actually needed and that using the number reported by SDC will under-estimate the frequency of deals requiring shareholder approval.

⁹ Some jurisdictions use a different threshold as a trigger for acquirer shareholder approval, see, for example, California (the 1/6 rule), Ohio (the 1/6 rule), and New Jersey (the 40% rule). Importantly, 61% of all-stock deals are made by acquirers incorporated in the state of Delaware whose corporate law uses the same 20% rule.

¹⁰ Further, the NASDAQ may aggregate multiple issuances (with each issuing less than 20% of the shares outstanding) for the purpose of the 20% rule based on the timing of these issuances and circumstances such as the commonality of investors and use of proceeds, leading to a few more cases where the running variable is less than 20% but shareholder approval is required.

¹¹ For example, we note that a few short-form merger deals where acquirers have a small number of insiders with highly concentrated ownership requested exemption; and a few cases where waiting for shareholder approval could result in the issuer's financial demise, requested "financial viability" exemption.

¹² These two cases account for 2% of the sample. It is worth noting that when we apply a fuzzy RD analysis to include these deals in the sample, our main findings remain unchanged.

¹³ Appendix IA3 provides an example of merger negotiation process showing how the merger agreement is reached prior to the public announcement of the deal.

stock deals involving public, private, and subsidiary targets (going forward, for simplicity, we will lump private and subsidiary targets as “private” targets).¹⁴ To the best of our knowledge, this is one of the largest samples to study shareholder approval in M&As.

B. Sample overview

Table 2 presents the sample distribution by year. Panel A is based on the full sample of 5,233 stock deals. We see a large merger wave around the time of the Internet bubble, a smaller wave in the period leading to the 2007-2008 financial crisis, and declining M&A activities afterwards. Slightly over a quarter of the sample (26%) requires acquirer shareholder approval.

Panel B separates the sample by methods of payment: all-stock versus mixed payment. We first note that over the sample period, the decline in all-stock deals is far more drastic than the decline in mixed-payment deals. One possible explanation is rising cash holdings by U.S. firms as documented by Bates, Kahle, and Stulz (2009). As a result, acquirers are far more likely to use cash as part of or the entire payment in more recent years. We further show that about half the sample (51%) use all-stock payment. Finally, among deals using all-stock payment, one-third of those deals (33%) require acquirer shareholder approval; in contrast, among deals using mixed payment, less than one-fifth of those deals (18%) require acquirer shareholder approval.

Table 3 Panel A presents summary statistics for the all-stock sample. All variables are defined in Appendix A. All continuous variables are winsorized at the 1st and 99th percentiles. We note that the acquirer three-day announcement return, CAR3, has a mean of 0.5% and a median of -0.2%. Not surprisingly, the mean/median M/B ratio for all-stock acquirers is 10.4/3.4, much higher than an average firm in the Compustat population. The mean/median leverage ratio

¹⁴ Over half of the sample (55%) involves private target firms, and about a tenth of the sample (11%) involves subsidiary target firms.

is 10.7%/3.5%, and the mean/median cash holdings ratio is 15.7%/8.1%. The former (latter) is much lower (higher) than comparable values for the Compustat population. The mean/median size of all-stock acquirers, in terms of book value of total assets is \$5.3 billion/\$355 million (in 1995 dollars), representing the 9th/6th decile among the Compustat population. In terms of deal characteristics, about a third of all-stock deals are diversifying with acquirers and targets from different industries (as measured by two-digit SIC codes). The mean/median relative size ratio is 0.51/0.13, suggesting that using all-stock payment allows acquirers to buy relatively large targets. Finally, 57% of the deals involve private targets, suggesting that all-stock payment is relatively more frequently used to buy private targets.

Panel B presents summary statistics for the two subsamples of all-stock deals partitioned by the requirement of acquirer shareholder approval or not. We find that except for acquirer announcement returns (in means), M/B (in means), and the frequency of tender offers, the two subsamples are statistically significantly different from each other. It is worth noting that when using the Wilcoxon test, we show that acquirer announcement returns for the subsample requiring shareholder approval are significantly lower than those for the subsample without requiring shareholder approval, suggesting a negative correlation between the requirement of shareholder approval and acquirer announcement returns. Overall, these summary statistics show systematic differences between the two subsamples of all-stock deals.

Panel C presents the correlation matrix for the all-stock deal sample. None of the correlations warrants any concern for multicollinearity.

IV. The Effect of Shareholder Approval on M&As

The challenge faced by many empirical studies is the endogeneity of a firm’s governance structure. In our setting, the requirement of acquirer shareholder approval might be correlated with unobservable firm and deal characteristics that also drive acquirer announcement returns, leading to a spurious association between shareholder approval and acquirer announcement returns. Our identification strategy relies on listing rules of the NYSE, AMEX, and NASDAQ that shareholder approval is required when an acquirer intends to issue more than 20% new shares to finance a deal. The discrete nature of the requirement for shareholder approval generates a potentially exogenous source of variation in the distance to the 20% threshold that can be used to estimate the effect of shareholder approval on deal quality. This regression discontinuity design provides a clean causal estimate of the effect.¹⁵

A. Methodology

In general, RD designs can be used to evaluate causal effects of interventions, where assignment to the intervention is determined by the value of an observed variable exceeding a known threshold. In our setting, the running variable is the percent of new shares that an acquirer intends to issue to finance a deal, and the observable threshold, c , is 20%, that leads to the requirement of shareholder approval as per exchange listing rules (i.e., the treatment).

Specifically, the sharp RD analysis is specified as follows:

$$Shareholder\ approval = \begin{cases} 1 & \text{if the running variable} \geq c \\ 0 & \text{if the running variable} < c \end{cases} \quad (1)$$

We then fit linear regression functions to observations within a distance h (i.e., the bandwidth) on either side of the threshold (Imbens and Lemieux (2008)):

¹⁵ A partial list of recent studies using this technique to examine various corporate decisions includes Chava and Roberts (2008), Nini, Smith, and Sufi (2009), Roberts and Sufi (2009), Cuñat, Gine, and Guadalupe (2012, 2015), Bach and Metzger (2015), Boone and White (2015), and Focke, Maug, and Niessen-Ruenzi (2016).

$$\min_{\alpha_l: \beta_l} = \sum_{i: c-h < x_i < c} (Y_i - \alpha_l - \beta_l(X_i - c))^2,$$

and

$$\min_{\alpha_r: \beta_r} = \sum_{i: c \leq x_i < c+h} (Y_i - \alpha_r - \beta_r(X_i - c))^2. \quad (2)$$

The regression function on the left side of the threshold is estimated as

$$\widehat{\mu}_l(c) = \hat{\alpha}_l + \hat{\beta}_l \cdot (c - c) = \hat{\alpha}_l, \quad (3)$$

and the regression function on the right side of the threshold is estimated as

$$\widehat{\mu}_r(c) = \hat{\alpha}_r + \hat{\beta}_r \cdot (c - c) = \hat{\alpha}_r. \quad (4)$$

Given these estimates, the average treatment effect is estimated as

$$\hat{t}_{RD} = \hat{\alpha}_r - \hat{\alpha}_l. \quad (5)$$

B. Testing for a quasi-random assignment

The key assumption of valid RD designs is that agents cannot *precisely* manipulate the “running variable.” If acquirer management—even while having *some* influence—is unable to *precisely* manipulate the running variable, consequently, the variation in treatment—the requirement of shareholder approval—near the 20% threshold is *randomized* as though from a *randomized* experiment. Given that acquirer management does have some control over methods of payment—all-stock, all-cash, or a combination of stock and cash payment—and in the last case, over the fraction of payment in stock, we need to establish that the identification assumption of RD designs is met in the sample of all-stock deals.

In all-stock deals, the running variable is determined by the target’s intrinsic market value, the offer premium, and the acquirer’s market value. There are a number of exchange rules and (unforeseen) circumstances associated with M&As that prevent *precise* manipulation: 1) the NYSE clearly states, “The issuance of shares from treasury is considered an issuance of shares

for purposes of Section 312.03” and hence is counted as part of the new shares to be issued for shareholder approval, preventing acquirer management to use treasury shares to bypass shareholder approval (see Appendix IA1 in the Internet Appendix); 2) the final purchase price is an outcome of bargaining (Ahern (2012)); and 3) fairness opinions sought by targets (and sometimes by acquirers) also affect the final purchase price (Kisgen, Qian, and Song (2009)).¹⁶

Figure 2 plots the frequency distribution of the running variable for the full sample of stock deals (5,223 deals, Panel A), the sample of mixed-payment deals (2,535, Panel B), and the sample of all-stock deals (2,688 deals, Panel C). Visual inspection of the histograms suggests some evidence of manipulation by acquirers at the 20% threshold in the full sample and the sample of mixed-payment deals. We further test the null hypothesis that there is no discontinuity in the density function of the running variable at the 20% threshold (McCrary (2008)). The test rejects the null hypothesis for the full sample ($Z\text{-stat} = -6.1$, $p\text{-value} < 0.01$), for the sample of mixed-payment deals ($Z\text{-stat} = -7.4$, $p\text{-value} < 0.01$), while fails to reject the null hypothesis for the sample of all-stock deals ($Z\text{-stat} = -0.09$; $p\text{-value} = 0.47$).¹⁷ We conclude that RD designs are valid for the sample of all-stock deals which we use in the rest of the analyses.^{18, 19}

¹⁶ Fairness opinion is provided, typically one or two days prior to the public announcement of the deal, to certify the consideration (i.e., the offer price) that is determined during the merger negotiation process. See Appendix IA3 for an example.

¹⁷ The fact that the McCrary (2008) test rejects the null hypothesis for the sample of mixed-payment deals and fails to reject it for the all-stock sample suggests that it is not a power issue for the difference in test results as both samples have a similar sample size.

¹⁸ Another validity test for the RD design is to examine whether observed baseline firm and deal characteristics are “locally” balanced on either side of the threshold (Lee and Lemieux (2010), and Roberts and Whited (2013)). Appendix IA5 reports the balancing tests for baseline firm and deal characteristics. It is evident that that none of these variables exhibits any sharp discontinuity at the 20% threshold.

¹⁹ The takeover battle between Kraft and U.K.-based Cadbury is illustrative of our sample formation criteria (noting that this particular deal is not in our sample as the target firm is not U.S.-based). On September 7th, 2009, Kraft launched a takeover bid for Cadbury with both cash and stock. The announcement period return for Kraft (CAR3) was -7.2%. Kraft is listed on the NYSE and subject to the 20% rule. Warren Buffett, Kraft’s single largest shareholder, with a 9.4% stake, opposed the deal. Kraft revised its initial bid by increasing the cash portion and lowering the share portion to avoid the requirement for shareholder approval. The case highlights two points in our sample formation process: 1) we only focus on all-stock deals; and 2) had the case been in our sample, deal quality would have been captured by CAR3 around the initial bid announcement on September 7th, 2009.

C. Main results

We start our main analyses with some plots of local sample means (i.e., the dots in the graph) of acquirer CAR3 using non-overlapping evenly spaced bins on each side of the 20% threshold in Figure 3. The solid lines are smoothed regression lines based on quadratic polynomial (Panel A) and local linear (Panel B) models estimated separately on the two sides of the 20% threshold, and there are twenty bins on each side with bin width equal to 1%. The plots show a striking discontinuous jump in acquirer CAR3, right at the 20% threshold: The acquirers that intend to issue just above (below) the 20% threshold have a mean CAR3 of 4.9% (0.20%).²⁰

Table 4 Panel A provides summary statistics for the sample employed in the RD analysis based on the optimal bandwidth of Imbens and Kalyanaraman (IK, 2011).²¹ The mean acquirer CAR3 is 1.1%, the median is -0.1%, and the 10th and 90th percentiles are -8.8% and 11.2%, respectively. The mean/median market capitalization of acquirers is \$3.3 billion /\$433 million.

