PHBS WORKING PAPER SERIES

EPS-Sensitivity and Mergers

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May 2022

Working Paper 20220503

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Keywords: Earning per share, sensititvity, mergers.
JEL Classification: G31, G32, G34, G35

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First draft: December 2018

This draft: May 2022

Abstract*:* Announcements of mergers very often discuss the immediate impact of the deal on the acquirer's earnings per share (EPS). We argue that the focus on EPS reflects the difficulty of evaluating and communicating deal synergy in M&A practice, and provide supporting evidence. We show that the acquirer's EPS focus affects how deals are structured, the premium that is paid, and the types of deals that are done. EPS-driven M&A decisions are also associated with costly distortions in the acquirer's financial and investment policies.

* We are grateful to Heitor Almeida, Nelson Camanho (discussant), Olivier Dessaint (discussant), Ming Dong (discussant), Massimo Massa, Rik Sen, Zhishu Yang (discussant), Huizhong Zhang (discussant), Marc Zenner (discussant), and seminar participants at the Chinese University of Hong Kong, Hong Kong University of Science and Technology, Hong Kong Baptist University, University of Sydney, Massey University, CUHK (Shenzhen), Southern University of Science and Technology, National University of Singapore, Singapore Management University, Iowa State University, University of Waterloo, University of Surrey, University of Exeter, University of Bristol, Southern Methodist University, and conference participants at the SFS Cavalcade Asia-Pacific (2018), Tsinghua Finance Workshop (2019), CICF (2019), FMA Asia-Pacific (2019), EFA (2019), and MARC (2021) for helpful comments.

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I. Introduction

Market participants pay close attention to the impact on earnings per share (EPS) of mergers and acquisitions (M&A). Deal announcements routinely discuss the combined firm's earnings per share or EPS, e.g., whether a deal is immediately accretive or dilutive to the acquirer's EPS, and, if dilutive, how quickly it would turn accretive. Investment bankers are usually asked to conduct an EPS analysis when advising a deal, and managers frequently quote EPS accretion as a favorable feature of the deal.[1] In contrast, forecasts of deal synergy are rarely provided by managers around deal announcements. However, finance theories mainly focus on deal synergies, and do not assign any particular benefit to immediate EPS accretion, which is largely mechanical and uninformative about value creation. This disconnect between theory and practice motivates us to study the extent to which EPS-sensitivity affects M&A decisions, as well as the associated economic distortions.

While some previous studies have argued that managers care about EPS because their compensation is typically tied to it, or that analysts care about EPS (see Almeida (2018) for a survey), our focus is somewhat different. We argue that in mergers, managers emphasize EPS as it is easier for them to make the case for a deal via a readily understood metric than via deal synergy. Deal synergies are typically uncertain, difficult to forecast, and realized only over the longer term. Providing detailed synergy forecasts exposes management to legal risk: investors can sue the management for misleading synergy disclosure and may even ask managers to disclose the basis of their synergy estimates in court (e.g., Hewlett-Packer's merger with Compaq).[2] Synergy is also not reflected in the announced acquisition

[1] A Factiva search reveals 309,505 results when the keywords of "mergers" along with "EPS accretion" and "EPS dilution" are used. Phrases that frequently occur include "immediately accretive," "slightly accretive," "no material impact on EPS," "slightly dilutive in the first year but turn accretive in 3 years," "minimizes dilution and builds shareholder value," and close variants of these.

[2] Based on a Factiva search, Bernile and Bauguess (2011) and Dutodoir, Roosenboom, and Vasconcelos (2014) report that only about 20% of all deals are accompanied by a management forecast of synergy, and only 2% actually provide an NPV number.

premium, a widely reported metric intended to convey the wealth gain to the target shareholders.[3] Just as the premium is measured using the pre-announcement values of share prices that exclude synergy, the commonly considered EPS number is based on the current year's EPS forecasts of the target and acquirer that are made before deal announcement. We find evidence consistent with the premise that when evaluating the EPS impact of a deal, deal synergies' contribution to EPS are typically ignored.

If managers consistently emphasize the EPS impact of deals (particularly when it is favorable), investors get primed to evaluate deals on that basis. This matters because shareholder approval is required by the listing rules for deals involving new issuance of 20% or more of the acquirer's stock. Such deals are fairly common: about 50 percent of the deals in our sample of deals between U.S. listed companies for the 1991-2017 period would have triggered a shareholder vote if they were done entirely in stock. Even when shareholder approval is not formally required, investor reaction to deal announcements is material for managers – for example, the possibility of shareholder lawsuits is inversely related to the acquirer announcement return.

Since mergers are among the most significant economic transactions (the year 2021 saw $2 trillion in deals done in the U.S. alone),[4] the emphasis on the impact of a deal on acquirer's EPS at the expense of synergy has potentially major consequences for value creation. Both type I and type II errors in deal selection can occur: bad (i.e., low or negative synergy) deals may be done because of their favorable impact on the acquirer's EPS,[5] and good deals may not be done because of their likely adverse impact on EPS. Despite the importance of this issue, however, previous literature provides little consensus on the importance of EPS for merger transactions. While Lys and Vincent (1995) and Andrade (1999) recognize

[3] The acquisition premium for a deal that is widely reported at deal announcement is $xP_B + c - P_T$, where x is the exchange ratio, c the cash paid per target share, and P_B and P_T are the acquirer and target share prices *prior* to deal announcement. Since these are pre-announcement prices, they do not reflect deal synergies or at best do so imperfectly. .

[4] https://www.refinitiv.com/perspectives/market-insights/global-ma-soars-as-acquirers-make-up-for-lost-time/

[5] This could happen if managers obtain private benefits from doing deals.

EPS as an important factor for merger decisions and market reactions, the former focuses on a case study and the latter does not establish causal evidence. On the other hand, Hazelkorn and Zenner (2004) find that EPS accretion is only marginally relevant for stock returns, and Rau and Vermaelen (1998) do not find short-term EPS to be related to the post-merger performance. More recently, Bates, Garvey, Linck, Milbourn, and Xie (2021) suggest that EPS matters for the matching between targets and acquirers, but do not examine other dimensions of merger decisions.

We fill the gap by examining the impact of EPS concerns on the deal structures, the premiums paid, and the set of deals done. We first show, in an empirical setting that is based on the presence of discontinuities in the frequency of how deals are structured around critical EPS accretion/dilution thresholds for the acquirer, that EPS considerations are important for managers and affect how deals are structured. By exploiting discontinuities in deal structuring around voting thresholds that would trigger mandatory shareholder votes, we provide evidence that shareholder approval is an important consideration for structuring deals so that the EPS impact is favorable. Based on similar discontinuity analysis, we show that deals that are slightly accretive to EPS are associated with more favorable stock market reaction for the acquirer than deals that are slightly dilutive. While we cannot observe the counterfactual deals that could have been done based on synergy considerations alone, we establish evidence on some of the economic distortions associated with EPS-sensitivity. Finally, we discuss the connection between EPS sensitivity and relative valuation of the target and acquirer, and show that when cash is not used, the deal premium is adjusted to accommodate the acquirer's preference for EPS accretion.

The widely calculated mechanical impact of M&A on the combined EPS in the short term is largely driven by the shares issued to target investors in deals in which the consideration is paid at least in part with the acquirer's stock. Relative to issuing stock, paying cash is generally friendlier to EPS. As long as the interest cost of financing the cash (or the forgone opportunity costs of cash) is not too high, paying cash

leads to a relatively higher combined EPS since it avoids issuing additional shares. However, paying cash incurs additional economic costs, as it triggers immediate tax liabilities and additional flotation costs for financing the cash. The need to finance the cash payment may further distort the acquirer's other cash-using activities. Therefore, we hypothesize that deal structures are determined by balancing the cosmetic benefit of EPS accretion and the cost of paying cash. Cash is more likely to be used as payment for mergers when a deal would incur mechanical EPS dilution if paid in stock.

To test this intuition, we make use of a novel measure of the acquirer's potential change in EPS if a deal were fully paid with stock. This measure ignores any deal synergy and relies on the pre-announcement EPS forecasts of the target and acquirer. We find that 51.5% of the potentially dilutive deals are actually paid (either fully or partially) with cash, whereas only 33.2% of the potentially accretive deals use any cash consideration. The proportion of potentially dilutive deals has been increasing over time, and the trend broadly matches a similar increasing trend in the fraction of cash and mixed deals. These findings are consistent with the argument that cash is preferred to stock when the latter would result in EPS dilution.

To test our hypotheses more rigorously, we examine whether the tendency of paying cash is disproportionately higher for deals that would be associated with slight dilution as opposed to slight accretion. This discontinuity at the point where the deal could no longer be called accretive (if paid entirely in stock) would arise if cash is used to substitute stock payment specifically to avoid EPS dilution. The identification relies on two assumptions. First, even a small magnitude of dilution would reduce the attractiveness of stock payments. Second, any factor other than the EPS concern should not affect the choice between paying cash and stock in a *discontinuous manner* around the zero threshold of potential change in EPS. We further emphasize that while a myriad of factors could contribute to the consideration decision, none of the alternative explanations predict a discontinuity at the dilution/accretion barrier.

We find strong supportive evidence based on both the propensity of paying cash and the fraction of cash in deal consideration. In economic terms, the fraction of cash is larger by 5 to 17 percentage points for the deals slightly on the negative side of the zero potential change in EPS compared to the deals slightly on the positive side. Moreover, 87.6 percent of cash deals with the potential change in EPS just below zero are associated with relatively low financing costs, so that even after deducting the opportunity costs of cash, the resulting EPS would still be larger than the potential EPS in the case of all-stock payment. We refer to such deals as being paid with the "EPS-friendly cash," and further confirm that the discontinuity is mainly attributed to this kind of cash payment. Last, we find that among the potentially slightly dilutive deals, some are paid with a combination of cash and stock. Among these "mixed" deals, the intended EPS according to the deal terms is just enough to be accretive. In other words, these deals have been carefully designed to achieve accretion, but not a deep accretion, which would occur if significantly more cash were added. The last observation is consistent with our argument that paying cash is costly.

We study voting as one of the channels through which shareholder perception affects managers' decision on the deal structure. When the deal consideration involves payment in stock exceeding 20% of the acquirer's shares outstanding, listing rules require voting approval by the acquirer shareholders (Li, Liu, and Wu, 2018). Therefore, when the 20% threshold is about to be crossed and the deal would be dilutive had it been paid in stock, acquirer management has the greatest incentive to substitute stock with cash as the method of payment, since paying cash could reduce both the dilutive EPS impact of the deal and the chance of being required to hold a shareholder vote. We find supportive evidence: potentially dilutive deals are likely to involve cash when financing these deals entirely with stock would trigger mandatory shareholder voting; however, there is no such pattern for the potentially accretive deals. We also find that around the 20% boundary, the probability of deal completion is lower for the stock deals that are required to have a vote than the ones that are not; however, this is only the case for the dilutive deals. Last, deeply dilutive stock deals are associated with a completion rate that is 2 percentage points

lower than the other stock deals.[6] We conclude that obtaining shareholder approval of deals is an important reason why EPS accretion matters for acquirers.

We also provide evidence that the market reacts more positively to accretive than to dilutive deals. To do so, and to mitigate the effect of confounding factors, we compare pure stock deals that are slightly accretive versus those that are slightly dilutive. Some stock deals may remain slightly dilutive because it is costly for the acquirer to raise cash, or cash is not "EPS-friendly". Similar to our main tests, we study whether the market reaction is discontinuously higher as the change in EPS for pure stock deals goes from slightly negative to slightly positive.[7] We find that the acquirer's three-day stock price reaction is significantly more positive for the slightly accretive deals than the slightly dilutive ones. Such a difference disappears in the longer run. These results confirm that acquirer shareholders consider EPS-dilution as a signal of value loss, at least in a short window around deal announcement during which deal fundamentals have not been fully revealed to or evaluated by investors.

