

Shareholder Approval in Mergers & Acquisitions*

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This version: July, 2016

* We are grateful for helpful comments from Tolga Caskurlu, Ling Cen, Stu Gillan, Todd Gormley, Daniel Greene, Yaniv Grinstein, Iftekhar Hasan, Jack He, Maggie Hu, Ioanuis Ioannou, Torsten Jochem, Karthik Krishnan, Katya Malinova, Ron Masulis, Ernst Maug, Harold Mulherin, Jeff Netter, Micah Officer, Brad Paye, Annette Poulsen, David Reeb, Luc Renneboog, Miikka Rokkanen, Arjen Siegmans, Aris Stouraitis, seminar participants at Australian National University, Goethe University, Queensland University of Technology, Tilburg University, Tinbergen Institute, University of Georgia, University of Mannheim, University of Queensland, and University of Toronto, and conference participants at the Glasgow-Nankai Finance Workshop (Glasgow), the Conference on Corporate Bonds (Strasbourg), the Workshop on Executive Compensation and Corporate Governance (Rotterdam), the International Corporate Governance Conference (Hong Kong), and the FMA Asia Pacific Conference (Sydney). We thank Ting Xu for research assistance. Li acknowledges financial support from the Social Sciences and Humanities Research Council of Canada. All errors are ours.

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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 outcome. 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 acquirers' 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 5.6% jump in acquirer announcement returns at the 20% threshold. We further show that this positive value effect is larger for acquirers with high institutional ownership, particularly high quasi-indexer ownership, and for acquirers buying targets with more severe information asymmetry as measured by listing status (public vs. private targets) and by analyst coverage (high- vs. low-coverage targets). We then provide 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 (quasi-indexer) 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 Form 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 20.1% new shares are similar to those who intend to issue 19.9% new shares. 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 acquirers—even while having *some* influence—are 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 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 acquirers 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. However, it is highly unlikely, if not impossible, that *all-stock* acquirers could have *precise* control over the percent of new shares to be issued 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 that “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 acquirers 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 reveals no evidence of (excess) manipulation by all-stock acquirers around the 20% threshold. A formal test of no manipulation in 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 5.6% jump in acquirer announcement returns at the 20% threshold. Given that the average acquirer in our sample has a market

capitalization of \$3.05 billion, a 5.6% jump in stock price around the merger agreement announcement corresponds to value creation of \$171 million for acquirer shareholders, suggesting an economically significant value effect. We further show that this positive value effect is larger for acquirers with high institutional ownership, particularly high quasi-indexer ownership, and for acquirers buying targets with more severe information asymmetry as measured by listing status (public vs. private targets) and by analyst coverage (high- vs. low-coverage targets). We then provide 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 effects 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 effects 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 based on a broader sample.

Our paper contributes to the literature in a number of dimensions. First, our paper contributes to the growing finance literature that studies the efficacy of 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)). Our paper conducts one of the first large sample studies that establish a positive causal effect of 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 larger for 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.

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 announcement returns, 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 the 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 these prior studies, we pay particular attention to obtain accurate information on the number of new shares to be issued and the requirement of shareholder approval 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 find that SDC misses the number of new shares to be issued in connection with a merger 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 listing rules. More importantly, we employ the RD analysis to help identify

a positive causal effect of shareholder approval in M&As. Further, using our sample of M&A deals that include public, private, and subsidiary targets, we find that the value impact of shareholder approval comes mainly from deals involving private or subsidiary targets. Finally, we provide fresh evidence on the heterogeneity in the treatment effect of shareholder approval and possible underlying economic mechanisms.

II. Theoretical Framework and Hypothesis Development

Shareholder voting on important corporate decisions (such as approving M&As, authorizing new equity issues, and amending a firm's articles of incorporation) is fundamental to the governance process. 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 the proxy votes of union funds and finds that union 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, and time-consuming, and might delay timely business decision making (Kahan and Rock (2008)).

On the benefit side, first of all, large shareholders as monitors have the potential to limit 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, Yermack (2010), and Levit and Malenko (2015)). These include a shift from plurality to majority voting, liberalizing proxy access, and the repeal of broker-voting.

Third, there are also a number of recent developments in technology and ownership structure that make shareholder voting more prominent and easier to participate (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 particular setting of shareholder approval in M&As, we expect the benefits dominate the costs in the following ways. First, deals that require shareholder approval, by construction, 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)).² This deterrence effect suggests that the requirement of shareholder approval may commit acquirer management to select value-enhancing deals and/or strengthen their bargaining position against target management. In other words, deals that require shareholder approval are better (i.e., value enhancing) than those without such a requirement. The above discussions lead to our first hypothesis:

H1: Shareholder approval in M&As is value enhancing.

² 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).

Prior literature has shown that institutional investors as a group are quite active in improving corporate governance practices and mitigating agency problems (see the survey by Gillan and Starks (2003), and Yermack (2010)). Further, several recent 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 particular 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 their 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 greater in acquirers with strong presence of institutional investors than in those with little institutional presence.

Furthermore, we also 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, due to greater valuation uncertainty. *Ceteris paribus*, an opaque target firm where mis-valuation is more likely to take place presents acquirer shareholders a much more valuable opportunity to access and analyze otherwise hard-to-obtain information about the target and the deal than a transparent target. The above discussions lead to our second hypothesis:

H2: The value impact of shareholder approval in M&As is stronger in acquirers with greater institutional ownership and/or in targets with greater information asymmetry.

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;³ 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 10%; 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 2,780 deals.

We note that the Thomson One Banker SDC database is generally accurate about whether a particular deal is financed by stock (including cases with mixed payment), but sometimes misses the number of new shares to be issued for deals financed by stock (particularly for private or subsidiary target firms),⁴ or sometimes provides the number of new shares actually issued instead (particularly for public targets).⁵ We identify a total of 753 such deals and add them back

³ 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.

⁴ About 80% of these deals involve non-public targets.