Panel B presents RD estimates of the treatment effect using local linear regression models on both sides of the threshold with a triangular kernel and for different bandwidths.²² The average treatment effect is positive and significant and ranges from 4.3% to 6.9%, depending on the bandwidth used.²³ Cuñat, Gine, and Guadalupe (2012) find that adopting a governance

²⁰ There are 47 observations in the bin with share issuance just below 20% (i.e., the running variable is between 18.98% and 19.98%), and there are 20 observations in the bin with share issuance just above 20% (i.e., the running variable is between 20% and 20.99%).

²¹ Based on the IK bandwidth of approximately 15%, 974 deals are used as the control group, and 276 deals are used as the treatment group, roughly half of the all-stock sample. Based on the fixed bandwidth of 6%/8%/10%, 360/502/679 deals are used in estimation. For comparison, the “Discontinuity Sample” in Chava and Roberts (2008) is about 40% of their full sample.

²² The triangular kernel assigns more weights to deals closer to the threshold and less weights to deals further away from the threshold. It is worth noting that the positive treatment effect remains if we employ a rectangular kernel (untabulated).

²³ Since stock prices are forward looking, the treatment effect could also incorporate the likelihood of deal completion. In unreported analyses, we compare the likelihood of deal completion in the two subsamples (the two adjacent bins used in our estimation) and find no significant difference.

proposal increases shareholder value by 2.8%. Holderness (2016) shows the increase in firm value associated with shareholder approval compared with unilateral issuances by management to be 4.2%. Our numbers are roughly consistent with theirs. These price increases are economically meaningful. For example, using the IK bandwidth, a 4.3% price increase around the merger announcement, for an average acquirer with a market capitalization of \$3.3 billion, translates into value creation of \$140 million for acquirer shareholders.²⁴

To gain further insight into RD designs, we next run OLS regressions on the indicator variable *Shareholder approval* and firm and deal controls using different subsamples (Chava and Roberts (2008), Cuñat, Gine, and Guadalupe (2012), and Krishnan, Nandy, and Puri (2015)). Panel C presents the results.

Column (1) presents the results from the OLS regression using a sample of deals in which the running variable falls within the band of [17.5%, 22.5%] centered at the threshold. The coefficient on *Shareholder approval* is positive and significant at 0.040, suggesting that shareholder approval is associated with an increase in acquirer announcement returns by 4%. Column (2) presents the regression results using a sample of deals in which the running variable falls within the band of [15%, 25%] centered at the threshold. The coefficient on *Shareholder approval* is positive and significant at 0.037, with a smaller standard error than that in column (1). As the band grows, more and more deals in which the running variable is farther away from the 20% threshold are included in the estimation, the effect of shareholder approval becomes smaller. The effect disappears in column (4) when all-stock deals with less than 40% of shares issued are included. These results highlight the importance of using the RD design to uncover the causal effect of shareholder approval on acquirer announcement returns. These results also help reconcile with prior findings of no significant value

²⁴ Note that our RD estimate of the treatment effect does not capture the selection effect whereby prospect acquirers with bad deals choose not to do them because they worry about being voted down by shareholders.

effect of shareholder approval – these studies do not properly account for the sharp discontinuity around the 20% threshold; instead, they employ the full sample of stock deals giving equal weight to every deal observation which differs more and more as the running variable takes a value further away from the threshold (see, for example, Hsieh and Wang (2008) and Kamar (2011)).

We conduct a number of robustness checks on our main findings and Table 5 presents the results. Panel A presents RD estimates of the treatment effect using quadratic polynomial models on both sides of the threshold. Panel B presents RD estimates of the treatment effect using the residuals from regressing acquirer CAR3 on the baseline firm and deal characteristics as the new outcome variable (Lee (2008), and Lee and Lemieux (2010)). In both cases, we show significant positive treatment effects.

To ensure that the estimated treatment effect is indeed due to exchange listing rules of the 20% threshold rather than a coincidental discontinuity or discontinuity in unobservables, we conduct falsification tests in Panels C and D using other thresholds than the true threshold (Lee and Lemieux (2010) and Roberts and Whited (2013)). We show that the treatment effects associated with alternative thresholds are indistinguishable from zero.

In summary, Tables 4 and 5 provide strong evidence in support of our first hypothesis (H1) that shareholder approval in M&As is value enhancing.

D. The treatment effect away from the threshold

The RD design provides estimates of a causal effect with a cost, i.e., the RD estimator is *local*—its estimate of the treatment effect only applies to acquirers whose percent of new shares to be issued within a narrow band around the 20% threshold. Very often, we would like to know the treatment effect away from the 20% threshold. In this section, we employ a new technique

developed by Angrist and Rokkanen (2015) that allows us to generalize the RD estimate and hence the treatment effect.

The method relies upon identifying a set of control variables that constitute a kind of sufficient statistic for the running variable in a window wider than the optimal bandwidth used in the RD estimator—the conditional independence assumption whereby once we condition on the set of control variables, the potential outcomes are mean-independent of the running variable. In other words, by controlling for the set of covariates we break the correlation between the running variable and the outcome variable, ensuring that we can identify the missing counterfactual average of what would have happened to the treated observations in the absence of the treatment.

Table 6 Panel A reports tests of the conditional independence assumption when the dependent variable is acquirer CAR3. Columns (1) and (3) present the simple regression results where the only explanatory variable is the running variable when it is in the range of (0, 20%) and [20%, 40%], respectively. Columns (2) and (4) include additional control variables. We observe significant correlations between the running variable and the outcome variable for both subsamples. After including additional controls, the correlations are close to zero. The results in Panel A suggest that for acquirers whose running variable ranges between 0% and 40%, representing close to 80% of all-stock deals, the conditional independence assumption is met and hence the treatment effect can be generalized.

Panel B presents the generalized treatment effect. The dependent variable is acquirer CAR3, weighted by propensity scores estimated from a logit regression where the indicator variable *Shareholder approval* is regressed on the same set of control variables in Panel A columns (2) and (4). Specifically, after obtaining a propensity score p_i for each firm i based on the logit regression, we weight the outcome variable (i.e., acquirer CAR3) of a treated (i.e.,

Shareholder approval = 1) firm by $1/p$ and control (i.e., *Shareholder approval* = 0) firm by $1/(1 - p)$.

Column (1) presents the simple regression results where the only explanatory variable is the indicator variable *Shareholder approval*. Columns (2) and (3) include additional control variables and without and with industry and year fixed effects, respectively. We show that the treatment effect of shareholder approval on acquirer CAR3 remains, ranging between 4.9% and 8.2%.²⁵ We conclude that using the method of Angrist and Rokkanen (2015), the positive treatment effect of shareholder approval on acquirer CAR3 can be generalized to close to 80% of all-stock deals.

V. Heterogeneity in the Treatment Effect

So far, we have established that there is a positive and significant treatment effect of shareholder approval on acquirer price reaction at the merger announcement. In this section, we test our second hypothesis (H2) by exploring possible cross-sectional variations in this treatment effect.

A. Acquirer institutional ownership

We first examine whether the effect of shareholder approval differs in acquirers with different levels of institutional ownership. Table 7 Panel A presents summary statistics of institutional ownership and ownership by three types of institutional investors: transient, quasi-indexer, and dedicated investors (Bushee (2001)) as of the most recent quarter-end prior to the merger announcement. We find that the mean institutional ownership in all-stock acquirers is

²⁵ It is informative to compare the results here with those OLS regression results in Table 4 Panel C: With the same regression specification without propensity score weighting, simple OLS regressions do not capture the treatment effect, while the Angrist and Rokkanen (2015) method can after satisfying the conditional independence assumption.

about 50%, and increasing over time in our sample. Importantly, over time, quasi-indexers have gained greater presence, with their ownership increasing from 19% to 34% for an average acquirer. In contrast, over time, the ownership by transient and dedicated institutional investors has declined.

Panel B compares two subsamples of all-stock acquirers based on their institutional ownership. In the high institutional ownership subsample (i.e., institutional ownership above the sample median), we show a positive and economically significant treatment effect: Shareholder approval contributes to a 9% increase in acquirer value creation. In contrast, in the low institutional ownership subsample, we find no significant treatment effect of shareholder approval although the coefficient estimates are positive. These results are consistent with our second hypothesis that the value impact of shareholder approval is stronger in acquirers with greater institutional ownership.²⁶

Anecdotal evidence as well as a number of recent studies show that passively indexing institutional investors are quite active in various corporate matters (Boone and White (2015) and Appel, Gormley, and Keim (2016)).²⁷ Panel C reports the RD estimates for acquirers with high and low ownership by quasi-indexers. We show that acquirers with high quasi-indexer ownership experience a significant jump in their stock prices in the range of 8-10% around the

²⁶ These results also help rule out potential alternative explanations such as a signaling story. Under the signaling story, acquirers with high-quality deals hope to send a credible signal to the market by issuing more than 20% new shares so that shareholder approval is required; this signal would be costly for acquirers with low-quality deals to mimic. If signaling were the whole story behind our findings, we would have expected similar positive and significant treatment effects across acquirer subsamples sorted by institutional ownership. Instead, we show no significant treatment effect in the acquirer subsample with low institutional ownership, which begs the question why the signaling story only applies to a subset of the sample.

²⁷ F. William McNabb III, Chairman and CEO of the Vanguard funds, at Lazard's 2015 Director Event, states that "We're big, we don't make a lot of noise, and we're focused on the long term. ... That is precisely why we care so much about good governance."

merger announcement. In contrast, acquirers with low quasi-indexer ownership experience no significant jump around the merger announcement.

Overall, the above evidence supports our second hypothesis (H2) that the value effect of shareholder approval is concentrated among acquirers with a strong presence of institutional investors.

B. Information asymmetry regarding targets

We next examine whether the effect of shareholder approval differs in deals with different degrees of information opaqueness about target firms. Because information asymmetry may exacerbate any underlying agency problems in M&As by making it more difficult to detect, we expect that shareholder approval in deals involving opaque targets presents acquirer shareholders a much more valuable opportunity to access and analyze otherwise hard-to-obtain information and is expected to have a greater value impact than that in deals involving transparent ones.

We employ two different proxies for the degree of information asymmetry regarding targets. The first is target listing status. Private targets have less available information and greater valuation uncertainty than their public counterparts due to lack of public filings, little media coverage, and no alternative valuation metrics such as stock prices, analyst forecasts, and management guidance. The second proxy is analyst coverage. Firms with low analyst coverage have less firm-specific information available to the market (Hong, Lim, and Stein (2000)).

Table 7 Panel D presents the RD estimates for the subsamples of acquirers buying private targets and acquirers buying public targets. We show that the treatment effect of shareholder approval is large and statistically significant for acquirers buying private targets. For example, using the IK bandwidth, an 8% price increase indicates a value creation of \$400 million, given

that the average market value of acquirers buying private targets is \$5.0 billion (untabulated). In contrast, the treatment effect is small and statistically insignificant for acquirers buying public targets. Panel E presents the RD estimates for the subsample of acquirers buying low-coverage targets and for the subsample of acquirers buying high-coverage targets. We show that the treatment effect of shareholder approval is about 4% and statistically significant for acquirers buying low-coverage targets. In contrast, the treatment effect is small and statistically insignificant for acquirers buying high-coverage targets. Overall, the results highlight how shareholder approval can help mitigate investment distortions (i.e., corporate acquisitions) arising from information asymmetry.