All these results together support the conclusion that a positive EPS impact is a major determinant of how deals are structured, and obtaining shareholder approval is an important reason why managers pay attention to the EPS impact of a deal. We next establish that EPS-driven deal structure is associated with distortions to the acquirer's investment policy. We find that prior to announcing a deal in which they use cash to counter potential dilution, firms preserve financial flexibility by cutting investments to increase their cash holdings. This implies that the market's focus on EPS can divert cash from other potentially value-enhancing corporate decisions and can pose a challenge to acquirers in maintaining their financial flexibility.

[6] The average failure rate of stock deals (for which we can measure the EPS impact) is 10.89%.

[7] We confirm that deal and acquirer characteristics are mostly smoothly distributed around the zero change in EPS threshold. These deal and acquirer characteristics, as well as the deal premium, are also controlled for in regressions.

Finally, we show that relative valuations (P/E ratios) of the acquirer and target along with the negotiated premia in stock deals are consistent with the parties creating a deal that offers a positive premium for target shareholders while remaining accretive to acquirer shareholders. We also present evidence inconsistent with this simply being a manifestation of overvalued acquirers or of pooling accounting treatment.

We contribute to the literature on how merger decisions are affected by the non-fundamental consideration of EPS. Andrade (1999) and Bates et al. (2019) argue that EPS-bootstrapping may have contributed to the merger wave in the late 1990s (related research shows that the accounting rules in place until 2001 that affected the post-merger earnings reporting had a material impact on the method of payment; see Lys and Vincent (1995), Aboody, Kasznik, and Williams (2000), and de Bodt, Cousin, and Roll (2017)).[8] We add to the literature by proposing novel tests to capture the EPS-sensitivity of deal structures, and showing that the sensitivity remained significant and, if anything, increased after 2001. We argue that EPS-sensitivity potentially explains why cash payments have become the major means of payment during this period, when "low-buys-high" deals became more common and cash payments were necessary to mitigate dilution while paying a positive premium. More importantly, the extent to which deals are influenced by the mechanical accretion considerations sheds light on the extent of distortion that EPS focus creates in the market for corporate control.

We also address the literature on the distortions that concern for EPS has on corporate decisions. Hribar, Jenkins, and Johnson (2006) show that firms tend to repurchase stock to meet analysts' EPS forecasts, and Almeida, Fos, and Kronlund (2016) find that managers are willing to trade off investment

[8] Prior to 2001, the pooling method of accounting was allowed for stock deals but not for cash deals. All else equal, pooling accounting is friendlier to EPS than the purchasing accounting, as the former does not require recognizing goodwill. It has been argued that stock was the more popular form of payment in the 1990s, because deals were structured to qualify for pooling accounting (Lys and Vincent (1995), Aboody, Kasznik, and Williams (2000)). De Bodt, Cousin, and Roll (2017) further argue that the abolition of pooling accounting in 2001 has contributed to the switch to cash as the more favorable form of payment after 2001.

and employment for EPS-driven stock repurchases. Bennett, Bettis, Gopalan, and Milbourn (2017) find that firms take actions, such as perturbing accounting accruals and cutting R&D expenditures, to meet the EPS goals specified in their CEOs' incentive plans. Cheng, Harford, and Zhang (2015) find that when the CEO's bonus is tied to EPS, the company is likely to conduct share repurchase, and that these repurchases are not followed by long-run abnormal returns, unlike other repurchases. Terry (2017) estimates that there is a significant cost at the macroeconomic level due to distortions to R&D caused by EPS targets. We add to the literature by showing that EPS-sensitivity has a major influence on firms' M&A decisions, the acquirers' financial and investment decisions around mergers, and shareholder value gains from the deal.

II. Empirical Design

1. Exclusion of Synergies from the "Combined EPS"

A merger's mechanical impact on EPS can be measured by comparing the acquirer's pre-merger EPS with a "combined EPS" that simply adds up the current earnings of the merging companies, and then scales the sum by the total number of shares of the combined entity (that can be calculated using deal terms and pre-deal share numbers). The combined EPS, which ignores any merger-related synergies and expenses, is widely cited in M&A practice. Often, discussions of EPS-impact specifically mention that such merger-related revenues and expenses are excluded. For example, in the report of the merger between U.S. Bancorp and Firstar Corporation, it says "the transaction … is expected to be 3.7 percent accretive to Firstar earnings per share in 2001… These accretion numbers … do not include increased earnings from revenue enhancements, or the reinvestment of excess capital."[9] Another example is Kroger's report regarding its acquisition of Roundy's, which mentions that "Kroger expects the merger to be slightly accretive to earnings in the first full year after closing, excluding merger-related expenses."[10] Managers and analysts seem to focus on the combined EPS that excludes synergies since the synergy forecasts would

[9] Source: Capital IQ
[10] Source: Capital IQ

involve managers' private information that is difficult for outsiders to verify, and could lead to future lawsuits if they fail to materialize. In some cases, combined EPS numbers provided by managers would include synergy considerations when the EPS number excluding synergy indicates dilution. For instance, in the announcement of Team Inc.'s acquisition of Furmanite Corp., which would be EPS-dilutive according to the combined EPS measure, the acquirer reports the following: "Team expects the transaction, including synergies, to contribute approximately $0.25 - $0.30 to earnings per share. Before synergies, Team expects the transaction to contribute approximately $400 million in annual revenue and $38 million in annual adjusted EBITDA."[11] In this instance, Team Inc. avoided discussing the per-share earnings impact excluding synergies, which was dilutive, but mentioned the total earnings excluding synergies instead.

2. All-Stock Change in EPS

We now propose a measure to investigate the sensitivity of deal decisions to the potential EPS impact. As discussed, a merger's mechanical impact on EPS is primarily driven by the number of shares issued to target investors. Paying for the deal in cash can mitigate such a dilutive effect. Whereas paying cash incurs additional interest expense on the debt used to finance the deal, as long as such expenses are not too sizable, adding cash is less dilutive than its equivalent stock payment (more details to be discussed in Section II.4). However, cash – especially, paying for the entire deal in cash for the larger deals – is unlikely to be the preferred method of payment unconditionally. This is because paying cash may require additional borrowing, reduce the acquirer's financial flexibility and cause economic distortions, and would also trigger immediate tax liabilities for target shareholders. Therefore, we hypothesize that cash is more likely to be added to the deal consideration if (a) paying entirely in stock instead would have resulted in EPS dilution, and (b) holding the acquisition premium constant, using cash rather than stock would

[11] Source: Capital IQ

improve the EPS. The second condition is met unless the financing cost/opportunity cost of the cash is high.

We construct a measure of the potential change in EPS if the deal were paid fully in stock. For any transaction not done entirely in stock, this measure reflects the pressure of EPS dilution if the deal had been done entirely in stock. First, for each deal paid with cash, we construct an "all-stock exchange ratio" that is the offer price per share (p_O) scaled by the acquirer's stock price two days before the deal announcement ($p_{B,t-2}$).

$$x_{as} = \frac{p_O}{p_{B,t-2}}$$

For stock deals, the all-stock exchange ratio is the same as the actual exchange ratio specified in the deal terms. This all-stock exchange ratio captures what the exchange ratio would have been set at had the entire deal consideration been paid in stock.

Next, we measure the all-stock combined EPS using the all-stock exchange ratio as follows:

$$e_{as} = \frac{e_T n + e_B m}{n \cdot x_{as} + m}$$

where n and m refer to the target's and acquirer's number of common shares outstanding before the deal, and e_T and e_B are the analysts' consensus forecasts for the target's and acquirer's current-year EPS (that is, the median forecasts of annual EPS that were made within 180 days before deal announcements). Our choice of the analysts' consensus forecast is motivated by the fact that these forecasts are widely available and followed in the market.[12] Moreover, the earnings forecasts from analysts, commonly referred to as "street earnings", typically ignore special and non-recurring items that are difficult to

[12] Liu, Nissim, and Thomas (2002) find that the forecasted EPS predicts stock returns better than historical EPS and other accounting metrics.

forecast. Therefore, given that the merger announcements often are associated with little quantitative guidance from managers regarding merger synergies and costs, it is reasonable to assume that shareholders (and security analysts) also pay attention to these street forecasts and use these to evaluate the EPS impact of merger deals.[13]

Last, we measure the potential impact of a merger on EPS in terms of the change from the acquirer's pre-deal EPS to the all-stock EPS (this difference is called ΔEPS_{as} hereafter). To make the magnitude comparable across firms, we construct the following standardized measure that scales the all-stock change in EPS by the acquirer's stock price two days before the deal announcement.

$$S\_\Delta EPS_{as} = \frac{e_{as} - e_B}{p_{B,-2}}$$

Our method of constructing the all-stock exchange ratio and the associated EPS-constructs implicitly assumes that from the target shareholders' perspective, the focus is on the acquisition premium (which is based on pre-announcement prices and deal terms per target share and does not include any estimates of deal synergy). If synergy considerations played a major role, the premium would be sensitive to the relative importance of cash and stock payment per target share. We show below that our major results remain unaffected if we allow variations in the value of the offer (i.e., the cash offered per share plus the value of any stock component at the acquirer's pre-announcement price) within a range of +/- 5% of the offer price when an all-cash or a mixed offer hypothetically converts to an all-stock offer.

3. Empirical Setting

Our EPS-sensitivity hypothesis implies that the more negative $S\_\Delta EPS_{as}$ is, the more likely it is that a deal is paid in cash rather than stock. Moreover, managers, analysts, and investors care about whether a deal

[13] Although managers may be able to manage analysts' expectations and influence their forecasts (He, Liu, Netter, and Shu, 2020), this does not invalidate using analysts forecasts for our analysis, since these forecasts represent the market beliefs that managers need to pay attention to when structuring the deal.

could be called "dilutive" or "accretive" according to the simplest and most objective combined EPS calculation. Therefore, they are concerned about even a small magnitude of dilution, which makes a cash payment disproportionately more likely to be made when $S\_\Delta EPS_{as}$ is slightly negative as opposed to being slightly positive. We test this conjecture by estimating the following regression that is in the spirit of a Regression Discontinuity Design (RDD).

$$Cash = \alpha \cdot Dilutive_{as} + \beta_1 \cdot S\_\Delta EPS_{as} + \beta_2 \cdot Dilutive_{as} \times S\_\Delta EPS_{as} + X + \eta + t + \varepsilon \qquad (1)$$

The dependent variable is either the proportion of cash in deal consideration or an indicator variable for cash and mixed deals.[14] $Dilutive_{AS}$ is a dummy indicator that the all-stock change in EPS (what we call potential change) is negative. The regression controls for up to the third polynomial terms of $S\_\Delta EPS_{as}$ and their interactions with $Dilutive_{AS}$. We also control for an extensive set of deal and firm characteristics that are known from the literature to be relevant to the choice of payment method, such as deal size, deal premium, market-to-book ratio of both the acquirer and target, the relative P/E ratio of target over acquirer, target size, cash holding, leverage, and tangibility of assets. Industry and year fixed effects or industry-year paired fixed effects are also controlled for. The latter is to capture the industry merger waves which could be associated with a particular method of payment. We expect the coefficient on $Dilutive_{AS}$ to be positive and significant.

Our setting differs from the typical RDD, as our running variable is constructed rather than directly observed. However, as argued before, the running variable, $S\_\Delta EPS_{as}$, for deals not done entirely in stock, captures the counterfactual of what the EPS impact would have been had the deal been done in stock, based on an EPS metric that is transparent and straightforward to calculate and has been the focus of

[14] As discussed, depending on the relevant interest costs or the opportunity cost of cash, we would also expect these cash and mixed deals to have a more favorable impact on EPS than if done entirely in stock. This is discussed further in the next section.

both the managers and market participants. As such, it captures a deal's EPS dilution pressure in the case of hypothetical stock payment.

A positive estimate of α would reflect a discontinuous sensitivity of deal consideration to the dilution pressure at the threshold of zero, which can be driven by three effects. First, it could reflect the acquirers' tendency to substitute stock with cash as payment when the former would result in dilution. Second, a cash-constrained acquirer, unwilling to complete a dilutive all-stock deal and unable to add a significant amount of cash, may bargain with the target for a lower premium, and settle on an exchange ratio that just renders the deal accretive. Third, some stock deals that incur small dilution might have been forgone if the acquirer is unwilling (or unable) to pay cash and, at the same time, the target is unwilling to accept a lower premium. All of these effects reflect EPS-sensitivity distortions to merger decisions that can all be present in the data, and we do not focus on disentangling them.