⁵ For three quarters of stock deals involving public targets, the percent of new shares to be issued that we collected via various SEC disclosures is higher than the percent of new shares actually issued as reported by SDC, suggesting

to our initial sample. We then collect share issuance information for these 3,533 deals via searches of SEC filings on EDGAR. The percent of new shares to be issued 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. 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 note that there are cases where acquirers intend to issue less than 20% of the shares outstanding but shareholder approval is required; and that there are also few cases where acquirers intend to issue more than 20% of the shares outstanding but shareholder approval is not required because they have requested exemption from the exchange.⁶ We exclude those deals from our sample.⁷

Figure 1 provides the timeline of major developments leading to the public announcement of a deal.⁸ When a deal is announced, it typically discloses the terms as well, such that the market can immediately figure out whether acquirer shareholder approval is called for. Assuming efficient markets, acquirer announcement returns capture the market's assessment of value creation (destruction) of the announced deal.

Table 1 lists the 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 number of new shares to be issued and the requirement of shareholder approval. Our sample consists of 3,292 stock deals involving public, private, and subsidiary

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.

⁶ 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.

⁷ These two cases account for 1.6% 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.

⁸ Appendix IA3 provides an example of merger negotiation process showing how the merger agreement is reached prior to the public announcement of the deal.

targets (going forward, for simplicity, we will lump private and subsidiary targets as “private” targets).⁹ 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 3,292 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 drastically declining M&A activities during the most recent economic recession towards the end of our sample period. Slightly over a third of the sample (35%) 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 (49%) use all-stock payment. Finally, among deals using all-stock payment, about two-fifths of those deals (43%) require acquirer shareholder approval; in contrast, among deals using mixed payment, about a quarter of those deals (26%) require acquirer shareholder approval.

Table 3 Panel A presents summary statistics for the all-stock deal 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, $CAR(-1, 1)$, has a mean of 0.3% and a

⁹ Over half of the sample (53%) involves private target firms, and about a tenth of the sample (12%) involves subsidiary target firms.

median of -0.8%. Not surprisingly, the mean/median M/B ratio for all-stock acquirers is 7.9/4.4, much higher than an average firm in the Compustat population. The mean/median leverage ratio is 7.5%/0.7%. Both are much lower than comparable values for the Compustat population. The mean/median size of all-stock acquirers, in terms of book value of total assets is \$2 billion/\$151 million (in 1995 dollars), representing the 8th/4th 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 0.79/0.36, suggesting that using all-stock payment allows acquirers to buy relatively large targets. Finally, about 60% of the deals involve private targets, suggesting that all-stock payment is more frequently used to buy private targets.

Panel B presents summary statistics for the 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) 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.¹⁰ We examine acquirer price reaction to deals in which acquirers 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 acquirer announcement returns.¹¹

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:

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

¹⁰ 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.

¹¹ 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).

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)):

$$\begin{aligned} \min_{\alpha_l: \beta_l} &= \sum_{i: c-h < x_i < c} (Y_i - \alpha_l - \beta_l(X_i - c))^2, \\ \text{and} & \\ \min_{\alpha_r: \beta_r} &= \sum_{i: c \leq x_i < c+h} (Y_i - \alpha_r - \beta_r(X_i - c))^2. \end{aligned} \tag{2}$$

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

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

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

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

Given these estimates, the average treatment effect is estimated as

$$\hat{\tau}_{RD} = \hat{\alpha}_r - \hat{\alpha}_l. \tag{5}$$

B. Testing for a quasi-random assignment

The key assumption of valid RD designs is that agents cannot *precisely* manipulate the “running variable.” If acquirers—even while having *some* influence—are 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 acquirers do 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 percent of new shares to be issued 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 that “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)).¹²

Figure 2 plots the frequency distribution of the running variable for the full sample of stock deals (3,292 deals, Panel A), the sample of mixed-payment deals (1,682, Panel B), and the sample of all-stock deals (1,610 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-stat = -10.77, p-value < 0.01), for the sample of mixed-payment deals (Z-stat = -6.45, p-value < 0.01), while fails to reject the null hypothesis for the sample of all-stock deals (Z-stat = -0.64; p-value = 0.51). We conclude that RD designs are valid for the sample of all-stock deals which we use in the rest of the analyses.¹³

C. Main results

¹² 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.

¹³ 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 all baseline firm and deal characteristics. It is evident that that none of these variables exhibits any sharp discontinuity at the 20% threshold.

We start our main analyses with a plot of local sample means (i.e., the dots in the graph) of acquirer CAR (-1,1) 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 polynomial 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%.¹⁴ The plot shows a striking discontinuous jump in acquirer announcement returns, right at the 20% threshold: The acquirers that intend to issue just above (below) the 20% threshold have a mean CAR (-1, 1) of 7.59% (1.78%).¹⁵

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).¹⁶ The mean acquirer CAR (-1, 1) is 1.1%, the median is -0.4%, and the 10th and 90th percentiles are -11.2% and 14.5%, respectively. The mean/median market capitalization of acquirers is \$3.05 billion /\$513 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.¹⁷ The average treatment effect is 5.6%, and is positive and significant.¹⁸ In terms of economic significance, a 5.6% price increase

¹⁴ Using local linear regressions to fit the data produces similar plots.

¹⁵ There are 28 observations in the bin with share issuance just below 20% (i.e., the percent of new shares to be issued is between 18.99% and 19.98%), and there are 16 observations in the bin with share issuance just above 20% (i.e., the percent of new shares to be issued between 20% and 20.99%).

¹⁶ Based on the IK optimal bandwidth of 15%, 632 deals are used as the control group, and 198 deals are used as the treatment group. So effectively deals with the percent of new shares to be issued between 5% and 35% are used for estimation.

¹⁷ 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).

¹⁸ 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.

around the merger announcement, for an average acquirer with a market capitalization of \$3.05 billion, indicates value creation of \$171 million for acquirer shareholders.¹⁹

To gain further insight into RD designs, we next run OLS regressions on the indicator variable *Shareholder approval* and firm and deal controls using various 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 percent of new shares to be issued falls within the band of [17.5%, 22.5%] centered at the threshold. The coefficient on *Shareholder approval* is positive and significant at 0.092, suggesting that shareholder approval is associated with an increase in acquirer announcement returns by 9.2%. Column (2) presents the regression results using a sample of deals in which the percent of new shares to be issued falls within the band of [15%, 25%] centered at the threshold. The coefficient on *Shareholder approval* is positive and significant at 0.053, with a smaller standard error than that in column (1). As the band grows, more and more deals in which the percent of new shares to be issued 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 40% of all-stock deals are included. These results highlight the importance of using RD designs to uncover the causal effect of shareholder approval on acquirer announcement returns. These results also help reconcile with prior findings of no significant value 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

¹⁹ Note that our RD estimate of the treatment effect does not capture the deterrence effect whereby prospect acquirers with bad deals choose not to do them because they worry about being voted down by shareholders. In that sense, our estimate provides a lower bound on the treatment effect of shareholder approval in M&As.