In summary, Table 7 shows that the positive treatment effect is concentrated among acquirers with high institutional ownership and/or among acquirers buying opaque targets, consistent with our second hypothesis (H2).

VI. The Underlying Mechanisms

So far, we have shown that acquirer shareholder approval has a positive impact on firm value. In this section, we explore possible economic mechanisms behind our main findings.

A. Offer premium

A natural starting point is the idea that the requirement of shareholder approval might constrain acquirer management in the amount they can offer (Becht, Polo, and Rossi (2016)). Following Wang and Xie (2009), offer premium is computed as the difference between offer price and the target price one week prior to the merger announcement divided by the target price. By construction, this analysis is based on a sample of deals with public targets. Given our findings in Section V.B that the positive value effect mainly comes from acquirers buying low-

coverage public targets, we expect to see stronger results in acquirers buying low-coverage public targets.

Table 8 Panel A presents the RD estimates of the difference in offer premium separated by acquirers buying low-coverage targets and acquirers buying high-coverage targets. We show that the difference in offer premium between deals requiring shareholder approval and deals not requiring shareholder approval is large and significant when using the IK bandwidth in the sample of acquirers buying low-coverage targets. Specifically, using the IK bandwidth, the difference in offer premium is 16.7%. In contrast, there is no difference in offer premium between deals requiring shareholder approval and deals not requiring shareholder approval in the sample of acquirers buying high-coverage targets. These results provide suggestive evidence that one possible channel for acquirer shareholder approval to create value is to prevent acquirer management from overpaying targets.

B. Synergistic gains

Another possible channel that we explore is the idea that the requirement of shareholder approval commit acquirer management to conduct deals with greater synergistic gains. Following Bradley, Desai, and Kim (1988), we estimate synergistic gains as the weighted average of acquirer and target CAR3, weighted by their respective market capitalization 50 days prior to the merger announcement—combined CAR3.

Table 8 Panel B presents the RD estimates of the difference in combined CAR3 separated by acquirers buying low-coverage targets and acquirers buying high-coverage targets. We show that the difference in synergistic gains between deals requiring shareholder approval and deals not requiring shareholder approval is both statistically and economically significant in the sample of acquirers buying low-coverage targets. Specifically, using the IK bandwidth, the

difference in combined CAR3 is 5.5%. These results suggest that one possible channel for acquirer shareholder approval to create value is to commit acquirer management to seek targets with greater synergies.

C. The acquirer's bargaining position

The final channel we explore is the idea that acquirer management might use the requirement of shareholder approval to strengthen its bargaining position against target management. Following Ahern (2012), our measure of the acquirer's bargaining position is the difference in dollar gains between the acquirer and the target at the time of the merger announcement, divided by the sum of the acquirer's and the target's market capitalization 50 days prior to the announcement. The acquirer's / target's dollar gain is the acquirer's / target's CAR3 times its market capitalization two days prior to the merger announcement. This measure captures the acquirer management's bargaining position vis-à-vis the target management.

Table 8 Panel C presents the RD estimates of the difference in our measure of acquirer management's bargaining position separated by acquirers buying low-coverage targets and acquirers buying high-coverage targets. We show that the difference in our measure of acquirer management's bargaining position between deals requiring shareholder approval and deals not requiring shareholder approval is at least 6.8%, and is both statistically and economically significant only in the sample of acquirers buying low-coverage targets. These results suggest that another possible channel for acquirer shareholder approval to create value is to strengthen acquirer management's bargaining position vis-à-vis that of target management, resulting in the former to extract a bigger share of synergistic gains.

Taken together, results in Table 8 provide some suggestive evidence that shareholder approval adds value because it prevents acquisition management from overpayment, commits

acquirer management to seek deals with larger synergies, and strengthens acquirer management's bargaining position against that of targets.

VII. Post-merger performance

Our analyses thus far show that shareholder approval contributes to large positive acquirer announcement returns. Other indicators of deal performance are measures of post-merger operating performance. In Section V.A, we show that shareholder approval only has a large positive value effect in acquirers with high institutional ownership, especially high quasi-indexer ownership. Prior work has also shown that these institutional investors tend to stay long-term to improve long-run performance (see, for example, Appel, Gormley, and Keim (2016)). We thus expect significant improvement in post-merger long-run performance of acquirers with high institutional (quasi-indexer) ownership.

To test this conjecture, we use post-merger performance measures as suggested by Heron and Lie (2002) and Boone and Mulherin (2008): return on assets (ROA) and operating margin. These measures help assess long-run performance implications of shareholder approval.

Table 9 presents the results. We show that for both measures of operating performance (for ROA), we observe significant positive treatment effects only among acquirers with high quasi-indexer ownership (high institutional ownership).²⁸ For example, ROA three years after the merger is 8.5% higher for the treatment group than the control group when acquirers have high quasi-indexer ownership (using the IK bandwidth). In contrast, there are no statistically significant positive jumps for acquirers with low quasi-indexer ownership. Balachandran, Joos, and Weber (2012) show that firms that adopt equity-based compensation plans with shareholder

²⁸ In untabulated analyses, we find no abnormal long-run returns for deals that require shareholder approval, as acquirer price reaction at the merger announcement has incorporated future return performance improvement.

approval have, on average, better long-run performance than firms that do not. They interpret this finding to be consistent with the view that shareholder control reduces agency costs and improves the efficiency of stock option plans. Our findings are consistent with their interpretation.

Overall, the results in Table 9 corroborate the announcement return analysis as well as prior work, highlighting that the positive value effect of shareholder approval is only present in acquirers with a strong presence of institutional investors, particularly quasi-indexers.²⁹

VIII. Conclusions

This paper provides one of the first large sample studies documenting a positive causal effect of shareholder approval in corporate decision making. Our identification strategy relies on listing rules of the NYSE, AMEX, and NASDAQ that shareholder approval is required when an acquirer intends to issue more than 20% new shares to finance a deal. We examine acquirer price reaction to deals that intend to issue either above or below the 20% threshold by a small margin. This regression discontinuity design provides a clean causal estimate of the effect of shareholder approval on M&As.

Using a hand-collected sample of U.S. M&A deals that involve all-stock payment over the period 1995-2015, we find a large and significant 4.3% jump in acquirer announcement returns at the 20% threshold, corresponding to value creation of \$140 million for an average acquirer in our sample. We further show that this positive value effect is concentrated among acquirers with high institutional ownership, particularly high quasi-indexer ownership, and

²⁹ In untabulated analyses, we implement balancing tests on these performance measures in the year prior to the merger announcement to make sure that our findings are not driven by differences in performance before the merger. We find no significant discontinuities in these pre-merger performance measures around the 20% threshold, suggesting that these acquirers have similar performance before the merger.

among acquirers buying opaque targets such as private targets and targets with low analyst coverage. We provide some suggestive evidence on the underlying economic mechanisms behind this positive value effect: The requirement of shareholder approval commits acquirer management to seek deals with larger synergies and strengthens acquirers' bargaining position against targets. Finally, we show that shareholder approval leads to better post-merger operating performance in acquirers with high institutional (quasi-indexer) ownership. We conclude that the requirement of shareholder approval is effective in addressing agency problems.

Our findings have important implications for securities regulators, stock exchanges, and investing public. The 20% rule for listed firms was first introduced in 1955 by the NYSE, in 1968 by the AMEX, and in 1985 by the NASDAQ to improve corporate governance practices (Karmel (2001)). In November 2015, the NASDAQ requested comments on the 20% rule, specifically whether it is too restrictive and whether the percentage should be higher (i.e., 25%). Institutional investors such as the California Public Employees' Retirement System—the largest public pension fund in U.S. are in firm support of *status quo* and argue that any weakening of the NASDAQ's 20% rule is inconsistent with its goal of preserving and strengthening the quality of its market to protect investors.³⁰ Our findings in this paper as well as the U.K. evidence provided in Becht, Polo, and Rossi (2016) and worldwide evidence in Iliev, Lins, Miller, and Roth (2015) and Holderness (2016) suggest that this listing requirement indeed achieves its intended effect - It empowers shareholders and leads to value-enhancing corporate decisions.

³⁰ <https://www.calpers.ca.gov/docs/2016-02-15-shareholder-approval-rules.pdf>.

Appendix A. Variable definitions

All Compustat firm characteristics are measured as of the fiscal year-end before the merger announcement, and all continuous variables are winsorized at the 1st and 99th percentiles. All dollar values are in 1995 dollars.

Variable	Definition
Shareholder approval	An indicator variable that takes a value of one if an acquirer plans to issue 20% or more new equity to finance the deal, and zero otherwise.
Percent of shares to be issued	The ratio of the number of shares an acquirer intends to issue divided by its total number of shares outstanding.
CAR3	Abnormal percentage return in a three-day window surrounding the merger announcement using market-adjusted returns from the CRSP value-weighted index.
CAR3mkt	Abnormal percentage return in a three-day window surrounding the merger announcement using the pre-event window (-250, -11) to estimate the market model.
Market cap	The stock price 50 days prior to the merger announcement (i.e., day -50) times the number of shares outstanding.
M/B	Market value of equity divided by book value of equity.
Leverage	Book value of debt divided by book value of assets.
Cash	Cash holdings divided by book value of assets.
Deal value	Deal value of the transaction as reported by SDC.
Relative size	Deal value dividend by the acquirer's book value of assets.
Diversifying	An indicator variable that takes a value of one if the acquirer is not from the same two-digit SIC industry as the target firm, and zero otherwise.
Tender offer	An indicator variable that takes a value of one if SDC reports the deal is a tender offer, and zero otherwise.
Public target	An indicator variable that takes a value of one if target public status reported by SDC is 'Public,' and zero otherwise.
Private target	An indicator variable that takes a value of one if target public status reported by SDC is either 'Private' or 'Subsidiary,' and zero otherwise.
Institutional ownership	Percentage of institutional ownership reported in 13F, measured at the most recent quarter-end prior to the merger announcement.
Transient ownership	Percentage of shares owned by institutional investors classified as transient investors with high turnover and highly diversified portfolios (Bushee (2001)).
Quasi-indexer ownership	Percentage of shares owned by institutional investors classified as quasi-indexers with low turnover and highly diversified portfolios (Bushee (2001)).
Dedicated ownership	Percentage of shares owned by institutional investors classified as dedicated investors with low turnover and less diversified portfolios (Bushee (2001)).
Return on assets (ROA)	Net income divided by total assets.
Operating margin	Operating cash flow divided by total assets.
Analyst coverage	The number of analysts following a firm as reported by the Institutional Brokers Estimate System (I/B/E/S) one month prior to the merger announcement.
Offer premium	The difference between offer price and the target price one week prior to the merger announcement divided by the target price.
Combined CAR3	Weighted average of the acquirer's CAR3 and the target's CAR3 with the weight being their respective market capitalization 50 days prior to the merger announcement (i.e., day -50) (Bradley, Desai, and Kim (1988)).
Acquirer's bargaining position	The difference in dollar gains between the acquirer and the target, divided by the sum of the acquirer's and the target's market capitalization 50 days prior to the merger announcement. The acquirer's (target's) dollar gain is the acquirer's (target's) CAR3 times its market capitalization two days prior to the merger announcement (i.e., day -2) (Ahern (2012)).

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Figure 1. The timeline of a typical U.S. merger deal

This figure illustrates the important stages involved in a U.S. merger deal before its public announcement.