Our identifying assumption is *not* that $S\_\Delta EPS_{as}$ is exogenous to the choice of payment method, but rather that any correlation that is not due to EPS-sensitivity should not display a discontinuous pattern around the zero threshold of $S\_\Delta EPS_{as}$. Also, we do not attempt to argue that the variation in $S\_\Delta EPS_{as}$ around zero is exogenously determined. Rather, we argue that it is strong evidence of EPS-sensitivity if we find that there is a discontinuous change in the association between the method of payment and $S\_\Delta EPS_{as}$ from the positive side to the negative side of $S\_\Delta EPS_{as}$.

Last, our measurement of $S\_\Delta EPS_{as}$ is based on analysts' forecasts, which may contain noise in terms of reflecting what EPS number is in managers' mind when making the decisions. Such noise could bias us toward finding no discontinuity. To minimize the problem, we make use of the full sample of data, which resembles the global RD design, as our baseline setting. We also report the results using a smaller set of deals with $S\_\Delta EPS_{as}$ close to zero, adopting both parametric and non-parametric estimations. Finding significant results in the smaller sample would suggest that measurement noise is limited.

4. EPS-friendly Cash

If cash payment is financed through debt, the interest expenses of financing the cash would decrease the numerator of the combined EPS. Even if external financing is not involved, the opportunity costs of using cash should be considered as a factor that reduces the combined earnings. We examine such a "numerator effect" by estimating the intended EPS for each cash and mixed deal according to the actual deal terms, taking into account the expected interest expenses associated with financing the deal with cash.

Consider a deal that offers "c dollars and x shares of the combined firm per target firm's common stock." An all-stock (all-cash) deal could be regarded as having $c = 0$ ($x = 0$). The intended EPS is as follows.

$$e_{int} = \frac{e_T n + e_B m - (1-\tau)E(R)C}{n \cdot x + m}$$

where *C* refers to the total amount of cash payment ($\mathrm{C} = \mathrm{c} \cdot \mathrm{n}$), x is the actual exchange ratio of the deal, τ refers to the tax rate (0.34 for our sample period), and $E(R)$ is the estimated interest rate for financing the cash. Since it is unclear which interest rate the shareholders and/or managers consider relevant in determining the EPS impact of cash, we use two alternative measures. The first is the three-month treasury bill rate, which arguably captures the investors' perceived interest cost for financing the cash payment. As a robustness check, we also construct an alternative measure that considers the individual acquirer's borrowing cost if the deal is financed with cash.[15]

[15] In particular, we assume that if the acquirer holds excess cash benchmarked to the average level of comparable firms, the opportunity cost of paying out the excess cash is the three-month treasury rate; for the component of cash consideration that exceeds the acquirer's excess cash holding, the interest rate is the same as the ratio of acquirer's interest expense and total lagged debt before the deal announcement. The excess cash holding is estimated using the residual term of OLS regression of the firm's cash holding on firm characteristics and industry and year fixed effects following Pinkowitz, Stulz, and Williamson (2015).

One way to understand the EPS impact of cash payment is to regard an M&A deal as if it were done in two steps. In the first step, stock is issued to target investors and two firms are merged. The combined EPS is exactly the e_{as} as constructed in the previous section. In the second step, the combined firm repurchases a fraction of the shares issued in the first step. The "post-repurchase" EPS is e_{int} as constructed above. When the expected cost of paying cash is relatively high, repurchasing cannot improve EPS, i.e., $e_{int} < e_{as}$.[16]

When $e_{int} > e_{as}$ ($e_{int} < e_{as}$) we denote the deal's cash payment as *EPS-friendly* (*EPS-unfriendly*). Since both e_{int} and e_{as} are rounded to the nearest cent before comparison, there will also be some deals with $e_{int} = e_{as}$, which are referred to as *EPS-neutral* cash. We will examine whether the cash and mixed deals with $S\_\Delta EPS_{as}$ slightly below zero are indeed "EPS-friendly," and whether the discontinuity around zero $S\_\Delta EPS_{as}$ is driven by EPS-friendly cash payments. Moreover, if the firm proceeds with a mixed deal, deal consideration (i.e., C and x) should be adjusted for the intended EPS to appear just accretive, but not deeply accretive since cash payment is costly.

Before moving forward, we highlight an important difference between our notion of EPS-sensitivity in M&A and EPS-driven repurchases (e.g., Hribar et al. (2006) and Almeida et al. (2016)). While the previous literature finds that a stock repurchase could be launched to avoid missing analysts' EPS expectations, we do *not* argue that cash-paid acquisitions are primarily driven by the need to meet analysts' EPS forecasts. Rather, we argue that cash, as opposed to stock, is likely to be paid to target investors to alleviate dilution, when the deal could no longer be called accretive in the case of stock payment.

III. Data

[16] $e_{int} < e_{as}$ is equivalent to $\frac{e_{as}}{p_r} < (1-\tau)E(R)$, where p_r is the price per share paid to repurchase the stocks.

We obtain the merger events from SDC and impose the following restrictions on our sample: (1) both the target and acquirer are US public firms; (2) deal size is at least 1 million US dollars; (3) the acquirer owns less than 50% of the target before the deal and intends to own 100% after the deal; (4) the form of the transaction is "Merger," "Acquisition of Majority Interests," or "Acquisition of Assets;"[17] (5) the deal announcement occurs between 1991 and 2017;[18] (6) the deal transaction value accounts for at least 1% and no more than 150% of the acquirer's capitalization; (7) both the acquirer and target can be matched to CRSP; (8) the deal is paid with common stock, cash, or a mixture of those,[19] and (9) the deal status is either "Completed" or "Withdrawn." There are 3,799 mergers in our sample, 3,319 of which are completed. Our baseline analysis focuses on the sample of completed deals. We classify the deals in our sample into three types—all stock, all cash, and mixed deals—based on the method used to pay the target firm's common shareholders.[20] The SDC M&A data are further matched with the I/B/E/S data for the annual forecasts of EPS, with CRSP for stock prices and returns, and with Compustat for financial data.

For deals with cash consideration, we calculate the all-stock exchange ratio, using the offer price per share for a cash or mixed deal and scaling it by the acquirer's stock price two days before the deal announcement.[21] Our results are robust to using the price one day before or one month before

[17] We keep the deals coded A, AP, AA, AC, AM, AR, and M, and exclude buyout and repurchase deals.

[18] We exclude the deals announced before 1991 because the deal consideration information is not available in SDC.

[19] We exclude the deals involving non-cash and non-stock consideration ("other consideration" hereafter). "Other consideration" includes convertible bonds, preferred stock, profit-sharing unit, choice between different types of considerations, and assumption of liability. The assumption of liability is the most common form of "other consideration." When the acquirer assumes target liability, there is usually a wealth transfer between the target's shareholders and debtholders. Thus, the value paid to target common stockholders in such deal is unlikely to be comparable with that in a deal without assumption of liability.

[20] We rely on both the SDC variable "consideration structure" and manual examination to classify deal types. The SDC "consideration structure" does not always reflect the payment method to the holders of target firms' common shares. For instance, if the common shareholders receive stock and preferred stock holders receive cash, the deal may be classified as "mixed deal" according to the SDC "consideration structure." We reclassify such a deal as a pure stock deal.

[21] For a few deals with collars, the exchange ratio is not fixed at announcement. The EPS implication of such deals is then determined by the eventual number of shares issued. In our baseline, we leave out the stock deals with collars. As a robustness check, we also explore an "adjusted exchange ratio," which is the number of shares issued scaled

(untabulated). To measure the combined EPS, we focus on analysts' forecasts of annual EPS for the first year ending after the deal announcement. We require the forecasts to be made within 180 days before the deal announcements. We adjust for any stock splits that take place between the forecast reporting date and two days before the deal announcement date. We use the median value of annual forecasts; when it is missing, we use the historical (last-twelve-month) EPS reported in SDC. We find robust results without filling up the missing values (untabulated).

As reported in Table 1, 71.4% of the completed merger deals would be dilutive to EPS if executed using stock only. The percentage is the highest among cash deals (81%), followed by mixed deals (75.4%), and is the lowest among stock deals (64.5%).[22] These statistics are consistent with the argument that cash is preferred to stock when stock payment implies EPS dilution. However, while the fraction of potentially dilutive deals is higher for cash and mixed deals than for stock, we also see that stock deals are often dilutive. This reflects the tradeoff managers face between the dilutive impact of a stock deal and the cost of financing deals – especially those that are larger relative to acquirer size – with cash. As discussed later, we find that the deals done in stock are larger, and acquirers doing deals entirely in stock are likely to be more financially constrained and incur higher interest cost of financing. In the latter scenario, if the effect of interest costs on earnings is considered, adding cash need not mitigate EPS dilution.

In the time series, we show in Figure 1 that there is an increasing trend for cash as the method of payment. The fraction of cash and mixed deals was around 30% in the early 1990s, and it increased to about 70% in recent years.[23] Notably, we find that there has also been an increasing trend in the fraction

by the target's number of shares outstanding. Our results are robust to using the adjusted exchange ratio (untabulated).

[22] The deals with missing value on $S\_\Delta EPS_{as}$ are left out of the sample. The missing values are mainly driven by the lack of information related to the target.

[23] Such a pattern has been documented in the literature. de Bodt, Cousin, and Roll (2017) argue that the 2001 abolition of pooling accounting in takeovers contributed to lowering (earnings-based) managerial incentives to make stock payments. Eckbo, Makaew, and Thorburn (2018) suggest that the potential competition for the target from cash-paying private bidders may have driven the increasing popularity of cash deals.

of potentially dilutive deals -- that is, deals that would be dilutive if entirely done in stock. The trends provide suggestive evidence that EPS dilution concerns have had a material aggregate effect on the method of payment in M&A deals. Last, we note that the association between the two fractions has been stronger after 2000 than before.

IV. Empirical Results

1. Baseline Result

We estimate Equation (1) and report the results in Table 2. We find that the coefficient on $Dilutive_{as}$ is positive and significant throughout different specifications, indicating a disproportionately higher tendency of paying cash when $S\_\Delta EPS_{as}$ crosses zero from the positive to the negative side. In the first four columns on the left, we use the full sample of completed deals, controlling for the higher-order polynomial terms of $S\_\Delta EPS_{as}$ and their interaction terms with $Dilutive_{as}$. In columns 2 to 4, we further control for different sets of the deal and firm characteristics and fixed effects.[24] In the last three columns on the right, we focus on a smaller set of deals with $S\_\Delta EPS_{as}$ within the range of [-0.002, 0.002]. The significant coefficient on $Dilutive_{as}$ is robust to different samples and control variables. In terms of the economic magnitude, the fraction of cash in the deal consideration is larger by 5 to 17 percentage points (depending on the specification) for a slightly if-stock dilutive deal than for a slightly if-stock accretive deal. Figure 2 provides visual evidence. In addition to the discontinuity, we also see from the upper two graphs (which make use of the full sample) that the propensity of adding cash decreases both as the deals become more deeply accretive as well as more potentially deeply dilutive if done entirely in stock – the latter is likely to reflect the fact that it becomes costly to raise the amount of cash needed to convert a dilutive deal to accretive as it becomes more deeply dilutive.

[24] The P/E ratio of the target and acquirer is only well defined when both firms have positive EPS. Including this variable in column 4 reduces the sample size by about 350 deals.

We next directly check whether the deals on both sides of zero $S\_\Delta EPS_{as}$ are comparable with each other. We report in Online Appendix Table OA1 the mean values of each variable of the deal and firm characteristics among the deals with $S\_\Delta EPS_{as}$ in [-0.002, 0), at 0, and in (0, 0.002].[25] To make sure that the distributions of acquirer, target or deal characteristics do not change discontinuously around the zero $S\_\Delta EPS_{as}$ threshold, we conduct a local RD test for each variable. In particular, we take the deals with $S\_\Delta EPS_{as}$ in [-0.002, 0.002], and regress each variable on the dummy indicator of $Dilutive_{as}$, $S\_\Delta EPS_{as}$, and their interaction terms, controlling for the other characteristics and industry and year fixed effects. In the last two columns of Online Appendix Table OA1, we report the point estimates and t-statistics of the coefficients on $Dilutive_{as}$. We find that except for deal size, none of the other characteristics shows a disproportionate difference between the negative and positive sides of zero $S\_\Delta EPS_{as}$. To make sure that the discontinuous distribution of deal size does not drive our baseline result in Table 2, we further control for the interaction of deal size and the if-stock dilutive dummy, and find our results are robust (untabulated).