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 CAR(-1, 1) 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 CAR (-1, 1). Columns (1) and (3) present the simple regression results where the only explanatory variable is the running variable for acquirers whose value ranges between 0% and 20% and for acquirers whose value ranges between 20% and 40%, respectively. Columns (2) and (4) include additional control variables. We observe significant correlation between the running variable and the outcome variable for acquirers whose running variable ranges between 0% and 20%. After including firm and deal controls, the correlation is close to zero. There is no significant correlation between the running variable and the outcome variable for acquirers whose running variable ranges between 20% and 40%, irrespective of control variables. The results in Panel A suggest that for acquirers whose running variable ranges between 0% and 40%, representing over 70% 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 CAR (-1, 1), weighted by propensity scores estimated from a logit regression. In the logit regression, 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). After obtaining a propensity

score p_i for each firm i based on the logit regression, we weight the outcome variable (i.e., acquirer CAR(-1, 1)) 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 CAR (-1, 1) remains, ranging between 10.4% and 15.9%.²⁰ We conclude that using the method of Angrist and Rokkanen (2015), the positive treatment effect of shareholder approval on acquirer CAR (-1, 1) can be generalized to more than 70% 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

²⁰ 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.

merger announcement. We find that the mean institutional ownership in all-stock acquirers is about 50%, and increasing over time in our sample. More importantly, over time, quasi-indexers have gained greater presence, with mean/median ownership in the range of 20%/15%. 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. The results are consistent with our second hypothesis that the value impact of shareholder approval is stronger in acquirers with greater institutional ownership.²¹

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)).²² 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 statistically significant 7% jump in their stock prices around the merger announcement. In contrast, acquirers with low quasi-indexer ownership experience no significant jump around the merger announcement.

²¹ 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.

²² 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."

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

B. Target information asymmetry

We next examine whether the effect of shareholder approval differs in deals with different degrees of information asymmetry about target firms. Shareholder approval in deals involving opaque targets where mis-valuation is more likely to take place 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 targets. We employ two different proxies for the quality of target informational environment. The first is target listing status. Private targets have higher information asymmetry 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 at 10% and statistically significant for acquirers buying private targets. Given that the average market value of acquirers buying private targets is \$2.07 billion (untabulated), a 10% price increase indicates a value creation of \$207 million for acquirer shareholders. 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 sizable at 8% and statistically significant for acquirers buying low-coverage targets. In contrast, we show that the treatment effect is small and statistically insignificant for acquirers buying high-coverage targets.

In summary, we show that shareholder approval has more significant impact when acquirers have higher institutional ownership and/or when there are higher information asymmetry and greater valuation uncertainty about target firms, 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. Synergistic gains

Following Bradley, Desai, and Kim (1988), we estimate synergistic gains as the weighted average of acquirer and target CAR (-1, 1), weighted by their respective market capitalization two days prior to the merger announcement—combined CAR. We expect that the requirement of shareholder approval commits acquirer management to pick deals with greater synergistic gains. By construction, this analysis is based on a sample of deals with public targets.

Table 8 Panel A presents the RD estimates of synergistic gains separated by acquirers buying low-coverage targets and acquirers buying high-coverage targets. We show that the average treatment effect of shareholder approval on synergistic gains is 8%, and is both statistically and economically significant only in the sample of acquirers buying low-coverage targets. 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.

B. The acquirer's bargaining position

We next examine a measure of the acquirer's bargaining position vis-à-vis its target. Following Ahern (2012), our measure of the acquirer's bargaining position is 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 one month prior to the merger announcement. The acquirer's / target's dollar gain is the acquirer's / target's CAR (-1, 1) 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 B presents the RD estimates of the measure of acquirer management's bargaining position separated by acquirers buying low-coverage targets and acquirers buying high-coverage targets. We show that the average treatment effect of shareholder approval on the acquirer's bargaining position is 11%, 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 acquirers' bargaining position vis-à-vis their targets 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 commits acquirer management to seek deals with larger synergies and strengthens acquirers' bargaining position against 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 has a larger 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, net income scaled by total assets), operating margin (operating cash flows scaled by sales), and free cash flow (FCF, free cash flow scaled by total assets). These measures help assess long-run performance implications of shareholder approval.

Table 9 presents the results. We show that across all measures of operating performance, we observe significant positive treatment effects only among acquirers with high institutional ownership and high quasi-indexer ownership.²³ For example, ROA three years after the merger is over 10% higher for the treatment group than the control group when acquirers have high institutional ownership. In contrast, there are no statistically significant positive jumps for acquirers with low institutional ownership or low quasi-indexer ownership. These patterns suggest that post-merger performance is significantly better for acquirers with strong institutional presence whose deals require shareholder approval, compared to those whose deals do not require shareholder approval.

²³ 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.

Overall, these results 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 strong presence of institutional investors, particularly quasi-indexers.²⁴

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 5.6% jump in acquirer announcement returns at the 20% threshold, corresponding to value creation of \$171 million for an average acquirer in our sample. We further show that this positive value effect is larger for acquirers with high institutional ownership, particularly high quasi-indexer ownership, and for acquirers buying targets with more severe information asymmetry as measured by listing status (public vs. private targets) and by analyst coverage (high- vs. low-coverage targets). We then provide 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

²⁴ 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.

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 policy makers, securities regulators, and stock exchanges. The 20% rule for listed firms was first introduced by the NYSE to improve corporate governance practices (Karmel (2001)). Our results suggest that this listing requirement indeed achieves its intended effect - It empowers shareholders and encourage their participation in the M&A process.