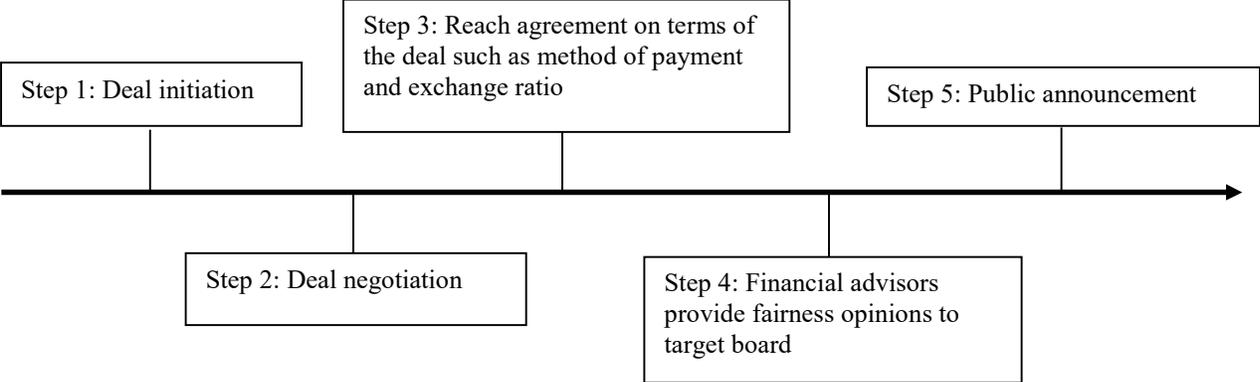
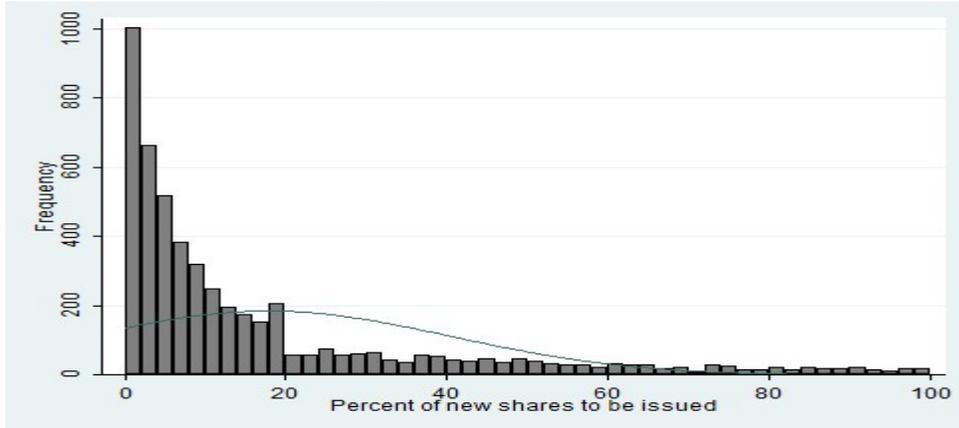


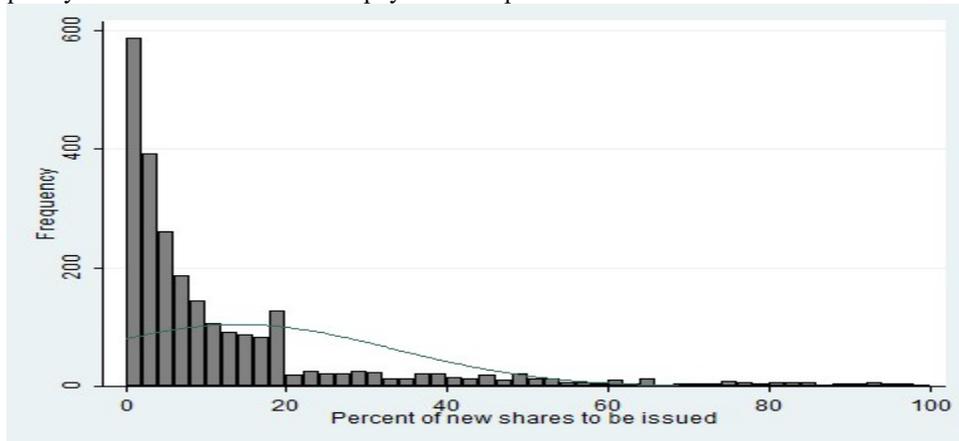
Figure 2. Frequency distribution of the running variable

This figure presents the frequency distribution of the running variable for different samples. The line in each graph represents the density distribution of the running variable. Panel A plots the full sample of 5,223 stock deals between 1995 and 2015 from the Thomson One Banker SDC database. Panel B plots the subsample of 2,535 deals involving mixed payment. Panel C plots the subsample of 2,688 deals involving all-stock payment.

Panel A: Frequency distribution for the full sample of stock deals



Panel B: Frequency distribution for the mixed-payment sample



Panel C: Frequency distribution for the all-stock sample

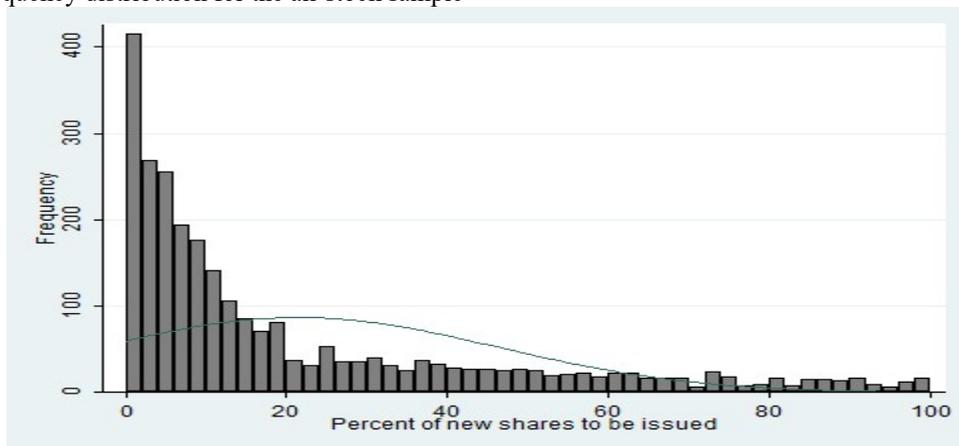
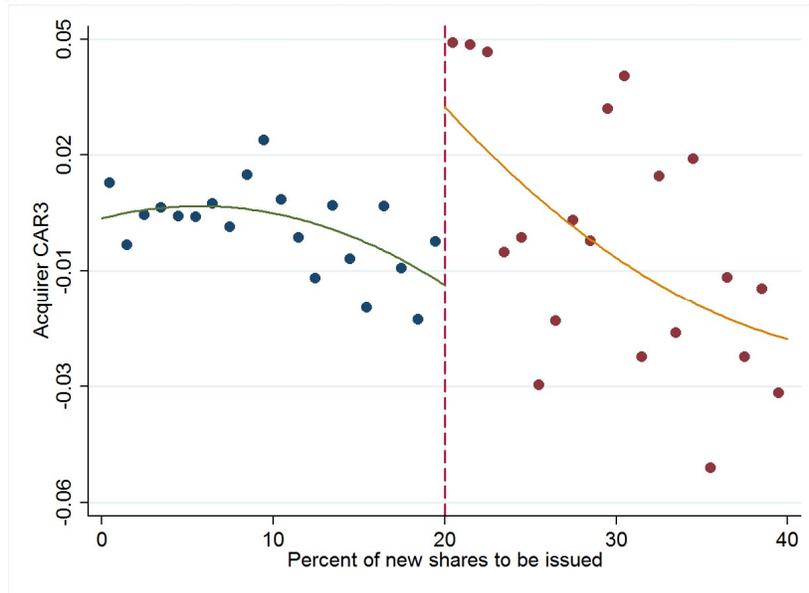


Figure 3. Acquirer announcement returns around the 20% threshold

This figure presents a plot of local sample means (i.e., the dots in the graph) of acquirer CAR3 using non-overlapping evenly spaced bins on each side of the 20% threshold (# bins = 20). The lines are smoothed regression lines estimated separately on the two sides of the 20% threshold. Panel A presents the regression lines based on quadratic polynomial models. Panel B presents the regression lines based on local linear models.

Panel A. Quadratic fit



Panel B. Local linear fit

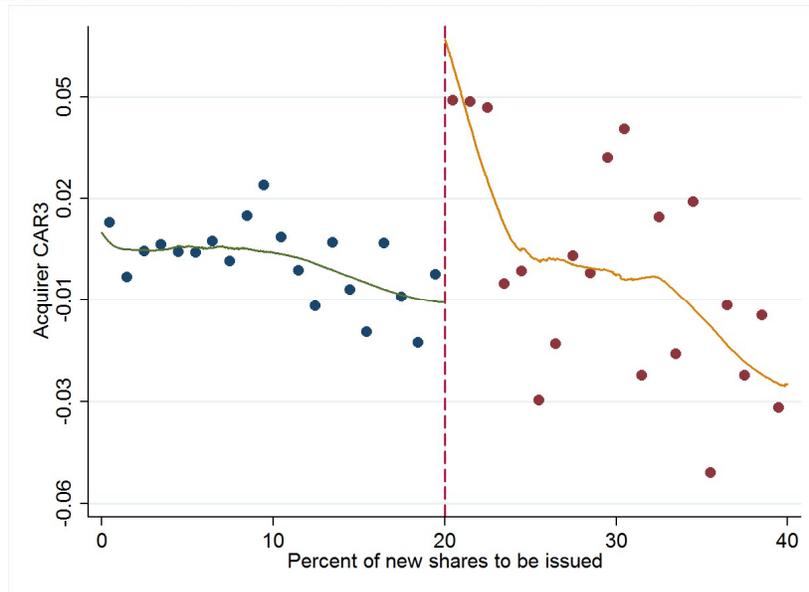


Table 1. Sample formation

This table provides steps taken to form the full sample of stock deals announced between 1995 to 2015.

Sample filters	# of deals
Date Announced: 01/01/1995 to 12/31/2015 & Form of the Deal: AA, AM, M	184,503
Acquirer Public Status: P	84,488
Percent of Shares Held at Announcement: less than 50%	84,458
Percent of Shares Acquirer is Seeking to Own after Transaction: 100%	79,713
Target Public Status: V, P, S	79,326
Deal Value > \$ 1 Mil (in 1995 dollars) & Return Data on CRSP & Basic Accounting Data on Compustat	26,513
Relative size > 1%	21,866
Share issuance > 0	4,810
Exclude Limited Partnerships Traded on NYSE, AMEX, and NASDAQ	4,282
Add Back Deals with Stock Payment But Missing or Zero Share Issuance (1,230 deals)	5,512
Exclude Share Issuance >100%	5,337
Exclude 67 Deals That Issue Less than 20% But Shareholder Approval Required and 47 Deals That Issue More Than 20% But Shareholder Approval Not Required	5,223

Table 2. Sample distribution over time

The full sample consists of 5,223 stock deals announced between 1995 and 2015 from the Thomson One Banker SDC database. Panel A presents the temporal distribution for the full sample. Panel B presents the temporal distribution by methods of payment.