In Online Appendix Figure OA1, we plot the distribution of the running variable. In Panel A, we show the histogram of $S\_\Delta EPS_{as}$ among all the completed deals along with a fitted smooth density. In Panel B, we test whether the actual number of deals in each bin of the histogram is significantly different from the estimated smooth density. We find that there is an abnormally larger number of deals in the two bins just to the left and right of zero.[26] This possibly reflects the tendency of two firms with the similar level of valuation to merge with each other (and "like-buys-like" hypothesize discussed by Rhodes-Kropf and

[25] There are some deals with exactly zero all-stock change in EPS, because both the all-stock EPS and the acquirer EPS are rounded to the nearest cent.

[26] If $S\_\Delta EPS_{as}$ is exactly zero, the deal is included in the bin just right to zero, to keep consistency with our cutoff point for $Dilutive_{as}$ in the regressions.

Robinson (2008)) and to set the deal multiple close to the acquirer's P/E level.[27] However, when we fit densities from both sides of zero $S\_\Delta EPS_{as}$, we do not find the densities to be significantly different from each other as shown in Panel C. Overall, the evidence shows that there is no discontinuous distribution of $S\_\Delta EPS_{as}$ around zero. However, there is an abnormally large clustering of deals with $S\_\Delta EPS_{as}$ close to zero. The latter feature is favorable to our RD test, as it guarantees a relatively large sample of deals within the small neighborhood of zero $S\_\Delta EPS_{as}$.

We examine the robustness of our baseline result by estimating the regressions in an even smaller range of $S\_\Delta EPS_{as}$ in [-0.001, 0.001]. As shown in Panel A of Online Appendix Table OA2, the coefficient on $Dilutive_{as}$ remains positive and generally significant throughout the specifications, although there are fewer than 600 deals in this sample. In Panel B of Table OA2, we further find the result to remain significant using non-parametric estimation techniques.

2. EPS-friendly Cash Payments

One might be concerned that since using cash has a numerator effect on EPS, our results are affected by ignoring this cost of using cash to avoid EPS dilution. To investigate this, we compare the intended EPS, which takes the interest expenses of financing the cash into account, with the potential EPS that would result had the entire deal been paid with stock. We are particularly interested in the cash and mixed deals that would be slightly dilutive to EPS according to $S\_\Delta EPS_{as}$. If cash is indeed paid to alleviate dilution for these deals, we should find the majority of these deals having an intended EPS higher than the all-stock EPS. In Panel A of Table 3, we find that only 5.2 percent of the deals with $S\_\Delta EPS_{as}$ in the range of [-0.002, 0) are paid with EPS-unfriendly cash, namely, having an intended EPS (using Treasury rate to proxy the cost of financing cash payment through debt) smaller than the all-stock EPS. On the other hand, the

[27] The difference between the combined EPS and the acquirer's EPS for a deal done entirely in stock is proportional to $\frac{P_B}{e_B} - (1+\pi)\frac{P_T}{e_T}$, where π denotes the acquisition premium $x\frac{P_B}{P_T} - 1$, and x is the exchange ratio. Thus, if the acquirer's P/E ratio is somewhat higher than that of the target, the implied $S\_\Delta EPS_{as}$ would be small.

fraction of EPS-unfriendly cash is larger in the other ranges of $S\_\Delta EPS_{as}$.[28] Overall, only 12 percent of cash and mixed deals involve EPS-unfriendly cash. These combined results strongly suggest that the disproportional fraction of cash and mixed deals with $S\_\Delta EPS_{as}$ right below zero are likely motivated by the need to mitigate EPS dilution, even after we consider the interest expenses of financing the cash.

We further investigate whether the discontinuity in the baseline result is driven by the cash payments that improve EPS even accounting for interest costs. In Panel B of Table 3, we replace the independent variable in Table 2 with the indicator of EPS-friendly cash or mixed deals, and find confirming evidence. In contrast, we find no discontinuity around the zero value of $S\_\Delta EPS_{as}$ for the propensity of doing an EPS-unfriendly cash or mixed deals relative to equity deals. We further show in Appendix Table OA3 that these results are robust to using the acquirer's implied interest cost, rather than the Treasury-bill rate, to calculate the intended EPS.

3. Mixed Deals

For some firms, adding cash to mitigate dilution does not necessarily mean it is optimal to pay the entire consideration with cash. These acquirers will balance the cosmetic benefit of EPS accretion and the costs associated with cash payment when determining the composition of the deal consideration.

We test this intuition using a small sample of mixed deals that are likely to be structured as such out of concern for the potential EPS impact. In particular, we focus on a subset of mixed deals with the $S\_\Delta EPS_{as}$ within a small region around zero. In Figure 3, we plot the standardized intended change in EPS ($S\_\Delta EPS_{int}$) against the standardized if-stock change in EPS ($S\_\Delta EPS_{as}$). If all the mixed deals choose the same composition of cash and stock, we should observe a positive correlation between $S\_\Delta EPS_{int}$ and

[28] In particular, 20.8 percent of deals with $S\_\Delta EPS_{as}$ in the range of (0, +0.002] are associated with EPS-unfriendly cash, suggesting that for accretive deals, there is room to accommodate EPS-unfriendly cash payments if there are reasons for either party to prefer not doing a deal entirely in stock. For example, fluctuations in the acquirer's price between deal announcement and completion would have a smaller effect on the premium if the deal is done partially in cash, reducing the likelihood of renegotiation and delay.

S_ΔEPS$_{as}$.[29] However, if cash is costly and used primarily to alleviate EPS dilution, *S_ΔEPS$_{int}$* should be managed to be just above zero when *S_ΔEPS$_{as}$* is negative.

In Figure 3, we first find that on the positive side of *S_ΔEPS$_{as}$,* there is a positive association between *S_ΔEPS$_{int}$* and *S_ΔEPS$_{as}$,* which reflects a mechanical relation between two measures in the case of a fairly stable composition of cash and stock. However, on the negative side of *S_ΔEPS$_{as}$,* the intended change in EPS remains slightly above zero, and is strikingly flat and insensitive to the amount of potential dilution. This strongly suggests that the fraction of cash for these deals has been carefully set to achieve essentially the same small magnitude of EPS accretion across the range of potential dilution. The evidence highlights the potential costs associated with EPS-friendly cash payments.

However, we do not expect all the slightly if-stock dilutive deals to be paid with a combination of cash and stock, since compared with all-cash deals, the structure of mixed deals is more complicated and flotation cost of such deals is likely higher. A cash-rich acquirer is more likely to choose the all-cash deal structure rather than the mixed structure to alleviate the dilution. In Online Appendix Table OA4, we examine this conjecture and find that the acquirers of mixed deals are more likely to be financially constrained than those for pure cash deals; the acquirers (targets) in mixed deals are relatively smaller (larger) in size than those in pure cash deals. We also find that the proportion of acquirers in the mixed deals that have positive excess cash holding is smaller than the corresponding proportion in all-cash deals, although the difference is not statistically significant. Overall, the evidence suggests that the high costs of financing cash payment is an important reason for paying for a deal with a mixture of cash and stock rather than entirely with cash.

[29] If cash accounts for λ proportion of offer price per share, i.e., $\frac{C}{n} = \lambda \cdot x_{as} p_B$, we have $x = (1-\lambda)x_{as}$ or $x_{as} = (1+\delta)x$. Holding the other parameters (including λ and δ) constant, when x increases, *ΔEPS$_{as}$* and *ΔEPS$_{int}$* both decrease, since $e_{as} - e_B = \frac{n(e_T - x_{as}e_B)}{m+nx_{as}} = \frac{n(e_T-(1+\delta)xe_B)}{m+n(1+\delta)x}$ and $e_{Int} - e_B = \frac{n(e_T - xe_B)-(1-\tau)E(R)n\delta x}{m+nx}$. Therefore, *ΔEPS$_{as}$* and *ΔEPS$_{int}$* move in the same direction and have a positive correlation.

4. Perturbations in the Offer Price

We implicitly assume that the offer price is not sensitive to the form of payment when we convert the offer price in a deal involving cash to an all-stock exchange ratio, creating the hypothetical all-stock EPS. Such an assumption is appropriate when target shareholders are focused on the deal premium *per se*, and largely ignore deal synergies.[30] However, we show that our results remain unchanged even when we accommodate modest perturbations in the offer price as deal composition changes from one involving cash to an all-stock offer. To do so, the ratio of each offer price divided by the acquirer's price (which is the all-stock exchange ratio) is multiplied by one plus a number that is randomly drawn within a $\pm 5\%$ range, and this latter number replaces the original all-stock exchange ratio. The all-stock exchange ratio for pure stock deals is not changed. This procedure allows for perturbations in not only the offer price, but also the acquirer's stock price before the deal announcement. We recalculate the all-stock change in EPS using the perturbed number. Such differences in the offer price or exchange ratio in the $\pm 5\%$ range are salient for the target; however, our intuition is that since the targets are typically much smaller firms than the acquirers, such perturbations do not produce significant changes in the all-stock combined EPS compared to the one calculated under the assumption that the offer price remains unchanged.[31] As a result, deals that are classified as slightly accretive or dilutive if done in stock would largely remain in these respective bins even after such a perturbation.

[30] The widely reported acquisition premium is $xP_B + c - P_T$, where x is the exchange ratio, c is the cash payment per target share, and P_B and P_T are the acquirer and target share prices prior to deal announcement. Different combinations of x and c offering the same premium are not value-neutral for the target and the acquirer when deal synergy is considered.

[31] To see this, recall that the combined EPS for an all-stock deal is $\frac{ne_T+me_B}{nx+m}$. The all-stock offer price is nxP_B. To accommodate a perturbation in the offer price, the exchange ratio x needs to adjust. The market value of the target is nP_T while that of the acquirer is mP_B. If the acquirer is much larger than the target, either P_B is much larger than P_T, or m is much larger than n, or both. In the former case, the required adjustment in x to accommodate the perturbation is small, and in the latter case, the first term in the denominator of the expression for the combined EPS is small compared to the second term. In either case, the combined EPS changes little.

Panel A in Appendix Table A1 confirms this intuition. The percentage of deals that do not change their status (as represented in the diagonal cells of the table) is 90 percent or higher. In Panel B, we report our main discontinuity results from Tables 2 and 3 for 100 replications of these regressions on samples where the offer price of each sample deal is randomly perturbed within the $\pm 5\%$ range. The results are robust to the perturbations.

5. Shareholder Voting

We now examine why managers are concerned about the EPS impact of a deal, and structure deals to mitigate an adverse EPS impact. As argued before, if acquirer shareholders consider the mechanical EPS change as an indicator of their gain or loss from the deal, they will perceive an EPS-dilutive deal as value-destroying and object to it. Anticipating this, managers tend to structure the deal in an "EPS-friendly" way to secure shareholder support. We hypothesize that the need to obtain voting support from shareholders is among the channels through which investors' preference over EPS accretion affects deal terms.

We first examine whether cash is more likely to be paid to counter EPS dilution, when paying stock would have triggered shareholder voting. NYSE and NASDAQ listing rules require acquirer shareholder approval when a deal is associated with share issuance of more than 20% of the acquirer's shares outstanding. For mixed deals, we calculate the total number of shares that would have been issued had the entire deal been paid with stock (called the "all-stock issuance" hereafter), and conduct our test using the combined sample of pure stock deals and mixed deals. The pure cash deals are excluded, as they typically would not breach the 20% threshold if done in stock.