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.
CAR(-1, 1)	Abnormal percentage return in a three-day window surrounding the merger announcement using market-adjusted returns from the CRSP value-weighted index.
Market cap	The stock price one month prior to the merger announcement (i.e., day -22) 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 the sum of book value of debt and market value of equity.
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 sales.
Free cash flow (FCF)	Free 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.
Combined CAR	Weighted average of the acquirer's CAR (-1, 1) and the target's CAR (-1, 1) with the weight being their respective market capitalization two days prior to the merger announcement (i.e., day -2).
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 one month prior to the merger announcement. The acquirer's (target's) dollar gain is the acquirer's (target's) CAR (-1, 1) 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.

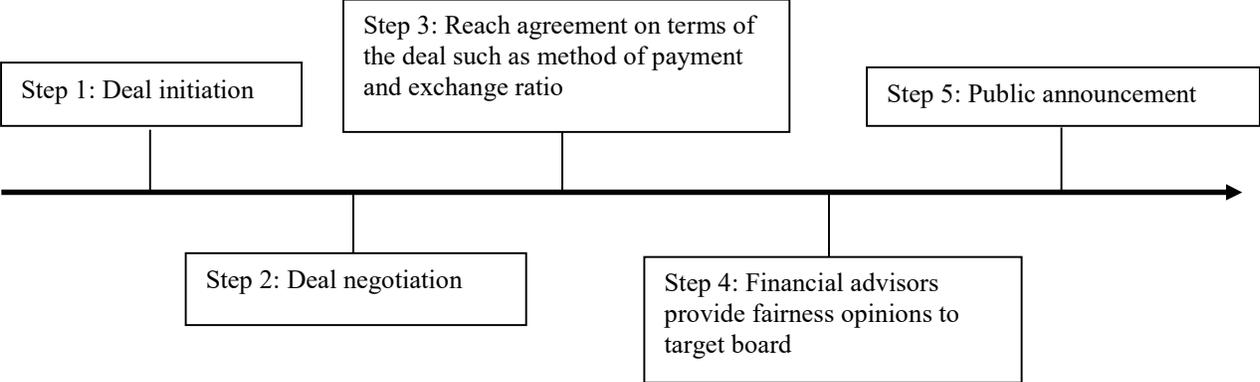
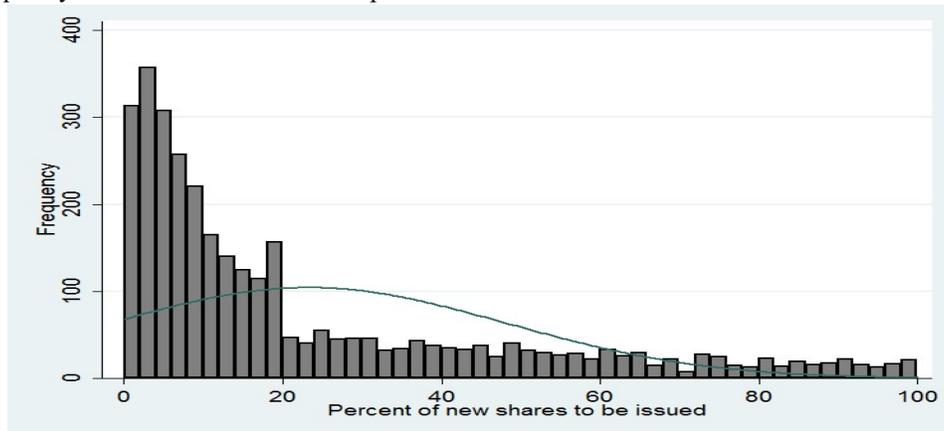


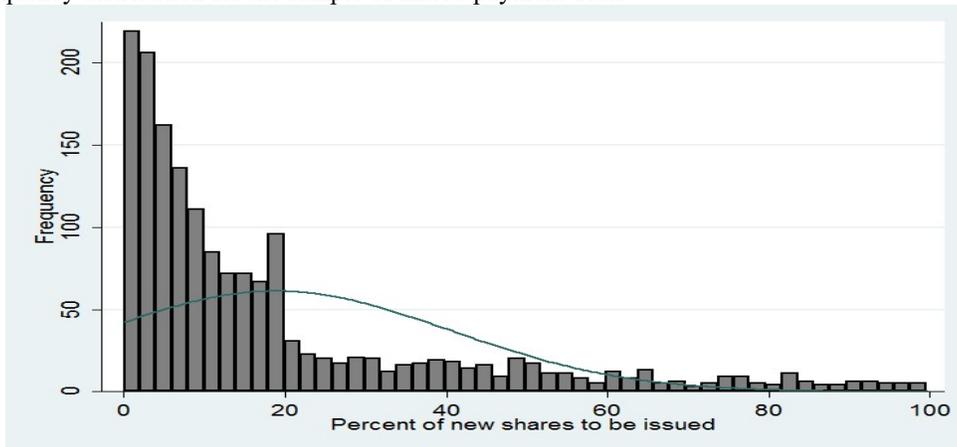
Figure 2. Frequency distribution of the running variable

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 3,292 stock deals between 1995 and 2015 from the Thomson One Banker SDC database. Panel B plots the subsample of 1,682 deals involving mixed payment. Panel C plots the subsample of 1,610 deals involving all-stock payment.

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



Panel B: Frequency distribution for the sample of mixed-payment deals



Panel C: Frequency distribution for the sample of all-stock deals

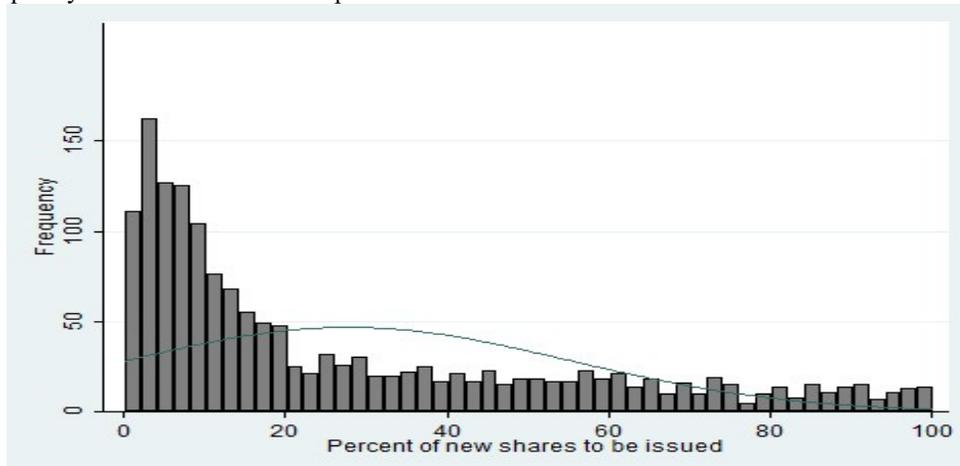


Figure 3. Acquirer announcement returns around the 20% threshold

This figure presents a plot of local sample means (i.e., the dots in the graph) of acquirer CAR (-1,1) using non-overlapping evenly spaced bins on each side of the 20% threshold (# bins = 20). The lines are smoothed regression lines based on polynomial models estimated separately on the two sides of the 20% threshold. Definitions of all variables are provided in Appendix A.