Panel A: Full sample

Year	# of deals	Require shareholder approval	Not require shareholder approval
1995	316	95	221
1996	493	130	363
1997	637	175	462
1998	627	156	471
1999	508	119	389
2000	499	116	383
2001	295	88	207
2002	184	40	144
2003	175	45	130
2004	194	49	145
2005	193	42	151
2006	162	37	125
2007	135	28	107
2008	112	28	84
2009	95	36	59
2010	83	19	64
2011	70	19	51
2012	91	25	66
2013	76	28	48
2014	150	49	101
2015	128	35	93
Total	5,223	1,359	3,864

Panel B: By methods of payment

Year	# of deals	All-stock payment		# of deals	Mixed payment	
		Require shareholder approval	Not require shareholder approval		Require shareholder approval	Not require shareholder approval
1995	237	78	159	79	17	62
1996	347	84	263	146	46	100
1997	407	132	275	230	43	187
1998	394	117	277	233	39	194
1999	339	79	260	169	40	129
2000	329	88	241	170	28	142
2001	144	56	88	151	32	119
2002	58	24	34	126	16	110

2003	67	26	41	108	19	89
2004	61	32	29	133	17	116
2005	50	22	28	143	20	123
2006	39	19	20	123	18	105
2007	31	16	15	104	12	92
2008	27	14	13	85	14	71
2009	28	19	9	67	17	50
2010	20	8	12	63	11	52
2011	16	9	7	54	10	44
2012	16	10	6	75	15	60
2013	19	15	4	57	13	44
2014	36	28	8	114	21	93
2015	23	16	7	105	19	86
Total	2,688	892	1,796	2,535	467	2,068

Table 3. Summary statistics

The sample consists of 2,688 all-stock deals announced between 1995 and 2015 from the Thomson One Banker SDC database. Panel A presents summary statistics for the all-stock sample. Panel B compares the subsample of 892 all-stock deals requiring shareholder approval (i.e., the running variable $\geq 20\%$) with the subsample of 1,796 all-stock deals without requiring shareholder approval (i.e., the running variable $< 20\%$). The last two columns present the tests of differences in means and medians between the two subsamples. Panel C presents the correlation matrix for the sample of all-stock deals. Definitions of all variables are provided in Appendix A. ***, **, * correspond to statistical significance at the 1, 5, and 10 percent levels, respectively.

Panel A: The all-stock sample

Variable	Mean	10 th percentile	Median	90 th percentile	Std Dev
CAR3	0.005	-0.100	-0.002	0.108	0.120
Total assets	5273.90	35.86	354.90	6947.27	36156.54
Market cap	6491.27	57.77	548.41	8946.21	29174.27
M/B	10.414	1.349	3.415	13.065	124.557
Leverage	0.107	0.000	0.035	0.320	0.158
Cash	0.157	0.013	0.081	0.409	0.182
Deal value	791.19	5.64	55.87	880.40	4933.76
Relative size	0.514	0.018	0.128	1.116	1.675
Diversifying	0.333	0	0	1	0.471
Tender offer	0.008	0	0	0	0.088
Public target	0.427	0	0	1	0.495
Private target	0.573	0	1	1	0.495

Panel B: Comparing all-stock deals with shareholder approval versus those without shareholder approval

Variable	Require shareholder approval (N = 892)			Not require shareholder approval (N = 1,796)			Test of difference	
	Mean (1)	Median (2)	Std Dev (3)	Mean (4)	Median (5)	Std Dev (6)	t-test (1) - (4)	Wilcoxon test (2) - (5)
CAR3	-0.001	-0.012	0.150	0.008	0.001	0.101	-0.009	-0.014***
Total assets	8222.84	376.66	53817.68	3809.28	340.38	22644.77	4413.56**	36.28
Market cap	3301.35	274.66	13558.53	8075.57	695.23	34282.35	-4774.22***	-420.576***
M/B	10.153	2.297	153.231	10.543	4.322	107.779	-0.389	-2.025***
Leverage	0.126	0.049	0.176	0.098	0.027	0.149	0.028***	0.022***
Cash	0.144	0.054	0.188	0.164	0.099	0.179	-0.020***	-0.045***
Deal value	1844.16	129.27	8227.18	268.22	37.22	1419.71	1575.936***	92.047***
Relative size	0.996	0.369	2.685	0.275	0.085	0.671	0.721***	0.284***
Diversifying	0.262	0	0.440	0.368	0	0.482	-0.106***	0***
Tender offer	0.004	0	0.067	0.009	0	0.097	-0.005	0
Public target	0.719	1	0.450	0.282	0	0.450	0.437***	1***
Private target	0.281	0	0.450	0.718	1	0.450	-0.437***	-1***

Panel C: Pearson correlation

	CAR3	Total assets	Market cap	M/B	Leverage	Cash	Deal value	Relative size	Diversifying	Tender offer	Public target
CAR3	1										
Total assets	-0.039**	1									
Market cap	-0.035*	0.280***	1								
M/B	0.079***	-0.007	0.007	1							
Leverage	-0.035*	0.012	-0.040**	0.042*	1						
Cash	0.009	-0.091***	-0.082***	0.012	-0.182***	1					
Deal value	-0.059***	0.425***	0.317***	0.002	0.042*	-0.068***	1				
Relative size	-0.036*	-0.033*	0.008	0.074***	-0.061***	0.183***	0.262***	1			
Diversifying	0.057***	0.009	0.084***	0.01	0.047**	-0.017	-0.017	-0.019	1		
Tender offer	-0.033*	-0.000	0.003	-0.004	0.024	-0.02	0.005	0	0.018	1	
Public target	-0.203***	0.138***	0.060***	-0.011	0.120***	-0.192***	0.163***	0.068***	-0.139***	0.103***	1

Table 4. Effects of shareholder approval on acquirer announcement returns

This table presents the effect of shareholder approval on acquirer announcement returns. The sample consists of 2,688 all-stock deals announced between 1995 and 2015 from the Thomson One Banker SDC database. Panel A presents the summary statistics for the sample used in the RD analysis based on the optimal bandwidth of Imbens and Kalyanaraman (IK, 2011). There are 974 deals to the left and 276 deals to the right of the 20% threshold. Panel B presents the treatment effect estimated by fitting a local linear regression using a triangular kernel to the left and right of the 20% threshold. The dependent variable is CAR3 and the market-model adjusted CAR3 (i.e., CAR3mkt). Panel C reports OLS regressions of CAR3 using different subsamples around the 20% threshold. For example, under column (1), acquirers with the running variable in the range of 17.5% to 22.5% are used in the regression. The heteroskedasticity-consistent standard errors (in parentheses) account for possible correlation within a firm cluster. All variables are defined in Appendix A. ***, **, * correspond to statistical significance at the 1, 5, and 10 percent levels, respectively.

Panel A: Summary statistics for the sample used in the RD analysis

Variable	Mean	10 th percentile	Median	90 th percentile	Std Dev
CAR3	0.011	-0.088	-0.001	0.112	0.129
Total assets	4926.20	32.19	357.33	6088.31	28872.88
Market cap	3255.89	54.45	432.72	5245.48	17913.30
M/B	13.294	1.402	3.132	11.389	180.193
Leverage	0.078	0.000	0.030	0.233	0.102
Cash	0.150	0.013	0.066	0.410	0.183
Deal value	456.36	7.48	55.95	704.09	2292.57
Relative size	0.462	0.017	0.157	1.058	0.984
Diversifying	0.306	0	0	1	0.461
Tender offer	0.011	0	0	0	0.105
Public target	0.442	0	0	1	0.497
Private target	0.558	0	1	1	0.497

Panel B: RD analysis using local linear regressions

Variable	Coef.	Std. Err.	z	P value	Bandwidth
CAR3	0.069**	0.032	2.144	0.032	+/- 6
CAR3	0.069**	0.028	2.461	0.014	+/- 8
CAR3	0.061**	0.025	2.460	0.014	+/- 10
CAR3	0.043**	0.019	2.270	0.023	IK (+/- 15.01)
CAR3mkt	0.046**	0.020	2.328	0.023	IK (+/- 14.22)

Panel C: OLS regressions using different subsamples

	(1) [17.5%, 22.5%]	(2) [15%, 25%]	(3) [10%, 30%]	(4) [0%, 40%]
Shareholder approval	0.040* (0.022)	0.037** (0.014)	0.019** (0.010)	0.009 (0.007)
Log(M/B)	0.030*** (0.010)	0.021** (0.010)	0.012 (0.009)	0.003 (0.004)
Leverage	0.129 (0.105)	-0.022 (0.070)	-0.067* (0.039)	-0.025 (0.017)
Cash	-0.083 (0.069)	-0.063 (0.047)	-0.089*** (0.032)	-0.018 (0.018)
Log(Deal value)	-0.002 (0.006)	-0.007* (0.004)	-0.006** (0.003)	-0.004** (0.001)
Relative size	-0.019 (0.018)	-0.007 (0.013)	0.003 (0.010)	0.008 (0.006)
Diversifying	0.022 (0.033)	0.015 (0.019)	0.009 (0.011)	0.006 (0.005)
Tender offer	-0.098 (0.061)	-0.062 (0.041)	-0.073*** (0.027)	-0.025 (0.021)
Public target	-0.044** (0.022)	-0.053*** (0.013)	-0.042*** (0.009)	-0.030*** (0.005)
Constant	0.072* (0.039)	-0.007 (0.033)	0.009 (0.025)	-0.050*** (0.012)
Industry FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
# of deals	141	287	671	2,130
R-squared	0.541	0.380	0.237	0.077

Table 5: Robustness checks

This table conducts a number of robustness checks on our main findings in Table 4. Panel A presents the treatment effect estimated by fitting a quadratic polynomial model using a triangular kernel to the left and right of the 20% threshold. Panel B presents the treatment effect using acquirer residual CAR3 which is obtained by regressing acquirer CAR3 on firm and deal characteristics (as in Equation (6)), and industry and year fixed effects. Panels C and D present the treatment effect using a pseudo threshold of 15% and 25% share issuance, respectively. All variables are defined in Appendix A. ***, **, * correspond to statistical significance at the 1, 5, and 10 percent levels, respectively.

Panel A: RD analysis using quadratic polynomial models

Variable	Coef.	Std. Err.	z	P value	Bandwidth
CAR3	0.068	0.050	1.379	0.168	+/- 6
CAR3	0.072*	0.042	1.725	0.085	+/- 8
CAR3	0.078**	0.036	2.140	0.033	+/- 10
CAR3	0.049**	0.021	2.372	0.018	IK (+/- 17.65)
CAR3mkt	0.048***	0.019	2.590	0.010	IK (+/- 17.56)

Panel B: RD analysis using local linear regressions: acquirer residual CAR3

Variable	Coef.	Std. Err.	z	P value	Bandwidth
CAR3	0.077***	0.030	2.595	0.009	+/- 6
CAR3	0.076***	0.026	2.976	0.003	+/- 8
CAR3	0.068***	0.023	3.033	0.002	+/- 10
CAR3	0.054***	0.018	2.996	0.003	IK (+/- 13.54)
CAR3mkt	0.056***	0.018	3.093	0.002	IK (+/- 13.32)

Panel C: The pseudo threshold is 15% of new shares to be issued

Variable	Coef.	Std. Err.	z	P value	Bandwidth
CAR3	-0.012	0.017	-0.712	0.477	+/- 6
CAR3	-0.014	0.016	-0.898	0.369	+/- 8
CAR3	-0.015	0.014	-1.098	0.272	+/- 10
CAR3	-0.010	0.012	-0.857	0.391	IK (+/- 13.71)
CAR3mkt	-0.011	0.012	-0.972	0.331	IK (+/- 14.39)

Panel D: The pseudo threshold is 25% of new shares to be issued

Variable	Coef.	Std. Err.	z	P value	Bandwidth
CAR3	-0.025	0.024	-1.064	0.287	+/- 6
CAR3	-0.031	0.021	-1.464	0.143	+/- 8
CAR3	-0.032	0.020	-1.608	0.108	+/- 10
CAR3	-0.008	0.012	-0.628	0.530	IK (+/- 19.53)
CAR3mkt	-0.013	0.011	-1.183	0.237	IK (+/- 19.94)

Table 6: The treatment effect away from the threshold

This table presents the effect of shareholder approval on acquirer announcement returns using the method from Angrist and Rokkanen (2015). The sample consists of 2,131 all-stock deals with the running variable in the range between 0 to 40%. Panel A reports tests of the conditional independence assumption where the dependent variable is acquirer CAR3. Panel B presents the generalized treatment effect where the dependent variable is acquirer CAR3, weighted by propensity scores estimated from a logit regression where the dependent variable is the indicator variable *Shareholder approval*, and the control variables are the same as those in Panel A columns (2) and (4). All variables are defined in Appendix A. Heteroskedasticity-consistent standard errors (in parentheses) are clustered at the acquirer level. ***, **, * correspond to statistical significance at the 1, 5, and 10 percent levels, respectively.