Panel A of Table 4 shows that for if-stock dilutive deals, the fraction of mixed deals is about 5 percent higher if the 20% threshold is crossed than if it is not, compared to a 0.5 percent difference for if-stock accretive deals. This stark difference suggests that many mixed deals arise from the desire to avoid the combination of dilution and required shareholder approval. Panel B presents regression results. The

dependent variable in columns (1)-(3) is the proportion of the payment made in cash. In columns (4)-(6), it is an indicator variable that takes a value of 1 if the deal involves EPS-friendly cash, and zero otherwise. Column (1) shows that potentially dilutive deals involve 3.5 percent more cash payment in relation to the total payment. Since mixed deals only account for 19.2 percent of our sample, the estimate of 3.5 translates to 18.2 percentage point increase in cash proportion conditional on being a mixed deal, which is likely to have a substantial impact on the EPS. In column (2), we find that the while the cash percentage is (mechanically) lower in deals that require more all-stock issuance as a fraction of the acquirer's outstanding shares, this effect is mitigated if the deal is potentially dilutive. This result is consistent with the idea that deals that involve more share issuance are more likely to receive shareholder attention or require a shareholder vote. Finally, in column (3), we note that deals that require mandatory shareholder voting if done entirely in stock would involve on average 4 percent higher cash payment if they would be dilutive when done entirely in stock. Again, this translates to 19.3 percent more cash payment for the mixed deals, given that they constitute 20.75 percent of the deals requiring mandatory shareholder approval. Columns (4)-(6) present similar evidence with regard to the likelihood of financing deals with EPS-friendly cash. Overall, evidence suggests that the prospect of required shareholder voting in an all-stock dilutive deal increases the likelihood that managers substitute in cash to counter EPS dilution.

Next, we examine whether the EPS dilution concern has anything to do with the managers' tendency to avoid voting by changing the cash-stock composition in deal consideration. As established in Li, Liu, and Wu (2018), acquirer management tends to use cash when the all-stock issuance would exceed the 20% threshold. In other words, deals can be (and are) structured to avoid giving the acquirer's shareholders an opportunity to vote. If, as argued, shareholders dislike EPS-dilution even though it is cosmetic, they may reject a dilutive deal through voting. Therefore, knowing a deal would be dilutive if entirely paid with stock, the managers have the strongest incentive to avoid shareholder voting by

adjusting deal structures. Paying cash rather than stock can reduce the chance of being required to have a vote and at the same time mitigate the EPS dilution effect.

We find evidence supporting the hypothesis that "vote avoidance" is more likely to take place when a deal would be EPS-dilutive if fully paid with stock. We measure the gap between the stock issuance percent if a deal were entirely paid in stock (the "all-stock issue") and the 20% threshold, and regress the fraction of cash in deal consideration on this gap, controlling for its polynomial terms and their interactions with the dummy indicator of the all-stock issue exceeding 20%. As shown in the left three columns of Table 5, we find that among the if-stock dilutive deals, the dummy indicating that an all-stock issue would exceed 20% has a positive and significant coefficient. This means that the fraction of cash increases disproportionately when the share issuance required by full stock payment crosses the 20% threshold from below. In other words, these deals have been structured to avoid shareholder voting. In contrast, we do not find significant evidence of such voting avoidance in the subsample of if-stock accretive/neutral deals as shown in the right three columns of Table 5. This confirmatory evidence around the 20% threshold supports our assumption that managers proceed as if shareholders view EPS dilution as a negative signal of deal quality.

Last, we provide evidence that when a stock deal is dilutive to EPS, shareholder voting is associated with a higher chance of deal failure. As shown in Online Appendix Table OA5, the completion likelihood of the dilutive stock deals involving more than 20% share issuance is disproportionately lower than those issuing less than 20% new shares, as would be the case if shareholder voting increases the likelihood of rejecting an EPS-dilutive deal.[32] In contrast, we do not find a significant effect for the

[32] The sample for this test is limited to the stock deals for which we can find the number of shares registered with the stock exchanges from the S-4 filings and proxy statements. As illustrated by Li, Liu, and Wu (2018), the voting requirement is based on the number of shares registered, which is subject to factors out of managers' control. Thus, the test result could be explained as the causal impact of voting on deal completion. However, our test has the caveat that it is lack of statistical power due to the small sample size.

accretive stock deals. We also find that among the pure stock deals, if *S_ΔEPS* is more negative than the median level, there is an 11.8% chance of deal failure. However, for the stock deals with *S_ΔEPS* higher than the median level, the deal failure rate is only 9.9%. Overall, the evidence suggests that dilutive deals are under greater scrutiny by shareholders than the accretive ones. This further implies that some dilutive deals might have been rejected/forgone because shareholders' accretion preference could not be satisfied.

6. Market Reactions

We next examine the acquirer's market reactions to the announcement of EPS-accretive and dilutive deals. Although managers tend to structure the deals to mitigate dilution, many dilutive stock deals are still done, possibly because acquirers are cash-constrained or the interest costs of financing the cash payment are high.[33]

Although the announced deal structures result from tradeoffs of cosmetic EPS impact and real economic effects, investors' immediate perception of the dilutive deals may still differ from that of the accretive deals. We test this conjecture in Table 6 by comparing the stock deals that incur a small magnitude of EPS accretion with the stock deals incurring small dilution using our standardized all-stock EPS change measure. As shown in Panel A, the former group is associated with a significantly more positive CAR in a three-day window around the deal announcements than the latter. This suggests that investors form more favorable perceptions about the accretive stock deals at least in the short window around deal announcement. On the other hand, in Panel B, we find the return difference vanishes by the time of deal

[33] As shown in Appendix Table A2, compared to the acquirers of the cash and mixed deals, the acquirers of stock deals are relatively smaller, are involved in deals with larger deal size to acquirer size, and more likely to be financially constrained. Although they are more likely to hold excess cash, they face higher borrowing cost (measured by both the treasury rate and implied interest rate). If the entire stock consideration were paid with cash, 49.2% of these acquirers would end up with an even lower EPS after we deduct the interest costs (estimated using the implied interest rates) than the all-stock EPS. In other words, the acquirers of many stock deals face high costs of raising cash, so that paying cash may not actually be friendlier to EPS than paying stock. This possibly explains why many dilutive deals are eventually paid with stock.

completion. A plausible explanation is that when dilution is unavoidable, managers spend more time post-deal announcement to explain the value proposition of the deal to analysts and investors. This also implies that the mechanical combined EPS measure mainly captures the cosmetic EPS impact and has little to do with deal fundamentals. These results are robust to choosing different ranges of EPS changes for the test sample (column 1 to 3), to controlling for deal and firm characteristics and *S_ΔEPS* polynomial terms (column 2 to 3), as well as including the deal premium as a control variable (column 4 to 6).

We do not intend to argue that the EPS changes around zero are exogenous to market reactions, since the EPS change is determined by deal terms that are chosen by managers who likely take stock returns into consideration. However, our results suggest that investors do not take into account the managers' tradeoffs underlying the deal terms immediately upon deal announcements, especially if the magnitude of dilution or accretion is small. Therefore, we can infer investors' preference over EPS accretion versus dilution from the short-term stock reactions. We further argue that the results in Table 6 are unlikely to be driven by the alternative explanation that investors learn about the acquirer's financial constraints from the announcement of a slightly dilutive deal. Because the financial conditions are unlikely to experience a dramatic change by the time of deal completion, this alternative explanation does not predict the non-result in Panel B. We also confirm in Online Appendix Table OA6 that the stock deals incurring small dilution and small accretion are comparable – most of the deal and firm characteristics do not present discontinuous patterns around the zero threshold of EPS change. These characteristics are also controlled for in the regressions in Table 6, and therefore do not drive the results.

7. Distortions to Financial and Investment Policies

As discussed, sensitivity to the EPS impact of a deal can cause both type I and type II errors in deal selection. Since it is difficult to identify the counterfactual deals that could have been done based on deal NPV alone, it is challenging to directly test such an implication. However, the cash payments driven by EPS sensitivity

could introduce other distortions such as affecting financial flexibility and investment policy. For example, doing a deal in cash can cause firms to become over-levered relative to target leverage (Harford, Klasa, and Walcott (2009)), and the need to build up a cash buffer could cause firms to under-invest prior to their M&A deals. In this section, we examine whether EPS-sensitivity is associated with such effects.

First, we find that EPS-driven cash payment is mainly financed by issuing debt, and prior to the deal announcement the acquirer preserves financial flexibility by saving cash. As shown in Panel A of Table 7, during the two quarters before announcing cash and mixed deals, the acquirers' cash holding increases and external financing decreases; however, there is no significant change in cash holding and external financing before the announcements of the all-stock deals. Next, we break down the cash and mixed deals into the if-stock dilutive deals and the other deals. As shown in Column 3, a larger amount of cash paid for the if-stock dilutive deals is associated with a significantly larger increase in cash holding, while the increase in cash holding before the if-stock non-dilutive deals is insignificant. These findings suggest that in planning to pay for an upcoming deal with cash to counter EPS dilution, the acquirer preserves financial capacity by increasing cash holdings. However, cash payments for if-stock non-dilutive deals are likely only made if the acquirer is not cash-constrained, and so there is no evidence that in this situation the acquirer builds up a cash reserve. In Panel B of Table 7, we examine how financial policies change during the quarter of, and quarter after, deal announcements. We find that while cash holdings do not change, debt and equity issues increase after the announcement of large deals paid in cash, and the magnitude of debt issue increase is much larger than that of equity issue, as would be the case if cash payments are also financed through debt. We also find in Column 6 that there is a larger increase in debt issue for the cash paid to if-stock dilutive deals than the other deals. Taken together, the evidence is consistent with EPS-sensitivity affecting acquirer's financial policies around the deal, which could have long-term influence on the firm's financial flexibility after mergers (Harford, Klasa, and Walcott (2009)).

Next, we examine whether the need to preserve financial capacity before announcing the EPS-driven cash deals is associated with distortions of other firm decisions. In Table 8, we regress capital expenditure on known determinants of investment opportunities. We find that capital expenditures are significantly lower in the two quarters before announcement for cash and mixed deals, but not for stock deals. When the amount of cash is broken down to payments to the if-stock dilutive and if-stock non-dilutive deals, we find the former has a larger and more significant coefficient. This suggests that the need to preserve financial flexibility for the cash payment to counter EPS dilution is associated with costs in terms of forgone investment.

Last, the value distortion of paying cash should also be reflected in shareholders' total gain from the deal. If cash paid to counter dilution is associated with real costs, such deals should be associated with a lower net value creation in the long term than the deals that are paid in stock and remain dilutive. We measure the deal's value creation in terms of the acquirer's and target's combined cumulative stock returns (CAR) from 42 trading days before the deal announcement to completion date following Schwert (2000), Gaspar, Massa, and Matos (2005), etc.[34] In Table 9, the combined CAR [-42, C] is regressed on an indicator for if-stock dilution, proportion of cash in deal consideration (or a dummy indicator of cash and mixed deals), and their interactions, controlling for the deal and firm characteristics (excluding deal premium) and industry and year fixed effects. We find that while shareholders' combined returns are higher when the deal involves cash payment, the interaction of cash payment and the dummy of if-stock dilutive is significantly negative. Thus, conditional on facing dilution pressure in the case of all-stock payment, the deals that are eventually paid with cash are associated with a lower combined shareholder gain than the ones paid in stock. Moreover, when we break down the combined CAR [-42, C] into the

[34] The pre-announcement period is included to capture the run-up of target stock prices due to information leakage about the deal (Schwert (1996)). It is the conventional practice to measure target shareholders' value gain (or acquisition premium) by CAR [-42, C] (see Bargeron, et. al. (2008), and Fu, Lin, and Officer (2013)), and acquirer shareholder' value gain in the same window (see Schwert (2000) and Gaspar, Massa, and Matos (2005)).

acquirer's and target's CAR, the result is mainly driven by the acquirer's return; the target's return goes the other way, although the interaction terms are statistically insignificant. Taken together, deals structured to alleviate the acquirer's EPS dilution are not associated with superior shareholder gains in the long run, although the EPS-friendly structure helps with gaining shareholder support in the shorter-term following deal announcement. [35]