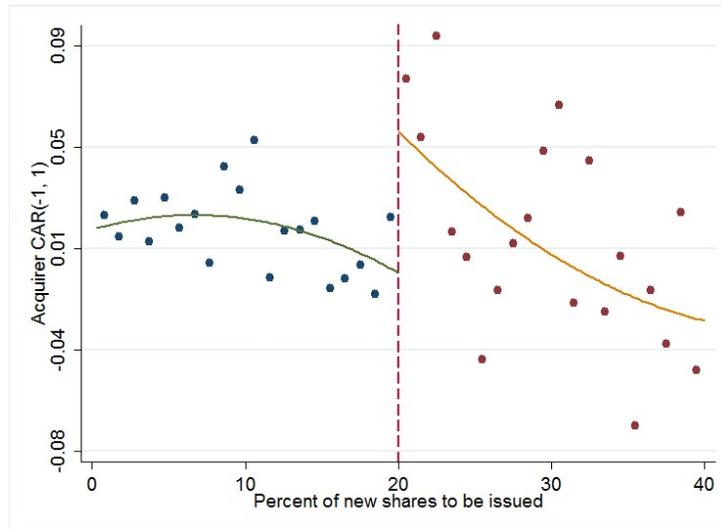


Table 1. Sample formation

This table provides the steps taken to form our sample of deals involving stock payment.

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 (\$ Mil): 1 (1995 dollar) & Return Data on CRSP & Basic Accounting Data on Compustat	21,885
Relative size > 10%	10,075
Share issuance > 0	3,146
Exclude Limited Partnerships Traded on NYSE, AMEX, and NASDAQ	2,780
Add Back Deals with Stock Payment But Missing or Zero Share Issuance (753 deals)	3,533
Exclude Share Issuance >100%	3,346
Exclude Deals That Issue More Than 20% But Shareholder Approval Not Required and Deals That Issue Less than 20% But Shareholder Approval Required	3,292

Table 2. Sample distribution over time

The sample consists of 3,292 deals involving stock payment 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	232	97	135
1996	334	115	219
1997	379	142	237
1998	415	141	274
1999	331	93	238
2000	363	98	265
2001	174	74	100
2002	97	36	61
2003	105	37	68
2004	114	40	74
2005	116	43	73
2006	98	26	72
2007	74	22	52
2008	70	21	49
2009	59	29	30
2010	43	13	30
2011	43	18	25
2012	46	18	28
2013	41	17	24
2014	86	33	53
2015	72	25	47
Total	3,292	1,138	2,154

Panel B: By methods of payment

Year	All-stock payment			Mixed payment		
	# of deals	Require shareholder approval	Not require shareholder approval	# of deals	Require shareholder approval	Not require shareholder approval
1995	164	71	93	68	26	42
1996	212	68	144	122	47	75
1997	211	99	112	168	43	125
1998	243	101	142	172	40	132
1999	201	53	148	130	40	90
2000	239	72	167	124	26	98
2001	82	43	39	92	31	61
2002	30	24	6	67	12	55
2003	35	19	16	70	18	52
2004	34	24	10	80	16	64
2005	31	21	10	85	22	63
2006	24	14	10	74	12	62
2007	17	12	5	57	10	47

2008	12	9	3	58	12	46
2009	17	14	3	42	15	27
2010	7	5	2	36	8	28
2011	9	8	1	34	10	24
2012	6	5	1	40	13	27
2013	8	7	1	33	10	23
2014	16	14	2	70	19	51
2015	12	11	1	60	14	46
Total	1,610	694	916	1,682	444	1,238

Table 3. Summary statistics

The sample consists of 1,610 all-stock deals announced between 1995 and 2015 from the Thomson One Banker SDC database. Panel A presents summary statistics for the full sample. Panel B compares the subsample of 694 all-stock deals requiring shareholder approval (i.e., the running variable $\geq 20\%$) with the subsample of 916 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 sample of all-stock deals

Variable	Mean	10 th percentile	Median	90 th percentile	Std Dev
CAR(-1, 1)	0.003	-0.128	-0.008	0.137	0.137
Total assets	2005.750	21.661	151.562	2324.290	10344.580
Market cap	4580.030	45.964	568.319	8385.110	18677.020
M/B	7.924	1.452	4.411	16.310	10.856
Leverage	0.075	0.000	0.007	0.263	0.129
Deal value	1018.580	8.637	79.918	1352.310	5892.750
Relative size	0.786	0.123	0.364	1.776	1.185
Diversifying	0.334	0	0	1	0.472
Tender offer	0.010	0	0	0	0.099
Public target	0.434	0	0	1	0.496
Private target	0.566	0	1	1	0.496

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

Variable	Require shareholder approval			Not require shareholder approval			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)
CAR(-1, 1)	-0.002	-0.016	0.157	0.007	-0.004	0.121	-0.009	-0.013***
Total assets	3463.300	190.383	14968.870	901.455	130.106	3954.650	2561.845***	60.276***
Market cap	3554.900	307.259	14874.030	5356.710	767.356	21081.940	-1801.81**	-460.097***
M/B	4.905	2.837	8.208	10.211	6.381	12.003	-5.305***	-3.545***
Leverage	0.126	0.042	0.166	0.036	0.002	0.071	0.089***	0.040***
Deal value	1980.350	148.982	8827.070	289.909	49.818	903.356	1690.441***	99.163***
Relative size	1.120	0.584	1.457	0.533	0.266	0.845	0.587***	0.318***
Diversifying	0.303	0	0.460	0.358	0	0.480	-0.055**	0**
Tender offer	0.006	0	0.076	0.013	0	0.114	-0.007	0
Public target	0.679	1	0.467	0.248	0	0.432	0.431***	1***
Private target	0.321	0	0.467	0.752	1	0.432	-0.431***	-1***