Panel A: Tests of the conditional independence assumption

	(0, 20%)		[20%, 40%]	
	(1)	(2)	(3)	(4)
Pct shares to be issued	-0.001*	-0.000	-0.003**	-0.002
	(0.000)	(0.000)	(0.002)	(0.001)
Log (M/B)		0.008***		0.006*
		(0.000)		(0.000)
Log(Deal value)		-0.002		-0.009*
		(0.002)		(0.005)
Diversifying		-0.000		0.059***
		(0.005)		(0.019)
Tender offer		-0.033		-0.004
		(0.025)		(0.111)
Public target		-0.024***		-0.088***
		(0.006)		(0.019)
Constant	0.014***	0.023***	0.110**	0.164***
	(0.004)	(0.006)	(0.046)	(0.048)
Observations	1,774	1,774	357	357
R-squared	0.002	0.027	0.013	0.151

Panel B: Treatment effects after propensity score weighting

	(1)	(2)	(3)
Shareholder approval	0.049***	0.081***	0.082***
	(0.018)	(0.018)	(0.019)
Log(M/B)		-0.001	-0.001
		(0.006)	(0.007)
Leverage		-0.034	-0.039
		(0.027)	(0.031)
Cash		-0.017	-0.006
		(0.028)	(0.031)
Log(Deal value)		-0.006**	-0.006**
		(0.002)	(0.003)
Relative size		0.014	0.013
		(0.011)	(0.011)

Diversifying		0.011	0.008
		(0.008)	(0.009)
Tender offer		-0.003	-0.012
		(0.032)	(0.036)
Public target		-0.084***	-0.082***
		(0.010)	(0.011)
Constant	0.007***	0.053***	-0.066***
	(0.003)	(0.011)	(0.022)
Industry FE	No	No	Yes
Year FE	No	No	Yes
# of deals	2,131	2,131	2,131
R-squared	0.012	0.086	0.118

Table 7: Heterogeneity in the treatment effect

This table presents the treatment effect for acquirers with different levels of institutional ownership and for targets with different degrees of information asymmetry. The sample consists of 2,688 all-stock deals announced between 1995 and 2015 from the Thomson One Banker SDC database. The dependent variable is acquirer CAR3. Panel A presents summary statistics of institutional ownership and ownership by types as classified by Bushee (2001). Panel B compares the treatment effect between acquirers with high institutional ownership (i.e., above the sample median) and acquirers with low institutional ownership (i.e., below the sample median). Panel C compares the treatment effect between acquirers with high ownership by quasi-indexers and acquirers with low ownership by quasi-indexers. Panel D compares acquirers with private targets and acquirers with public targets. Panel E compares acquirers with low-coverage (i.e., below the sample median) public targets and acquirers with high-coverage public targets. All variables are defined in Appendix A. ***, **, * correspond to statistical significance at the 1, 5, and 10 percent levels, respectively.

Panel A: Summary statistics of institutional ownership and ownership by type

	Institutional ownership		Transient ownership		Quasi-indexer ownership		Dedicated ownership	
	Mean	Median	Mean	Median	Mean	Median	Mean	Median
1995-1999	0.425	0.415	0.146	0.118	0.186	0.169	0.125	0.101
2000-2009	0.452	0.447	0.175	0.146	0.218	0.182	0.071	0.055
2010-2015	0.500	0.498	0.123	0.103	0.338	0.355	0.055	0.047

Panel B: Acquirers with high institutional ownership vs. acquirers with low institutional ownership

Variable	High institutional ownership				Low institutional ownership			
	Coef.	Std. Err.	Z	Bandwidth	Coef.	Std. Err.	Z	Bandwidth
CAR3	0.088*	0.046	1.893	+/- 6	0.056	0.064	0.868	+/- 6
CAR3	0.098**	0.043	2.293	+/- 8	0.043	0.051	0.845	+/- 8
CAR3	0.097**	0.039	2.506	+/- 10	0.028	0.043	0.644	+/- 10
CAR3	0.089***	0.034	2.641	IK (+/- 12.63)	0.018	0.024	0.739	IK (+/- 19.71)
CAR3mkt	0.083**	0.033	2.505	IK (+/- 13.01)	0.019	0.024	0.797	IK (+/- 19.15)

Panel C: Acquirers with high quasi-indexer ownership vs. acquirers with low quasi-indexer ownership

Variable	High quasi-indexer ownership				Low quasi-indexer ownership			
	Coef.	Std. Err.	Z	Bandwidth	Coef.	Std. Err.	Z	Bandwidth
CAR3	0.079*	0.045	1.758	+/- 6	0.074	0.069	1.077	+/- 6
CAR3	0.097**	0.040	2.402	+/- 8	0.053	0.057	0.924	+/- 8
CAR3	0.101***	0.036	2.839	+/- 10	0.032	0.049	0.639	+/- 10
CAR3	0.086***	0.028	3.124	IK (+/- 14.63)	0.008	0.028	0.272	IK (+/- 19.85)
CAR3mkt	0.088***	0.029	2.975	IK (+/- 14.12)	0.008	0.027	0.297	IK (+/- 19.82)

Panel D: Acquirers with private targets vs. acquirers with public targets

Variable	Private targets				Public targets			
	Coef.	Std. Err.	Z	Bandwidth	Coef.	Std. Err.	Z	Bandwidth
CAR3	0.154***	0.053	2.928	+/- 6	0.006	0.032	0.180	+/- 6
CAR3	0.142***	0.046	3.114	+/- 8	0.018	0.028	0.650	+/- 8
CAR3	0.121***	0.040	3.025	+/- 10	0.023	0.025	0.927	+/- 10
CAR3	0.077***	0.026	2.911	IK (+/- 18.81)	0.017	0.016	1.103	IK (+/- 14.86)
CAR3mkt	0.080***	0.027	2.990	IK (+/- 17.65)	0.017	0.015	1.172	IK (+/- 14.78)

Panel E: Acquirers with low-coverage public targets vs. acquirers with high-coverage public targets

Variable	Low-coverage public targets				High-coverage public targets			
	Coef.	Std. Err.	Z	Bandwidth	Coef.	Std. Err.	Z	Bandwidth
CAR3	0.041	0.030	1.356	+/- 6	-0.003	0.061	-0.051	+/- 6
CAR3	0.052*	0.027	1.927	+/- 8	-0.000	0.055	-0.001	+/- 8
CAR3	0.052**	0.024	2.172	+/- 10	0.005	0.051	0.099	+/- 10
CAR3	0.039**	0.019	2.038	IK (+/- 14.53)	0.010	0.030	0.344	IK (+/- 14.62)
CAR3mkt	0.042**	0.019	2.216	IK (+/- 14.63)	0.005	0.028	0.189	IK (+/- 15.33)

Table 8: The underlying economic mechanisms

This table presents possible mechanisms behind the treatment effect of shareholder approval. The sample consists of 1,147 all-stock deals involving public target firms announced between 1995 and 2015 from the Thomson One Banker SDC database. Panel A presents the difference in offer premium. Panel B presents the difference in combined CAR3. Panel C presents the difference in an acquirer's bargaining position vis-à-vis its target. All variables are defined in Appendix A. ***, **, * correspond to statistical significance at the 1, 5, and 10 percent levels, respectively.

Panel A: Offer premium

Variable	Low-coverage public targets				High-coverage public targets			
	Coef.	Std. Err.	Z	Bandwidth	Coef.	Std. Err.	Z	Bandwidth
Deal premium	-16.949	19.244	-0.881	+/- 6	4.021	17.507	0.230	+/- 6
Deal premium	-17.775	15.080	-1.179	+/- 8	6.231	15.316	0.407	+/- 8
Deal premium	-18.369	13.161	-1.396	+/- 10	9.173	13.668	0.671	+/- 10
Deal premium	-16.700*	10.020	-1.667	IK (+/- 15.07)	12.169	10.723	1.135	IK (+/- 15.05)

Panel B: Combined CAR3

Variable	Low-coverage public targets				High-coverage public targets			
	Coef.	Std. Err.	Z	Bandwidth	Coef.	Std. Err.	Z	Bandwidth
Combined CAR3	0.058	0.046	1.267	+/- 6	0.007	0.066	0.102	+/- 6
Combined CAR3	0.077*	0.040	1.921	+/- 8	0.010	0.059	0.169	+/- 8
Combined CAR3	0.074**	0.036	2.057	+/- 10	0.017	0.054	0.309	+/- 10
Combined CAR3	0.055*	0.029	1.872	IK (+/- 16.69)	0.018	0.034	0.539	IK (+/- 14.76)
Combined CAR3mkt	0.060**	0.028	2.147	IK (+/- 16.29)	0.014	0.030	0.453	IK (+/- 16.14)

Panel C: The acquirer's bargaining position

Variable	Low-coverage public targets				High-coverage public targets			
	Coef.	Std. Err.	Z	Bandwidth	Coef.	Std. Err.	Z	Bandwidth
Bargaining	0.077*	0.046	1.665	+/- 6	0.024	0.060	0.402	+/- 6
Bargaining	0.094**	0.040	2.360	+/- 8	0.019	0.054	0.347	+/- 8
Bargaining	0.093***	0.036	2.610	+/- 10	0.016	0.049	0.333	+/- 10
Bargaining	0.068**	0.027	2.498	IK (+/- 14.91)	0.002	0.024	0.072	IK (+/- 14.47)
Bargaining_mkt	0.070***	0.025	2.769	IK (+/- 15.34)	-0.006	0.020	-0.284	IK (+/- 15.09)

Table 9. Acquirer post-merger operating performance

This table presents the treatment effect of shareholder approval on acquirer post-merger operating performance. The sample consists of 2,688 all-stock deals announced between 1995 and 2015 from the Thomson One Banker SDC database. Panel A presents the RD coefficients of acquirer ROA three years after the deal completion. Panel B presents the RD coefficients of acquirer operating margin three years after the deal completion. All variables are defined in Appendix A. ***, **, * correspond to statistical significance at the 1, 5, and 10 percent levels, respectively.