V. Further Evidence and Discussions

1. Relative P/E Ratio and Sub-period Analysis

We now discuss which types of deals are most likely to be done given the EPS-sensitivity. As discussed before, a deal is more likely to be approved by the acquirer's shareholders when it is accretive to EPS. On the other hand, target shareholders almost never accept an offer with a non-positive premium. Consequently, a deal that combines a positive premium and is at the same time EPS-accretive for the acquirer is most likely to receive the approval of both groups of shareholders. Focusing on the all-stock deals, EPS-accretion requires the acquirer's P/E ratio to exceed deal multiple ($\frac{p_B}{e_B} > \frac{p_O}{e_T}$), while positive premium implies deal multiple to be higher than the target's P/E ($\frac{p_O}{e_T} > \frac{p_T}{e_T}$). Taken together, a stock deal involving a high P/E acquirer buying a low P/E target ($\frac{p_B}{e_B} > \frac{p_T}{e_T}$) would satisfy both "requirements" that the deal offers a positive premium to the target and is also accretive for the acquirer (see the illustrative graph in the upper panel of Appendix Figure A1). This implies that most of the all-stock deals that take place should be associated with a higher acquirer's P/E than the target's P/E. On the other hand, if the acquirer's P/E is lower than the target's P/E, it is not possible for an all-stock deal to offer a positive premium and still be accretive for the acquirer (see the lower panel of Figure A1). To avoid EPS dilution, the latter type

[35] It is possible that only deals with relatively weak value propositions are done partially in cash to mitigate dilution, while managers may prefer to avoid the distortionary effects of cash when the value propositions can be communicated to shareholders prior to deal completion. This could also contribute to poorer performance of cash-financed dilutive deals than those done in stock.

of deal is more likely to be paid in cash or a combination of cash and stock, and may have to be forgone if the acquirer is averse to dilution but is cash-constrained. In Table 10, we find consistent evidence. Among the deals with a higher acquirer P/E than the target P/E (the "high-buys-low" type), 61.25% are paid entirely with stock. For the deals with a lower acquirer P/E than target P/E (the "low-buys-high" type), only 47.65% are all-stock deals. A majority of stock deals (54.45%) belong to the "high-buys-low" type, whereas most of the cash deals (61.08%) belong to the "low-buys-high" type.

These findings are also in line with the idea that overvalued acquirers tend to use stock as currency to buy target assets (Shleifer and Vishny (2003), Rhodes-Kropf, Robinson, and Viswanathan (2005), Dong et al. (2006), Ang and Cheng (2006)). "EPS-sensitivity" and "misvaluation" are not mutually exclusive. The acquirer management can appeal to "EPS accretion" to justify a deal paid in overvalued stock, since communicating "overvaluation" is problematic.

Moreover, we emphasize that our results cannot be fully attributed to the "misvaluation" idea, since the latter does not predict a discontinuity around the zero threshold of $S\_\Delta EPS_{as}$. Further, we conduct a sub-period analysis, and find in Table 11 that the discontinuity result remains and, if anything, is even stronger after the significant market decline in 2000. One reason for the weaker results for the earlier sub-period has to do precisely with the misvaluation theory. As is noticeable from the vertical distance between the dashed and solid lines in Figure 1, prior to 2001 many dilutive deals were done in stock, in contrast to the later sub-period. This could have been because acquirers were more willing to accept dilution since they were able to offer overvalued stock. In other words, the EPS-accretion constraint did not bind as tightly during this period, but mattered more in the later period, once market-wide overvaluation disappeared.

2. Deal Premium

As noted in Section IV.6, the evidence in Appendix Table A2 shows that stock-paying acquirers would incur higher interest cost associated with cash payments, and the acquirers of stock deals are more likely to be financially constrained than the acquirers of cash and mixed deals. We now show that the inability to pay cash can result in distortions of the deal premia for some all-stock deals to satisfy the acquirer's preference of EPS accretion.

As discussed before, when a high P/E acquirer is buying a low P/E target, a stock-paid deal can be accretive to the acquirer and at the same time offer a positive deal premium to the target. If the initial negotiation results in a deal multiple slightly higher than the acquirer's P/E ratio (so that the deal would be slightly dilutive to the acquirer's EPS), a cash-constrained acquirer can credibly threaten to walk away from the deal if the premium is not lowered to achieve accretion.

Consistent with this hypothesis, we find in Figure 4 that among the stock deals involving "high-buys-low," there is an abnormal clustering of stock deals that are slightly accretive. The frequency of *S_ΔEPS* is abnormally high in the first bin to the right of zero, and the fitted density from the left of zero *S_ΔEPS* is significantly higher than that from the right of zero. The discontinuous distribution is only found among the "high-buys-low" sample where accretion can be achieved without asking the target to bare a negative premium. As shown in Online Appendix Figure OA2, we do not observe the same pattern in the full sample of stock deals.

Next, we confirm in Table 12 that the cluster of stock deals with "high-buys-low" and small accretion to EPS is associated with a significantly lower premium compared to the deals incurring small dilution. In the left three columns of Table 12, deal premium (the percentage premium of offer price per share to the target's stock price 2 days before deal announcement) is regressed on a dummy indicator for EPS accretion (*S_ΔEPS*>0), controlling for deal and firm characteristics and industry and year fixed effects. Deals with different ranges of *S_ΔEPS* are taken as the test sample from Column 1 to 3. Since premium

and *S_ΔEPS* are negatively correlated, we control for polynomial terms of *S_ΔEPS* and their interaction with the accretion dummy when the range of *S_ΔEPS* is widened in Column 2 and 3. We find robust results throughout different samples and specifications. In the right three columns of Table 12, the dependent variable is the target's cumulative abnormal return within a [-1, +1] window of the deal announcement. We find that target share prices react negatively to the announcement of slightly accretive stock deals in a three-day window, reflecting the abnormally low premium.

Thus, even after we control for the relative valuation of the acquirer and target (by focusing on the subsample of stock deals involving "high-buys-low"), the results regarding deal premium still show evidence of EPS-sensitivity. Notably, the regressions also control for the relative valuation (the P/E ratio of the target to that of the acquirer), which has an expected negative effect on the deal premium and the target cumulative abnormal returns. Therefore, EPS-sensitivity cannot be explained by the misvaluation argument discussed in the previous section.

3. Accounting Rules

Our arguments about the importance of EPS-sensitivity also raise the issue of the possible role of an important accounting change that occurred in 2001. In the case of the pooling method of accounting (only available for pure-stock deals prior to 2001), the book values of the target and acquirer could be combined and there was no amortization of goodwill. In contrast, in the case of the "Purchase" method, target assets and liabilities were recognized at fair value. The gap between acquisition price and recognized fair value (the step-up) would be recorded as goodwill and amortized. Thus, the pooling method was much more EPS-friendly and was the overwhelming method of choice for pure stock deals. It has been argued (de Bodt, Cousin, and Roll (2017)) that the popularity of stock deals prior to 2001 was largely due to the availability of the pooling method for such deals only. The Statement of Financial and Accounting Standards (SFAS) 141 and 142 were adopted in June 2001. SFAS 141 essentially abolished the pooling

method of accounting for M&A transactions, so that the purchase method would apply to all transactions. SFAS 142 abolished the goodwill amortization principle and replaced it with a yearly impairment test procedure. de Bodt, Cousin, and Roll (2017) argue that this rule change greatly contributed to the subsequent rapid decline of stock deals.

The accounting rule change no doubt contributed to the decline in the popularity of stock deals after 2001. However, we find in Table 11 that methods of payment are even more sensitive to if-stock dilution after goodwill amortization was essentially abolished after 2001. It is worth pointing out that the EPS-sensitivity we document is fundamentally distinct from the accounting treatment of goodwill. Specifically, we highlight that the forms of payment affect post-merger EPS through new shares issued—a "denominator" effect—while goodwill treatment is essentially a "numerator effect" on the EPS metric. As far as we know, we are the first to show that EPS-sensitivity is stronger in recent years after accounting rules created a more level playing field between cash and stock deals.

VI. Conclusion

Merger announcements are typically accompanied by discussions of the impact of the deal on the acquirer's EPS, even though this is not a proper measure of value creation. We argue that in the absence of hard information about deal synergy, the EPS impact of a deal is an easy-to-communicate metric that managers can use to convince shareholders about the merits of a deal. As a result, focus on EPS has become part of M&A practice. We show that this focus not only affects how deals are paid for, but also the acquisition premium and the types of deals that occur. We find that cash payment is generally friendlier to EPS compared to stock payment, and the former is likely used to alleviate the dilution that might occur with the latter. We further establish evidence on the costs associated with the EPS-driven cash deals.

Our results do not imply that EPS accretion is the primary driver of mergers; indeed, many dilutive deals are proposed and completed. Rather, we show that while efficiency would require that the NPV of the acquisition, as determined by the total synergies created and the bargaining split between the acquirer and target, should be the only consideration in determining which deals get done, the EPS impact of the deal is also an important factor, and this factor distorts merger decisions.

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Figure 1: The Trend of Cash Payment and If-stock dilution

The figures below plot the proportions of M&A deals that are paid fully in cash or a mixture of cash and stock (solid lines) and the fractions of if-stock dilutive deals (dashed lines). In Panel A, if-stock change in EPS is measured in terms of our main measure as described in Section II; the full sample of completed deals between two US public firms are included. In Panel B, we report an alternative measure of if-stock change in EPS as robustness check, which is an indicator of deals with deal multiple (offer price per share over target's last-twelve-month EPS) higher than acquirer P/E ratio (stock price one day before deal announcement over acquirer last-twelve-month EPS); the sample includes all the completed deals with positive past-twelve-month EPS numbers.