Panel C: Pearson correlation

	CAR(-1, 1)	Total assets	Market cap	M/B	Leverage	Deal value	Relative size	Diversifying	Tender offer	Public target
CAR(-1, 1)	1									
Total assets	-0.0272	1								
Market cap	-0.056**	0.362***	1							
M/B	-0.050**	-0.058**	0.171***	1						
Leverage	-0.02016	0.187***	-0.03587	-0.239***	1					
Deal value	-0.063**	0.529***	0.521***	0.053**	0.065***	1				
Relative size	-0.03721	-0.062**	0.03317	0.332***	-0.187***	0.141***	1			
Diversifying	0.067***	-0.063**	-0.00731	0.01255	-0.042*	-0.03281	-0.02623	1		
Tender offer	-0.042*	0.03137	0.02446	-0.02632	0.01789	0.00608	-0.01045	0.00867	1	
Public target	-0.233***	0.193***	0.154***	-0.156***	0.272***	0.173***	0.101***	-0.104***	0.114***	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 1,610 all-stock deals announced between 1995 and 2015 from the Thomson One Banker SDC database. The dependent variable is acquirer CAR (-1, 1). Panel A presents the summary statistics for the sample used in the RD analysis. Panel B reports RD coefficients of acquirer announcement returns estimated by fitting a local linear regression using a triangular kernel to the left and right of the 20% threshold. Panel C reports OLS regressions using different discontinuity samples around the threshold of 20%. For example, under column (1), acquirers with the percent of new shares to be issued in the range of 17.5% to 22.5% are used in the OLS 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
CAR(-1,1)	0.011	-0.112	-0.004	0.145	0.144
Total assets	1111.240	20.174	133.796	1512.760	4911.680
Market cap	3048.130	50.556	513.045	6106.210	10479.680
M/B	7.371	1.848	4.637	14.374	8.857
Leverage	0.055	0.000	0.007	0.184	0.094
Deal value	469.290	7.824	65.357	806.422	2137.470
Relative size	0.727	0.132	0.369	1.409	1.080
Diversifying	0.360	0	0	1	0.480
Tender offer	0.017	0	0	0	0.128
Public target	0.364	0	0	1	0.481
Private target	0.636	0	1	1	0.481

Panel B: RD analysis using local linear regressions

	Coef.	Std. Err.	z	P > z
Bandwidth = IK				
Conventional	0.056**	0.027	2.102	0.036
Bias-corrected	0.067**	0.027	2.526	0.012
Robust	0.067**	0.033	2.031	0.042

Panel C: OLS regressions with discontinuity samples

	(1) [17.5%, 22.5%]	(2) [15%, 25%]	(3) [10%, 30%]	(4) [0%, 40%]
Shareholder approval	0.092* (0.055)	0.053** (0.027)	0.029* (0.017)	0.01 (0.011)
Log(M/B)	0.04 (0.034)	0.024 (0.020)	0.003 (0.014)	-0.01 (0.006)
Leverage	-0.053 (0.256)	0.022 (0.135)	-0.075 (0.080)	-0.028 (0.047)
Log(Deal value)	0.012 (0.021)	-0.003 (0.007)	-0.006 (0.004)	-0.004 (0.003)
Relative size	-0.063* (0.034)	-0.021 (0.017)	-0.006 (0.013)	0.007 (0.007)
Diversifying	-0.004 (0.052)	0.01 (0.027)	0.013 (0.015)	0.007 (0.007)

Tender offer	-0.078 (0.084)	-0.024 (0.052)	-0.053 (0.034)	-0.027 (0.031)
Public target	-0.07 (0.052)	-0.075*** (0.027)	-0.064*** (0.015)	-0.048*** (0.009)
Constant	-0.13 (0.079)	-0.052 (0.065)	-0.01 (0.041)	-0.042** (0.019)
Industry FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
# of deals	91	187	434	1,148
R-squared	0.533	0.403	0.260	0.114

Table 5: Robustness checks

This table conducts a number of robustness checks on our main findings in Table 4. Panel A reports RD coefficients of acquirer announcement returns estimated by fitting a quadratic polynomial model using a triangular kernel to the left and right of the 20% threshold. Panel B reports RD coefficients of acquirer residual CAR(-1, 1) which is obtained by regressing acquirer CAR(-1, 1) on firm and deal characteristics (as in Equation (6)), and industry and year fixed effects. Panels C and D report RD estimates of acquirer announcement returns 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

	Coef.	Std. Err.	z	P > z
Bandwidth = IK				
Conventional	0.077**	0.039	1.980	0.048
Bias-corrected	0.157***	0.039	4.047	0.000
Robust	0.157*	0.081	1.942	0.052

Panel B: RD analysis using local linear regressions: acquirer residual CAR (-1, 1)

	Coef.	Std. Err.	Z	P > z
Bandwidth = IK				
Conventional	0.057**	0.023	2.473	0.013
Bias-corrected	0.064***	0.023	2.783	0.005
Robust	0.064**	0.029	2.252	0.024

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

	Coef.	Std. Err.	z	P > z
Bandwidth = IK				
Conventional	-0.026	0.022	-1.198	0.231
Bias-corrected	-0.007	0.022	-0.340	0.734
Robust	-0.007	0.034	-0.215	0.830

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

	Coef.	Std. Err.	z	P > z
Bandwidth = IK				
Conventional	-0.029	0.041	-0.703	0.482
Bias-corrected	-0.031	0.041	-0.757	0.449
Robust	-0.031	0.048	-0.641	0.522