Panel A: ROA

Variable	High institutional ownership				Low institutional ownership			
	Coef.	Std. Err.	Z	Bandwidth	Coef.	Std. Err.	Z	Bandwidth
ROA	0.146	0.110	1.325	+/- 6	-0.023	0.083	-0.273	+/- 6
ROA	0.127	0.092	1.371	+/- 8	0.010	0.083	0.124	+/- 8
ROA	0.101	0.078	1.292	+/- 10	0.023	0.083	0.276	+/- 10
ROA	0.049	0.045	1.084	IK (+/- 14.48)	0.056	0.075	0.740	IK (+/- 18.15)
Variable	High quasi-indexer ownership				Low quasi-indexer ownership			
	Coef.	Std. Err.	Z	Bandwidth	Coef.	Std. Err.	Z	Bandwidth
ROA	0.172**	0.077	2.215	+/- 6	-0.012	0.095	-0.125	+/- 6
ROA	0.146**	0.068	2.161	+/- 8	0.034	0.097	0.354	+/- 8
ROA	0.120**	0.059	2.044	+/- 10	0.044	0.098	0.451	+/- 10
ROA	0.085*	0.046	1.840	IK (+/- 15.01)	0.069	0.081	0.855	IK (+/- 16.21)

Panel B: Operating margin

Variable	High institutional ownership				Low institutional ownership			
	Coef.	Std. Err.	Z	Bandwidth	Coef.	Std. Err.	Z	Bandwidth
Operating margin	0.094*	0.049	1.892	+/- 6	-0.090	0.091	-0.988	+/- 6
Operating margin	0.086**	0.044	1.968	+/- 8	-0.053	0.081	-0.656	+/- 8
Operating margin	0.071*	0.038	1.862	+/- 10	-0.042	0.072	-0.579	+/- 10
Operating margin	0.059*	0.033	1.782	IK (+/- 12.53)	-0.012	0.049	-0.244	IK (+/- 18.64)
Variable	High quasi-indexer ownership				Low quasi-indexer ownership			
	Coef.	Std. Err.	Z	Bandwidth	Coef.	Std. Err.	Z	Bandwidth
Operating margin	0.124***	0.044	2.816	+/- 6	-0.055	0.082	-0.672	+/- 6
Operating margin	0.106**	0.042	2.527	+/- 8	-0.025	0.073	-0.349	+/- 8
Operating margin	0.090**	0.038	2.377	+/- 10	-0.026	0.066	-0.402	+/- 10
Operating margin	0.082**	0.033	2.473	IK (+/- 13.78)	-0.014	0.042	-0.325	IK (+/- 19.67)

Internet Appendix for “Shareholder Approval in Mergers & Acquisitions”

Appendix IA1.

Exchange listing rules regarding shareholder approval

1. Shareholder approval policy from the NYSE Listed Company Manual

Section 312.00 Shareholder Approval Policy

312.03 Shareholder Approval

- (A) Shareholder approval is required for equity compensation plans.
- (B) Shareholder approval is required prior to the issuance of common stock, or of securities convertible into or exercisable for common stock, in any transaction or series of related transactions, to:
 - 1. a director, officer or substantial security holder of the company (each a Related Party);
 - 2. a subsidiary, affiliate or other closely-related person of a Related Party; or
 - 3. any company or entity in which a Related Party has a substantial direct or indirect interest;

If the number of shares of common stock to be issued, or if the number of shares of common stock into which the securities may be convertible or exercisable, exceeds either one percent of the number of shares of common stock or one percent of the voting power outstanding before the issuance.

However, if the Related Party involved in the transaction is classified as such solely because such person is a substantial security holder, and if the issuance relates to a sale of stock for cash at a price at least as great as each of the book and market value of the issuers common stock, then shareholder approval will not be required unless the number of shares of common stock to be issued, or unless the number of shares of common stock into which the securities may be convertible or exercisable, exceeds either five percent of the number of shares of common stock or five percent of the voting power outstanding before the issuance.

- (C) Shareholder approval is required prior to the issuance of common stock, or of securities convertible into or exercisable for common stock, in any transaction or series of related transactions if:
 - 1. the common stock has, or will have upon issuance, voting power equal to or in excess of 20 percent of the voting power outstanding before the issuance of such stock or of securities convertible into or exercisable for common stock; or
 - 2. the number of shares of common stock to be issued is, or will be upon issuance, equal to or in excess of 20 percent of the number of shares of common stock outstanding before the issuance of the common stock or of securities convertible into or exercisable for common stock.

However, shareholder approval will not be required for any such issuance involving:

- any public offering for cash;
- any bona fide private financing, if such financing involves a sale of:
 - common stock, for cash, at a price at least as great as each of the book and market value of the issuer’s common stock; or
 - securities convertible into or exercisable for common stock, for cash, if the conversion or exercise price is at least as great as each of the book and market value of the issuer’s common stock.

(D) Shareholder approval is required prior to an issuance that will result in a change of control of the issuer.

(E) Sections 312.03 (b), (c) and (d) shall not apply to issuances by limited partnerships.

Amended: December 31, 2015 (NYSE-2015-02).

312.04 For the Purpose of Section 312.03

For the purpose of Section 312.03:

- (A) Shareholder approval is required if any of the subparagraphs of Section 312.03 require such approval, notwithstanding the fact that the transaction does not require approval under one or more of the other subparagraphs.
- (B) Pursuant to Sections 312.03 (b) and (c), shareholder approval is required for the issuance of securities convertible into or exercisable for common stock if the stock that can be issued upon conversion or exercise exceeds the applicable percentages. This is the case even if such convertible or exchangeable securities are not to be listed on the Exchange.
- (C) The Exchange's policy regarding the need to apply to list common stock reserved for issuance on the conversion or the exercise of other securities is described in Section 703.07.
- (D) Only shares actually issued and outstanding (excluding treasury shares or shares held by a subsidiary) are to be used in making any calculation provided for in Sections 312.03 (b) and (c). Shares reserved for issuance upon conversion of securities or upon exercise of options or warrants will not be regarded as outstanding.
- (E) An interest consisting of less than either five percent of the number of shares of common stock or five percent of the voting power outstanding of a company or entity shall not be considered a substantial interest or cause the holder of such an interest to be regarded as a substantial security holder.
- (F) "Voting power outstanding" refers to the aggregate number of votes that may be cast by holders of those securities outstanding that entitle the holders thereof to vote generally on all matters submitted to the company's security holders for a vote.
- (G) "Bona fide private financing" refers to a sale in which either:
 1. a registered broker-dealer purchases the securities from the issuer with a view to the private sale of such securities to one or more purchasers; or
 2. the issuer sells the securities to multiple purchasers, and no one such purchaser, or group of related purchasers, acquires, or has the right to acquire upon exercise or conversion of the securities, more than five percent of the shares of the issuer's common stock or more than five percent of the issuer's voting power before the sale.
- (H) "Officer" has the same meaning as defined by the Securities and Exchange Commission in Rule 16a-1(f) under the Securities Exchange Act of 1934, or any successor rule.
- (I) "Market value" of the issuer's common stock means the official closing price on the Exchange as reported to the Consolidated Tape immediately preceding the entering into of a binding agreement to issue the securities. For example, if the transaction is entered into after the close of the regular session at 4:00 pm Eastern Standard Time on a Tuesday, then Tuesday's official closing price is used. If the transaction is entered into at any time between the close of the regular session on Monday and the close of the regular session on Tuesday, then Monday's official closing price is used. Please note that an average price over a period of time is not acceptable as "market value" for purposes of Section 312.03.
- (J) The issuance of shares from treasury is considered an issuance of shares for purposes of Section 312.03. (See Section 703.01, Part 1, of the Listed Company Manual regarding required notice to the Exchange of issuance of shares from treasury.)
- (K) "Early Stage Company" means a company that has not reported revenues greater than \$20 million in any two consecutive fiscal years since its incorporation and any Early Stage Company will lose that designation at any time after listing on the Exchange that it files an annual report with the SEC in which it reports two consecutive fiscal years in which it has revenues greater than \$20 million in each year.

Amended: December 31, 2015 (NYSE-2015-02).

312.05 Exceptions

Exceptions may be made to the shareholder approval policy in Para. 312.03 upon application to the Exchange when (1) the delay in securing stockholder approval would seriously jeopardize the financial viability of the enterprise and (2) reliance by the company on this exception is expressly approved by the Audit Committee of the Board.

A company relying on this exception must mail to all shareholders not later than 10 days before issuance of the securities a letter alerting them to its omission to seek the shareholder approval that would otherwise be required under the policy of the Exchange and indicating that the Audit Committee of the Board has expressly approved the exception.

2. Shareholder approval policy from the AMEX Company Guide

Section 712. Acquisitions

Approval of shareholders is required in accordance with §705 as a prerequisite to approval of applications to list additional shares to be issued as sole or partial consideration for an acquisition of the stock or assets of another company in the following circumstances:

- a. if any individual director, officer or substantial shareholder of the listed company has a 5% or greater interest (or such persons collectively have a 10% or greater interest), directly or indirectly, in the company or assets to be acquired or in the consideration to be paid in the transaction and the present or potential issuance of common stock, or securities convertible into common stock, could result in an increase in outstanding common shares of 5% or more; or
- b. where the present or potential issuance of common stock, or securities convertible into common stock, could result in an increase in outstanding common shares of 20% or more.

NOTE: A series of closely related transactions may be regarded as one transaction for the purpose of this policy. Companies engaged in merger or acquisition discussions must be particularly mindful of the Exchange's timely disclosure policies. In view of possible market sensitivity and the importance of providing investors with sufficient information relative to an intended merger or acquisition, listed company representatives are strongly urged to consult with the Exchange in advance of such disclosure.

Amended: November 25, 2002 (Amex-2002-87).

3. Shareholder approval policy from the NASDAQ Manual: Marketplace Rules

Section 4350 Qualitative Listing Requirements for NASDAQ National Market and NASDAQ SmallCap Market Issuers Except for Limited Partnerships.

(i) Shareholder Approval

(1) Each issuer shall require shareholder approval or prior to the issuance of securities under subparagraph (A), (B), (C), or (D) below:

...

(C) in connection with the acquisition of the stock or assets of another company if:

- (i) any director, officer or substantial shareholder of the issuer has a 5% or greater interest (or such persons collectively have a 10% or greater interest), directly or indirectly, in the company or assets to be acquired or in the consideration to be paid in the transaction or series of related transactions and the present or potential issuance of common stock, or securities convertible into or exercisable for common stock, could result in an increase in outstanding common shares or voting power of 5% or more; or
- (ii) where, due to the present or potential issuance of common stock, or securities convertible into or exercisable for common stock, other than a public offering for cash:

- a. the common stock has or will have upon issuance voting power equal to or in excess of 20% of the voting power outstanding before the issuance of stock or securities convertible into or exercisable for common stock; or
- b. the number of shares of common stock to be issued is or will be equal to or in excess of 20% of the number of shares or common stock outstanding before the issuance of the stock or securities; or

...

(2) Exceptions may be made upon application to Nasdaq when:

- (A) the delay in securing stockholder approval would seriously jeopardize the financial viability of the enterprise; and
- (B) reliance by the company on this exception is expressly approved by the audit committee or a comparable body of the board of directors.

A company relying on this exception must mail to all shareholders not later than ten days before issuance of the securities a letter alerting them to its omission to seek the shareholder approval that would otherwise be required and indicating that the audit committee or a comparable body of the board of directors has expressly approved the exception.

Amended: March 25, 2003.

Appendix IA2.
An example of joint proxy statement/prospectus

FORM S-4

NANOMETRICS INCORPORATED

1550 Buckeye Drive
Milpitas, California 95035

May 22, 2006

Dear Shareholder:

The boards of directors of Nanometrics Incorporated and Accent Optical Technologies, Inc. have unanimously approved the merger of Alloy Merger Corporation, a wholly owned subsidiary of Nanometrics, with and into Accent Optical pursuant to the terms and conditions of an agreement and plan of merger and reorganization, dated as of January 25, 2006, by and among Nanometrics, Alloy Merger Corporation, Accent Optical and Sanford S. Wadler, as Stockholder Agent. The maximum number of shares that Nanometrics would issue in connection with the merger and reserve for issuance upon the exercise of assumed options is approximately 5,212,940 shares of common stock, assuming that the average closing price of Nanometrics common stock for the 10 trading days ending the two consecutive trading days prior to the consummation of the merger is \$15.63, which would result in the Accent Optical stockholders holding approximately 27% of the fully diluted shares of Nanometrics common stock immediately after the merger, and Nanometrics shareholders holding approximately 73% of the fully diluted shares of Nanometrics common stock immediately after the merger. The actual number of Nanometrics shares to be issued in the merger depends on several factors. See the sections of the attached joint proxy statement/prospectus captioned "Summary Overview of Merger Agreement and Related Agreements Merger Consideration" beginning on page 12 and "The Merger Agreement Treatment of Securities" beginning on page 85 for a description of how the final number of shares will be determined. Nanometrics common stock trades on the Nasdaq National Market under the symbol "NANO."