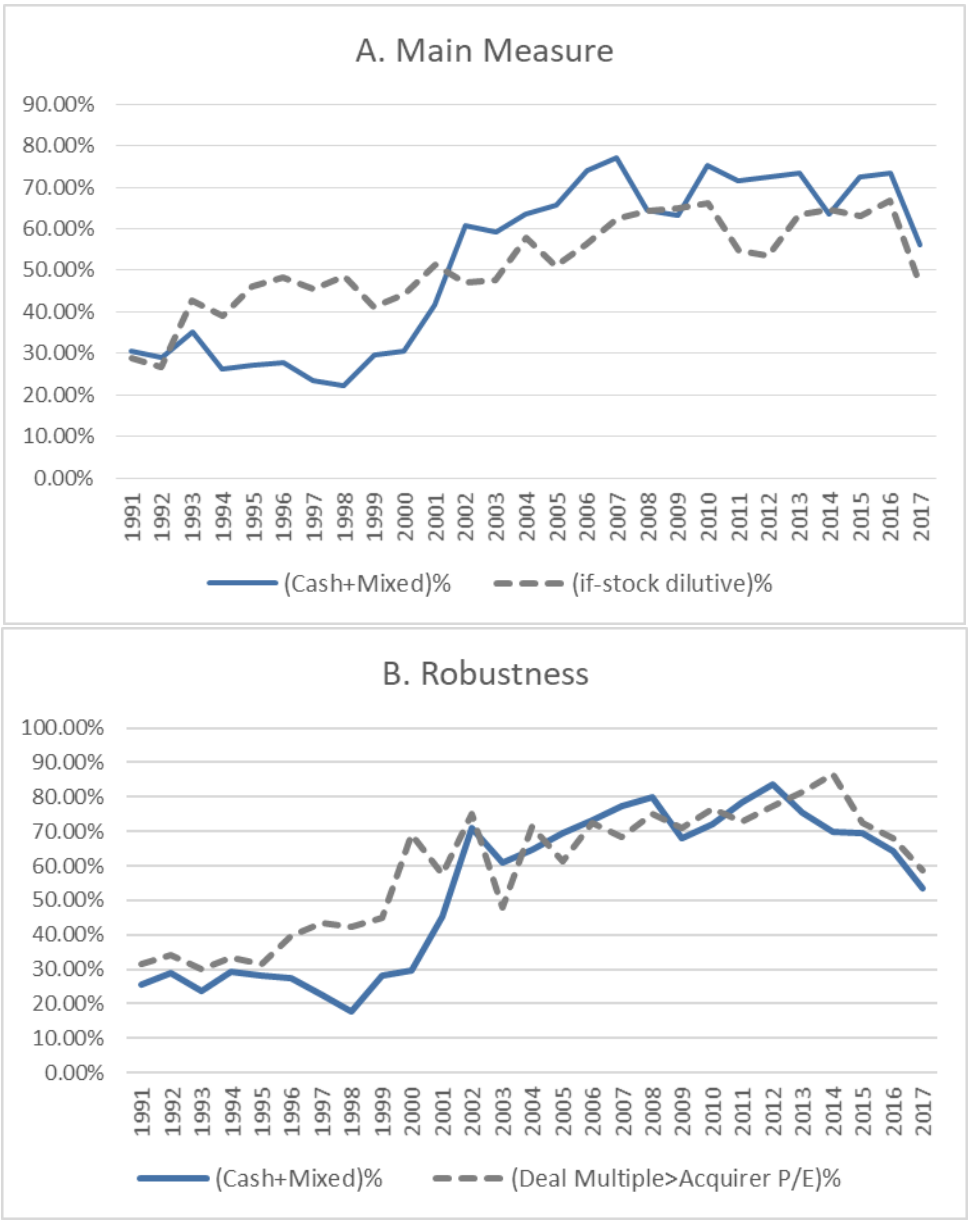


Figure 2: Discontinuity

This figure shows visual evidence on the discontinuous propensity of paying cash around the zero threshold of $S\_\Delta EPS_{as,}$ that is, the standardized change from the acquirer's pre-deal EPS to the all-stock EPS (details described in Section II.2). The bin size is optimally chosen using the mimicking variance evenly spaced method available from Stata. The upper two graphs show the full sample of deals with non-missing values of $S\_\Delta EPS_{as}$ (2,299 deals in total). The lower two graphs show the deals within a small range of $S\_\Delta EPS_{as}$ around zero (937 deals in this range). The curves in each graph show the local-polynomial regression fits on both sides of zero.

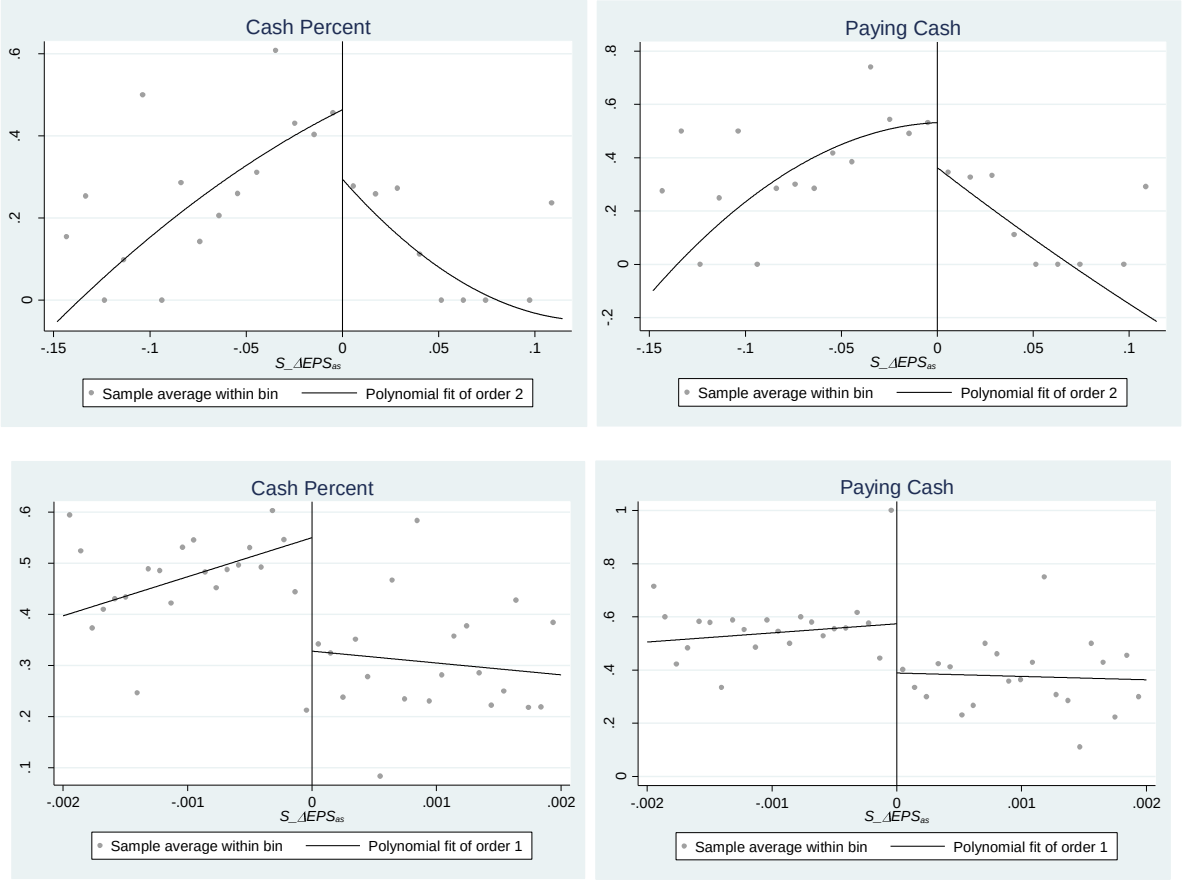


Figure 3: Mixed Deals

The figure plots the relation between the standardized change in the intended EPS (according to actual deal terms and using the treasury rate as the interest expense for financing the cash payment) and the standardized change in all-stock EPS (the hypothetical EPS if the deal were fully paid in stock) in the sample of mixed deals with $S\_\Delta EPS_{as}$ within the range of -0.01 and 0.01 (187 deals in this range). The bin sizes are optimally chosen using the mimicking variance evenly spaced method. The dots show the average value of each group of deals. The curves show the local-polynomial regression fits on both sides of zero.

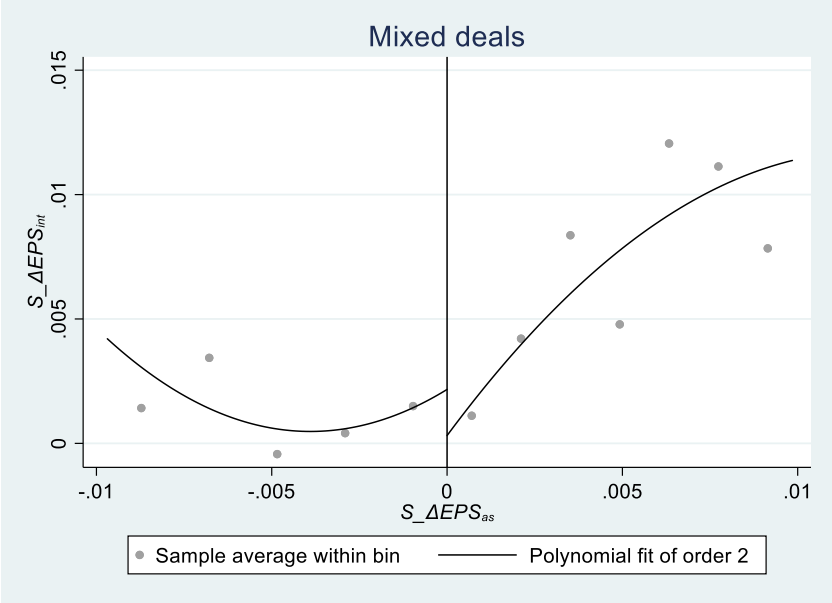


Figure 4: Distribution of *S_ΔEPS* among Stock Deals involving "High-buys-Low"

This figure shows the distribution of *S_ΔEPS* among stock deals with the acquirer's P/E ratio higher than the target's. In Panel A, we choose the optimal bin size following Bollen and Pool (2009) and report the histogram and a fitted smooth density function. In the Panel B, we report the t-statistics for the difference between the actual number of observations in each bin and the estimated number of observations from the smooth density curve as shown in Panel A. The dashed lines indicate the 95% confidence interval for the t-tests. It shows that the first bin of deals to the right of zero contains a significantly larger number of observations than implied by the smooth density estimation. In Panel C, we show the local-polynomial density estimation following Cattaneo, Jansson, and Ma (2019). We report in the subtitle the bandwidth used for estimation and the number of observations within the bandwidth on both sides of zero. The shaded area indicates the 95% confidence interval calculated using bias-corrected robust errors. For the histogram, the running variable has been truncated at 5 percentile on both sides; for the tests in Panel B and C, the running variable is winsorized at 2.5 percentile on both sides but the outlier bins are not shown in the graph.

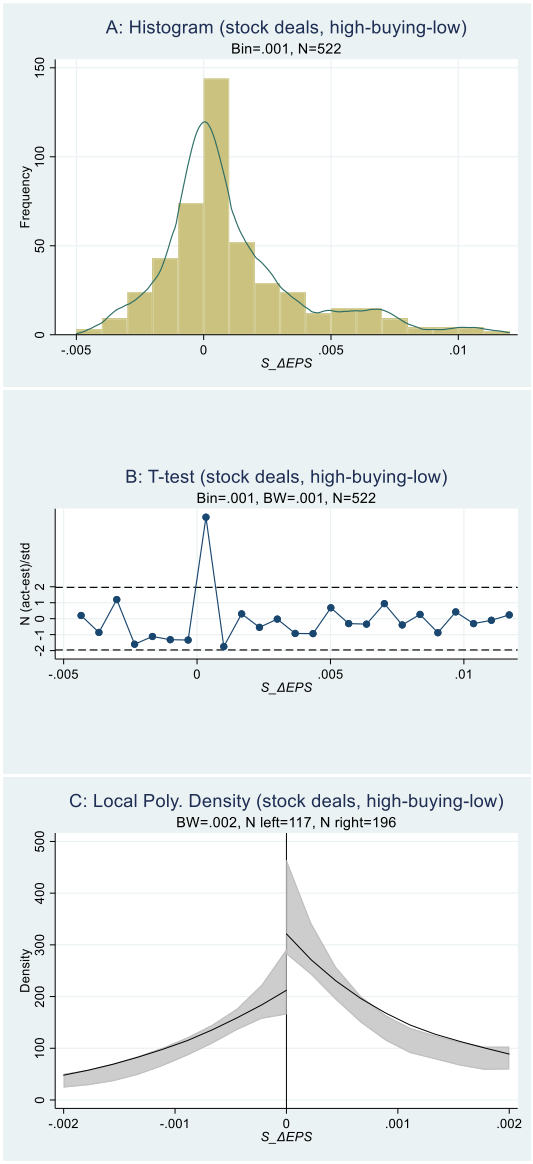


Table 1: Summary Statistics

Panel A reports the number and fraction of if-stock dilutive (accretive/neutral) deals that are paid in cash, stock, and a mixture of these. (Since we have rounded EPS numbers to the nearest cent, there are some deals with zero change in the all-stock EPS, which are referred to as the if-stock neutral deals.) It shows that the fraction of if-stock dilutive deals is the highest among cash deals followed by mixed deals, and is the lowest among stock deals. Panel B shows the summary statistics of standardized change in all-stock EPS, as well as the unstandardized change in all-stock EPS among the three types of deals. The all-stock EPS is our measure of the potential EPS if the entire deal were paid in stock (construction details in Section II).