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 1,160 all-stock deals announced between 1995 and 2015 from the Thomson One Banker SDC database with the percent of shares to be issued ranging between 0 to 40%. Panel A reports tests of the conditional independence assumption where the dependent variable is acquirer CAR(-1, 1). Panel B presents the generalized treatment effect where the dependent variable is acquirer CAR (-1, 1), 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	-0.005** (0.002)	-0.003 (0.002)	-0.001 (0.001)	0.000 (0.001)
Log(Deal value)		-0.009 (0.006)		0.001 (0.003)
Diversifying		0.045** (0.023)		0.001 (0.008)
Tender offer		-0.010 (0.116)		-0.044 (0.036)
Public target		-0.085*** (0.024)		-0.045*** (0.011)
Constant	0.161*** (0.057)	0.180*** (0.061)	0.021*** (0.007)	0.025** (0.012)
Observations	244	244	916	916
R-squared	0.027	0.140	0.001	0.029

Panel B: Treatment effects after propensity score weighting

	(1)	(2)	(3)
Shareholder approval	0.104*** (0.034)	0.151*** (0.038)	0.159*** (0.042)
Log(M/B)		-0.014 (0.012)	-0.013 (0.013)
Leverage		-0.122 (0.107)	-0.158 (0.120)
Log(Deal value)		-0.000 (0.006)	-0.002 (0.006)
Relative size		0.010 (0.014)	0.008 (0.014)
Diversifying		0.024 (0.017)	0.014 (0.018)
Tender offer		-0.012 (0.058)	0.007 (0.067)
Public target		-0.161***	-0.157***

		(0.026)	(0.026)
Constant	0.016***	0.076***	-0.055
	(0.005)	(0.027)	(0.098)
Industry FE	No	No	Yes
Year FE	No	No	Yes
# of deals	1,160	1,148	1,148
R-squared	0.025	0.104	0.187

Table 7: Heterogeneity in the treatment effect

This table reports the RD analysis for acquirers with different levels of institutional ownership and for targets with different degrees of information asymmetry. The sample consists of 1,610 all-stock deals announced between 1995 and 2015 from the Thomson One Banker SDC database. The dependent variable is acquirer CAR (-1, 1). 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) targets and acquirers with high-coverage 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	0.451	0.446	0.162	0.139	0.178	0.154	0.105	0.069
2000-2009	0.460	0.456	0.187	0.162	0.214	0.176	0.057	0.034
2010-2015	0.544	0.602	0.083	0.039	0.212	0.095	0.024	0.000

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

	High institutional ownership				Low institutional ownership			
	Coef.	Std. Err.	Z	P > z	Coef.	Std. Err.	Z	P > z
Bandwidth = IK								
Conventional	0.090**	0.044	2.039	0.041	0.040	0.036	1.113	0.266
Bias-corrected	0.107**	0.044	2.437	0.015	0.041	0.036	1.131	0.258
Robust	0.107**	0.053	2.041	0.041	0.041	0.051	0.805	0.421

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

	High quasi-indexer ownership				Low quasi-indexer ownership			
	Coef.	Std. Err.	Z	P > z	Coef.	Std. Err.	Z	P > z
Bandwidth = IK								
Conventional	0.071*	0.038	1.853	0.064	0.056	0.044	1.289	0.197
Bias-corrected	0.094**	0.038	2.459	0.014	0.069	0.044	1.572	0.116
Robust	0.094*	0.053	1.772	0.076	0.069	0.055	1.249	0.212

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

	Private targets				Public targets			
	Coef.	Std. Err.	z	P > z	Coef.	Std. Err.	z	P > z
Bandwidth = IK								
Conventional	0.101**	0.043	2.352	0.019	0.026	0.033	0.782	0.434
Bias-corrected	0.134***	0.043	3.123	0.002	0.035	0.033	1.065	0.287
Robust	0.134**	0.061	2.193	0.028	0.035	0.060	0.582	0.561

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

	Low-coverage targets				High-coverage targets			
	Coef.	Std. Err.	z	P > z	Coef.	Std. Err.	z	P > z

Bandwidth = IK

Conventional	0.080**	0.038	2.104	0.035	-0.001	0.040	-0.026	0.979
Bias-corrected	0.126***	0.038	3.331	0.001	-0.025	0.040	-0.624	0.533
Robust	0.126**	0.055	2.288	0.022	-0.025	0.169	-0.148	0.882

Table 8: The underlying economic channels

This table presents possible mechanisms behind the treatment effect of shareholder approval. The sample consists of all-stock deals involving public target firms announced between 1995 and 2015 from the Thomson One Banker SDC database. Panel A presents the RD coefficients when the dependent variable is combined CAR. Panel B presents the RD coefficients when the dependent variable is a measure of 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: Combined CAR

	Low-coverage targets				High-coverage targets			
	Coef.	Std. Err.	z	P > z	Coef.	Std. Err.	z	P > z
Bandwidth = IK								
Conventional	0.083**	0.035	2.414	0.016	0.015	0.035	0.413	0.680
Bias-corrected	0.116***	0.035	3.356	0.001	-0.063*	0.035	-1.794	0.073
Robust	0.116***	0.044	2.681	0.007	-0.063	0.159	-0.398	0.691

Panel B: The acquirer's bargaining position

	Low-coverage targets				High-coverage targets			
	Coef.	Std. Err.	z	P > z	Coef.	Std. Err.	z	P > z
Bandwidth = IK								
Conventional	0.110**	0.045	2.443	0.015	-0.015	0.033	-0.443	0.658
Bias-corrected	0.139***	0.045	3.083	0.002	0.094***	0.033	2.835	0.005
Robust	0.139**	0.056	2.482	0.013	0.094	0.267	0.353	0.724

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 1,610 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. Panel C presents the RD coefficients of acquirer free cash flow 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

	High institutional ownership				Low institutional ownership			
	Coef.	Std. Err.	z	P > z	Coef.	Std. Err.	z	P > z
Bandwidth = IK								
Conventional	0.095**	0.047	2.024	0.043	0.006	0.104	0.054	0.957
Bias-corrected	0.142***	0.047	3.016	0.003	-0.211**	0.104	-2.027	0.043
Robust	0.142**	0.062	2.297	0.022	-0.211	0.180	-1.170	0.242
	High quasi-indexer ownership				Low quasi-indexer ownership			
	Coef.	Std. Err.	z	P > z	Coef.	Std. Err.	z	P > z
Bandwidth = IK								
Conventional	0.152**	0.066	2.300	0.021	0.107	0.147	0.728	0.467
Bias-corrected	0.197***	0.066	2.973	0.003	-0.190	0.147	-1.290	0.197
Robust	0.197**	0.085	2.328	0.020	-0.190	0.211	-0.897	0.370