Nanometrics and Accent Optical cannot complete the merger unless Nanometrics shareholders approve the issuance of shares of Nanometrics common stock in the merger and Accent Optical stockholders approve and adopt the merger agreement and the merger and approve certain other matters described in the joint proxy statement/prospectus including the escrow agreement and the appointment of a stockholder agent. These matters, among others, are included in the proposals to be voted on at the special meetings of the Nanometrics shareholders and Accent Optical stockholders, to be held on [], 2006, as more fully described in this joint proxy statement/prospectus, which also includes more information about Nanometrics, Accent Optical and the merger. You are encouraged to carefully read this joint proxy statement/prospectus in its entirety, including the section entitled Risk Factors beginning on page 29 before voting on the matters set forth in the attached joint proxy statement/prospectus.

The Nanometrics board of directors unanimously recommends that Nanometrics shareholders vote "FOR" Nanometrics proposal to approve the issuance of shares of Nanometrics common stock in the merger.

The Accent Optical board of directors unanimously recommends that the Accent Optical stockholders vote FOR Accent Optical's proposal to approve and adopt the merger agreement and approve the merger, as well as the other matters set forth in the joint proxy statement/prospectus for their consideration.

Sincerely,

John D. Heaton
President and Chief Executive Officer

Nanometrics Incorporated

Bruce C. Rhine
Chairman and Chief Executive Officer
Accent Optical Technologies, Inc.

Appendix IA3.

An example of merger negotiation process

Acquirer: Adobe Systems Inc.

Target: Macromedia.

Link to merger file:

<http://www.sec.gov/Archives/edgar/data/796343/000104746905018172/a2160070zs-4.htm>

Manner and basis of converting shares

If you are a Macromedia stockholder, you will receive 1.38 shares of Adobe common stock in exchange for each share of Macromedia common stock you own. The exchange ratio is fixed and, regardless of fluctuations in the market price of Adobe's or Macromedia's common stock, will not change between now and the date the merger is consummated, subject to any adjustments for changes in the number of outstanding shares of Adobe or Macromedia by reason of future stock splits, division of shares, stock dividends or other similar transactions.

Key developments of the merger

September 2004, Bruce R. Chizen, Adobe's CEO and Robert K. Burgess, Macromedia's CEO discussed the possibility of a business combination involving the two companies.

January 11, 2005, the Adobe board of directors held a meeting at which Adobe management made a presentation regarding the possible strategic fit between Macromedia and Adobe.

January 21, 2005, the Adobe board approved initiating discussions with Macromedia regarding a potential business combination and working with Goldman Sachs, as Adobe's financial advisor.

January 28 to February 9, 2005, representatives of Adobe and Macromedia held telephone conferences to negotiate the terms of a nondisclosure agreement and establish the procedures for preliminary financial due diligence.

February 19, 2005, at a meeting of the Adobe board of directors, Goldman Sachs presented a financial analysis relating to the potential business combination. At that meeting, the board authorized Adobe to present a proposal to Macromedia for a potential business combination.

February 22, 2005, Goldman Sachs orally delivered a proposal by Adobe regarding a potential business combination to Morgan Stanley, financial advisor of Macromedia.

February 23, 2005, the Macromedia board of directors reviewed the status of the discussions with Adobe, including the proposal presented by Adobe. The Macromedia board determined that the proposal made by Adobe was not sufficiently attractive to warrant further consideration.

March 28, 2005, Representatives of Adobe and Goldman Sachs contacted representatives of Morgan Stanley to communicate a new proposal for the potential business combination.

April 2 to April 17, 2005, Representatives of Adobe and Macromedia met numerous times to discuss the potential business combination. During this period, representatives of Macromedia and its advisors engage in due diligence discussions regarding Adobe.

April 5, 2005, Adobe delivered a draft of the merger agreement to Macromedia.

April 8, 2005, Macromedia delivered proposed revisions to the draft merger agreement to Adobe.

April 10 to April 17, 2005, Adobe and Macromedia negotiated the terms of the merger agreement.

April 16, 2005, the Adobe board of directors reviewed the proposed business combination with Macromedia, and determined to propose an exchange ratio of 1.38 shares of Adobe common stock for each share of Macromedia common stock.

April 17, 2005, the Adobe board of directors held a meeting at which the proposed merger was discussed and considered. Goldman Sachs reviewed the financial terms of the proposed merger and delivered its fairness opinion as of the same date, that, as of April 17, 2005 and based on and subject to the factors and assumptions set forth in its opinion, the exchange ratio of 1.38 shares of Adobe common stock to be issued in exchange for each share of Macromedia common stock pursuant to the merger agreement was fair to Adobe from a financial point of view.

April 17, 2005, the Macromedia board of directors reviewed the update on the Adobe board of directors' authorization of the proposed exchange ratio of 1.38 shares of Adobe common stock for each share of Macromedia common stock.

April 17, 2005, the Adobe board of directors unanimously approved the merger and related matters. Following the meetings of Adobe's and Macromedia's respective boards of directors, the parties signed the merger agreement.

April 18, 2005, the signing of the merger agreement was publicly announced prior to the opening of the NASDAQ National Market.

Appendix IA4.

Our data collection process

Under RD designs, it is important to have accurate data on the running variable which according to the Exchange listing requirement (see Appendix IA1), is “the percent of new shares a firm *intends* to issue.”³¹

We start our data collection using a sample of deals where equity issuance is involved. We collect information on the running variable from the following sources:

1. S-4 is the main source to identify “the amount to be registered,” which represents the estimated maximum number of shares to be issued by the acquirer in connection with the deal.
2. 8-K is used when we are unable to locate S-4. For example, in the case of private placement, registration may be exempted. Typically, 8-K states, “we intend to issue XXX number of shares” or “the maximum number of shares to be issued is approximately XXX.”³²
3. Occasionally, acquirers only report the fixed exchange ratio. In this case, we use the fixed ratio times the target’s number of shares outstanding (diluted) to calculate the acquirer’s number of shares to be issued.
4. Occasionally, acquirers report deal value and the portion of the deal financed by stock. For example, RCM Technologies, Inc., a leading provider of business and technology solutions, announced on August 21, 2007, that it has made a proposal to acquire all of the outstanding common stock of Computer Task Group, Inc. in a total equity value of approximately \$105 million. The offer is structured as 50% cash and 50% RCM stock. In this case, we use 50% of the deal value divided by the acquirer’s share price the day prior to the announcement to calculate its number of shares to be issued.
5. Occasionally, acquirers announce “after the completion of the merger, the target firm will own approximately XXX% of the combined company.” For example, in the deal between Nexstar Broadcasting Group, Inc. and Media General, Inc. (announced on September 28, 2015). 8-K states, “Media General shareholders would own approximately 26% of the combined company.” In this case, we use the following formula: the number of new shares to be issued by the acquirer / (the acquirer’s number of shares outstanding (31.616 million) + the number of new shares to be issued by the acquirer) = 26%, to obtain the number of new shares to be issued by the acquirer to be 11.108 million, and divided by the acquirer’s number of shares outstanding on the day prior to the merger announcement (i.e., day -1) to obtain the running variable (i.e., 35%).

Finally, we manually verify whether acquirer shareholder approval is required by searching SEC filings including S-4, 8-K, S-4/A, DEFM 14, DEFM 14/A, DEF 14A, DEFS14A, PRES14A, PRER14A, 10-K, and 10-Q.

³¹ There are a number of reasons that the running variable—“the percent of new shares a firm *intends* to issue” might diverge from “the percent of new shares a firm *actually* issues.” First, under the fixed value stock payment arrangement, the dollar value of the shares to be paid is fixed but not the number of new shares to be issued. The exact number of new shares to be issued is not known until the end of the pricing period, which is usually between the 10th to the 15th days ending the day prior to the consummation of the deal. In this case, shareholder approval is required as long as an acquirer intends to issue more than 20% of the shares outstanding, even if it ends up issuing less than 20% of new shares. Second, the target’s shareholders may have a choice over cash versus stock payment. Finally, some public target firms have convertible securities and/or options outstanding prior to the bid. In this case, acquirers do not know exactly how much the convertible securities will be converted and/or how many options will be exercised, and typically register an estimated maximum number of new shares they intend to issue.

³² Most of the time, we rely on acquirers’ S-4 or 8-K. When such filings are not available for acquirers and target firms happen to be public, we also use target firms’ 8-K to locate relevant information.

Appendix IA5.
Testing local randomization for baseline characteristics

This table presents balancing tests suggested by Lee and Lemieux (2010) and Roberts and Whited (2013). The sample consists of 2,688 all-stock deals announced between 1995 and 2015 from the Thomson One Banker SDC database. The differences are estimated by fitting a local linear regression using a triangular kernel to the left and right of the 20% threshold. All variables are defined in Appendix A. ***, **, * correspond to statistical significance at the 1, 5, and 10 percent levels, respectively.

Variable	Coef.	Std. Err.	Z	P value	Bandwidth
M/B	1.761	2.551	0.690	0.490	+/- 6
	2.140	2.366	0.905	0.366	+/- 8
	2.637	2.160	1.221	0.222	+/- 10
	2.920	1.837	1.589	0.112	IK (+/- 13.25)
Leverage	0.035	0.043	0.802	0.420	+/- 6
	0.013	0.036	0.356	0.722	+/- 8
	0.003	0.031	0.111	0.911	+/- 10
	-0.004	0.023	-0.172	0.863	IK (+/- 15.57)
Cash	0.046	0.051	0.890	0.373	+/- 6
	0.042	0.045	0.945	0.345	+/- 8
	0.044	0.039	1.115	0.265	+/- 10
	0.042	0.031	1.349	0.177	IK (+/- 15.05)
Deal value	78.768	295.870	0.266	0.790	+/- 6
	54.736	259.490	0.211	0.833	+/- 8
	72.494	230.020	0.315	0.753	+/- 10
	-3.201	149.720	-0.021	0.983	IK (+/- 18.27)
Relative size	0.023	0.189	0.120	0.905	+/- 6
	0.046	0.170	0.271	0.786	+/- 8
	0.102	0.155	0.661	0.509	+/- 10
	0.121	0.122	0.995	0.320	IK (+/- 17.15)
Diversifying	0.005	0.110	0.046	0.964	+/- 6
	-0.021	0.097	-0.218	0.828	+/- 8
	-0.033	0.087	-0.378	0.705	+/- 10
	-0.067	0.072	-0.924	0.355	IK (+/- 14.24)
Tender offer	0.024	0.043	0.557	0.578	+/- 6
	0.012	0.040	0.288	0.773	+/- 8
	0.004	0.037	0.118	0.906	+/- 10
	-0.005	0.022	-0.242	0.809	IK (+/- 19.9)
Public target	0.140	0.117	1.196	0.232	+/- 6
	0.119	0.104	1.138	0.255	+/- 8
	0.118	0.095	1.247	0.212	+/- 10
	0.093	0.076	1.212	0.226	IK (+/- 15.10)