Panel B: Operating margin

	High institutional ownership				Low institutional ownership			
	Coef.	Std. Err.	z	P > z	Coef.	Std. Err.	z	P > z
Bandwidth = IK								
Conventional	0.178***	0.053	3.388	0.001	-0.014	0.098	-0.147	0.883
Bias-corrected	0.233***	0.053	4.446	0.000	-0.075	0.098	-0.767	0.443
Robust	0.233***	0.067	3.467	0.001	-0.075	0.150	-0.500	0.617
	High quasi-indexer ownership				Low quasi-indexer ownership			
	Coef.	Std. Err.	z	P > z	Coef.	Std. Err.	z	P > z
Bandwidth = IK								
Conventional	0.174***	0.062	2.793	0.005	0.029	0.107	0.268	0.789
Bias-corrected	0.211***	0.062	3.389	0.001	-0.009	0.107	-0.087	0.931
Robust	0.211***	0.078	2.702	0.007	-0.009	0.162	-0.057	0.954

Panel C: FCF

	High institutional ownership				Low institutional ownership			
	Coef.	Std. Err.	z	P > z	Coef.	Std. Err.	z	P > z
Bandwidth = IK								
Conventional	0.198***	0.055	3.582	0.000	0.009	0.092	0.094	0.925
Bias-corrected	0.246***	0.055	4.451	0.000	0.052	0.092	0.562	0.574
Robust	0.246***	0.067	3.699	0.000	0.052	0.120	0.429	0.668
	High quasi-indexer ownership				Low quasi-indexer ownership			
	Coef.	Std. Err.	z	P > z	Coef.	Std. Err.	z	P > z
Bandwidth = IK								
Conventional	0.159**	0.074	2.149	0.032	0.041	0.084	0.481	0.631

Bias-corrected	0.185**	0.074	2.489	0.013	0.133	0.084	1.576	0.115
Robust	0.185**	0.087	2.118	0.034	0.133	0.131	1.017	0.309

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 Opticals 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. Description of our data collection process

Under RD designs, it is important to have accurate data on the running variable. In our setting, according to the Exchange listing requirement (see Appendix A), the running variable should be “the percent of new shares a firm *intends* to issue,” not “the percent of new shares a firm *actually* issues.”²⁵

We start our data collection using a sample of deals where equity issuance is required based on methods of payment. We collect information on the number of new shares a firm *intends* to issue from the following sources:²⁶

1. Form S-4, which is used 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. Form 8-K when we are unable to locate Form S-4, for example, in the case of private placement where registration can be exempt. We read Form 8-K to identify the information on share issuance. Typically, in 8-K, it states that “we intend to issue XXX number of shares” or “the maximum number of shares to be issued is approximately XXX.”
3. Occasionally, acquirers only report the fixed exchange ratio. In this case, we use the fixed ratio times target shares outstanding (diluted) to estimate the number of acquirer shares to be issued.
4. Occasionally, acquirers report deal value and the portion of the deal financed by stock. For example, RCM Technologies, Inc. (NASDAQ: RCMT; “RCM”), 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. (NASDAQ: CTGX; “CTG”) 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

²⁵ There are a number of reasons that “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 shareholders may have a choice over cash versus stock payment. Finally, some public target firms have convertible debt and/or options outstanding prior to the bid. In this case, acquirers do not know exactly how much the convertible debt 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.

²⁶ Most of the time, we rely on acquirers’ S-4 or 8-K. When there is no S-4 or 8-K available for acquirers and target firms happen to be public, we search target firms’ 8-K for relevant information.

divided by acquirer share price the day prior to the deal announcement to calculate the number of acquirer shares to be issued.

5. Occasionally, acquirers say “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 / (the number of acquirer shares outstanding (31.616 million) + the number of new shares to be issued) = 26%, to back out the number of new shares to be issued. The number of new shares to be issued is 11.108 million.

After obtaining the number of new shares a firm intends to issue, we divide the number by the number of shares outstanding on the day prior to the merger announcement (i.e., day -1) to obtain the percent of new shares a firm intends to issue—our running variable.

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.

Appendix IA5.

Testing local randomization for all baseline characteristics

This table presents balancing tests suggested by Lee and Lemieux (2010) and Roberts and Whited (2013). The sample consists of 1,610 all-stock deals announced between 1995 and 2015 from the Thomson One Banker SDC database. The RD coefficients are estimated by fitting a local linear regression using a triangular kernel to the left and right of the 20% threshold. The optimal bandwidth from Imbens and Kalyanaraman (IK, 2011) is employed. All variables are defined in Appendix A. ***, **, * correspond to statistical significance at the 1, 5, and 10 percent levels, respectively.

Dep. Var.	Method	Coef.	Std. Err.	Z	P > z
M/B	Conventional	1.789	3.078	0.581	0.561
	Bias-corrected	-1.244	3.078	-0.404	0.686
	Robust	-1.244	3.688	-0.337	0.736
Leverage	Conventional	-0.024	0.019	-1.214	0.225
	Bias-corrected	-0.010	0.019	-0.513	0.608
	Robust	-0.010	0.029	-0.350	0.726
Deal value	Conventional	-42.392	119.300	-0.355	0.722
	Bias-corrected	-117.400	119.300	-0.984	0.325
	Robust	-117.400	194.740	-0.603	0.547
Relative size	Conventional	0.064	0.121	0.527	0.598
	Bias-corrected	0.069	0.121	0.569	0.570
	Robust	0.069	0.196	0.351	0.726
Diversifying	Conventional	-0.017	0.075	-0.234	0.815
	Bias-corrected	0.029	0.075	0.393	0.695
	Robust	0.029	0.109	0.269	0.788
Tender offer	Conventional	-0.018	0.034	-0.518	0.605
	Bias-corrected	-0.023	0.034	-0.666	0.505
	Robust	-0.023	0.043	-0.534	0.593
Public target	Conventional	0.011	0.081	0.130	0.896
	Bias-corrected	0.069	0.081	0.852	0.394
	Robust	0.069	0.151	0.460	0.645