Panel A: The fraction of if-stock dilutive deals

	If-stock Dilutive $S\_\Delta EPS_{as} < 0$	*If-stock Accretive/Neutral* $S\_\Delta EPS_{as} \geq 0$	Total
Cash Deals	624	146	770
	(81.04%)	(18.96%)	
Mixed Deals	221	72	293
	(75.43%)	(24.57%)	
Stock Deals	797	439	1236
	(64.48%)	(35.52%)	
All Deals	1642	657	2299
	(71.42%)	(28.58%)	

Panel B: The change in all-stock EPS

	Mean	P25	Median	P75
Sample	Variable: $S\_\Delta EPS_{as}$			
Cash Deals	-0.0048	-0.0055	-0.0018	-0.0004
Mixed Deals	-0.0082	-0.0086	-0.0026	-0.0003
Stock Deals	-0.0055	-0.0059	-0.0012	0.0006
All Deals	-0.0056	-0.0060	-0.0016	0.0000
Sample	Variable: ΔEPS_{as}			
Cash Deals	-0.1331	-0.1500	-0.0600	-0.0100
Mixed Deals	-0.1858	-0.2400	-0.0800	-0.0100
Stock Deals	-0.1159	-0.1500	-0.0400	0.0200
All Deals	-0.1306	-0.1700	-0.0500	0.0000

Table 2: Baseline Regression: Paying Cash and If-stock Dilution

This table reports OLS regression results. The dependent variables are the fraction of cash as payment (in Panel A) and a dummy indicator of cash and mixed deals (in Panel B). The main independent variable is $Dilutive_{AS}$, an indicator of if-stock dilution, that is, $S\_\Delta EPS_{as}$ <0. The left four columns use the full sample of completed deals, while the right three columns use the completed deals with $S\_\Delta EPS_{as}$ within a small band around zero. In the left four (right three) columns, we control for up to the third (first) order polynomial terms of $S\_\Delta EPS_{as}$ and their interactions with the if-stock dilutive dummy. We also control for deal and firm characteristics, industry fixed effects, year fixed effects, and the interacted fixed effects (column 3). Column 4 further controls for the ratio of the target's and acquirer's P/E ratio, which is non-missing only when both firms have positive EPS. Each variable is winsorized at 1 percentile on both sides. T-statistics are reported in parentheses, using robust standard errors clustered on years. *, **, and *** indicate statistical significance at 10%, 5%, and 1% level, respectively.

Panel A: OLS regression

	Proportion of Cash in Deal Consideration						
Sample:	*Full Sample*				*$S\_\Delta EPS_{as}$ in [-0.002, 0.002]*		
	[1]	[2]	[3]	[4]	[5]	[6]	[7]
$Dilutive_{AS}$	0.13***	0.098***	0.047**	0.066**	0.17***	0.13***	0.13***
	(5.02)	(4.04)	(2.44)	(2.66)	(3.96)	(2.86)	(3.02)
$S\_\Delta EPS_{as}$	-7.37	-3.80	-4.56	0.46	-8.60	54.0	60.4**
	(-1.39)	(-0.64)	(-0.86)	(0.07)	(-0.25)	(1.70)	(2.08)
$Dilutive_{AS}$ x $S\_\Delta EPS_{as}$	12.1**	3.31	2.39	-9.52	84.0*	-32.4	-10.7
	(2.23)	(0.54)	(0.46)	(-1.27)	(1.90)	(-0.74)	(-0.27)
Deal Value/Acq Mktcap		-0.29***	-0.26***	-0.32***		-0.42***	-0.39***
		(-8.11)	(-8.00)	(-6.76)		(-8.33)	(-7.40)
Deal Premium		0.089**	0.062*	0.074*		0.043	0.059
		(2.77)	(1.91)	(1.83)		(0.92)	(1.16)
P/E Ratio (Tar/Acq)				0.011			0.043***
				(1.25)			(3.24)
MTB Acq		-0.039***	-0.023**	-0.040***		-0.031**	-0.032**
		(-4.85)	(-2.21)	(-4.18)		(-2.74)	(-2.52)
Leverage Acq		0.089	-0.021	0.066		0.093	0.040
		(1.46)	(-0.28)	(0.81)		(0.65)	(0.27)
Cash Holding Acq		-0.064	-0.077	0.014		0.036	0.066
		(-1.16)	(-1.11)	(0.20)		(0.70)	(1.47)
Tangibility Acq		-0.076	-0.027	-0.10		-0.093	-0.15
		(-0.70)	(-0.23)	(-0.84)		(-0.63)	(-0.96)
Firm Size Tar		-0.013	-0.026***	-0.022**		-0.019	-0.014
		(-1.51)	(-2.97)	(-2.38)		(-1.51)	(-1.25)
MTB Tar		-0.012	-0.013	-0.024**		-0.017	-0.030**
		(-1.38)	(-1.49)	(-2.32)		(-1.61)	(-2.42)
Leverage Tar		0.050	0.12*	0.13*		0.15**	0.17**
		(0.88)	(1.94)	(1.95)		(2.12)	(2.57)
Cash Holding Tar		0.048	0.062	0.10**		0.10	0.13*
		(1.13)	(1.26)	(2.09)		(1.38)	(1.74)
Tangibility Tar		-0.016	0.0080	-0.011		0.086	0.10
		(-0.16)	(0.07)	(-0.09)		(0.44)	(0.51)
Constant	0.33***	0.57***	0.64***	0.60***	0.36***	0.56***	0.49***
	(18.55)	(10.29)	(12.06)	(10.82)	(15.56)	(7.61)	(7.61)
Polynomials of $S\_\Delta EPS_{as}$		3-order with interactions			1-order with interaction		
Industry FE and Year FE	YES	YES	NO	YES	YES	YES	YES
AcqSIC1 x TarSIC1 x Year	NO	NO	YES	NO	NO	NO	NO
Observations	2294	1969	1969	1607	934	825	792

Adjusted R-squared	0.231	0.332	0.536	0.372	0.287	0.385	0.391

Panel B: Linear probability regression

	Dummy Indicator for Paying Any Cash						
Sample:	*Full Sample*				*S_ΔEPS$_{as}$ in [-0.002, 0.002]*		
	[1]	[2]	[3]	[4]	[5]	[6]	[7]
Dilutive$_{AS}$	0.12***	0.095***	0.050	0.062**	0.12***	0.088*	0.096**
	(4.15)	(3.30)	(1.66)	(2.09)	(2.79)	(1.83)	(2.11)
S_ΔEPS$_{as}$	-6.30	-3.86	-4.42	-1.69	-16.6	41.0	48.1
	(-1.11)	(-0.61)	(-0.72)	(-0.26)	(-0.39)	(1.00)	(1.24)
Dilutive$_{AS}$ x *S_ΔEPS$_{as}$*	8.13	2.28	1.11	-7.29	58.5	-53.2	-36.5
	(1.22)	(0.31)	(0.16)	(-0.87)	(1.22)	(-1.09)	(-0.76)
Deal Value/Acq Mktcap		-0.24***	-0.23***	-0.27***		-0.36***	-0.34***
		(-6.36)	(-6.09)	(-5.90)		(-6.31)	(-5.62)
Deal Premium		0.092**	0.055	0.072		0.030	0.050
		(2.39)	(1.40)	(1.64)		(0.63)	(0.96)
P/E Ratio (Tar/Acq)				0.013			0.038***
				(1.23)			(3.00)
MTB Acq		-0.035***	-0.024	-0.037***		-0.027*	-0.030**
		(-2.96)	(-1.64)	(-3.33)		(-1.94)	(-2.07)
Leverage Acq		0.067	-0.032	0.0020		-0.0024	-0.048
		(1.11)	(-0.42)	(0.02)		(-0.02)	(-0.31)
Cash Holding Acq		-0.018	-0.050	0.068		0.089	0.14**
		(-0.26)	(-0.62)	(0.80)		(1.45)	(2.10)
Tangibility Acq		-0.024	0.024	-0.033		0.019	-0.018
		(-0.21)	(0.19)	(-0.28)		(0.13)	(-0.12)
Firm Size Tar		-0.0100	-0.019*	-0.016*		-0.014	-0.011
		(-1.16)	(-1.95)	(-1.90)		(-1.25)	(-0.94)
MTB Tar		-0.016*	-0.014	-0.028**		-0.020*	-0.031**
		(-1.86)	(-1.50)	(-2.49)		(-1.79)	(-2.27)
Leverage Tar		0.00091	0.067	0.11		0.14*	0.16**
		(0.02)	(1.08)	(1.68)		(2.01)	(2.44)
Cash Holding Tar		0.015	0.063	0.099*		0.087	0.11
		(0.35)	(1.13)	(1.85)		(1.05)	(1.37)
Tangibility Tar		0.0020	0.017	0.016		0.094	0.11
		(0.02)	(0.14)	(0.14)		(0.56)	(0.60)
Constant	0.41***	0.61***	0.67***	0.62***	0.44***	0.58***	0.53***
	(19.68)	(9.97)	(8.99)	(10.22)	(15.49)	(8.36)	(7.79)
Polynomials of *S_ΔEPS$_{as}$*		3-order with interactions			1-order with interaction		
Industry FE and Year FE	YES	YES	NO	YES	YES	YES	YES
AcqSIC1 x TarSIC1 x Year	NO	NO	YES	NO	NO	NO	NO
Observations	2294	1969	1969	1607	934	825	792
Adjusted R-squared	0.231	0.302	0.490	0.349	0.279	0.340	0.345

Table 3: EPS-friendly and EPS-unfriendly Cash

For each cash or mixed deal, we compare the all-stock EPS with the intended EPS (according to actual deal terms and using the treasury rate to proxy the interest cost of financing cash), and denote the cash payment as EPS-friendly (EPS-unfriendly) if the all-stock EPS is smaller than (larger than) the intended EPS. Since both EPS numbers are rounded to the nearest cent before comparison, there are some deals with intended EPS equal to the all-stock EPS, which are referred to as the EPS-neutral cash/mixed deals. Panel A shows the number and fraction of each type of deal within each range of $S\_\Delta EPS_{as}$. In Panel B, we examine the discontinuous propensity of paying cash that is EPS friendly/unfriendly. We replace the dependent variable in Table2 with (1) the indicator of EPS-friendly cash and mixed deals, (2) the indicator EPS-unfriendly cash and mixed deals (leaving the EPS-friendly cash and mixed deals out of the sample). The specification resembles Panel B of Table 2. The control variables are included but not reported.

Panel A: Distribution of cash and mixed deals

$S\_\Delta EPS_{as}$	*EPS-unfriendly* $e_{int} < e_{as}$	*EPS-neutral* $e_{int} = e_{as}$	*EPS-friendly* $e_{int} > e_{as}$	Total Num. of cash and mixed deals
<-0.002	49	22	438	509
	(9.63%)	(4.32%)	(86.05%)	
[-0.002, 0.000)	16	22	269	307
	(5.21%)	(7.17%)	(87.62%)	
0	3	9	30	42
	(7.14%	(21.43%)	(71.43%)	
(0.000, 0.002]	19	5	67	91
	(20.88%)	(5.49%)	(73.63%	
>0.002	28	4	48	80
	(35.00%	(5.00%	(60.00%	
Total	115	62	852	1029
	(11.18%)	(6.03%)	(82.80%)	

Panel B: Propensity of paying cash that is friendly and unfriendly to EPS

Sample:	*Full Sample*				*$S\_\Delta EPS_{as}$ in [-0.002, 0.002]*		
	(1) Dummy of EPS-friendly Cash (vs. the Other Deals)						
Dilutive$_{AS}$	0.13***	0.090***	0.042*	0.068**	0.12***	0.082*	0.076*
	(5.00)	(3.46)	(1.76)	(2.61)	(3.60)	(1.87)	(1.77)
Observations	2294	1969	1969	1607	934	825	792
	(2) Dummy of EPS-unfriendly Cash (vs. Equity Deals)						
Dilutive$_{AS}$	-0.011	0.008	0.005	-0.010	-0.031	-0.016	-0.000
	(-0.50)	(0.37)	(0.21)	(-0.52)	(-1.29)	(-0.63)	(-0.01)
Observations	1381	1159	1159	914	533	460	448
Polynomials of $S\_\Delta EPS_{as}$	3-order with interactions				1-order with interaction		
Industry FE and Year FE	YES	YES	NO	YES	YES	YES	YES
AcqSIC1 x TarSIC1 x Year	NO	NO	YES	NO	NO	NO	NO

Table 4: Voting Pressure and Cash Payment

In Panel A, we report the number and percent of mixed and stock deals in four subsamples that are defined according to whether the deal is if-stock dilutive and whether the all-stock issuance exceeds 20% (in which case shareholder voting is required). In Panel B, we take the sample of mixed and stock deals and estimate regressions as follows. The dependent variable in the left three columns is the percent of cash in deal consideration. The dependent variable in the right three columns is the dummy indicator of paying EPS-friendly cash. The main independent variables are the indicator of an if-stock dilutive deal, the all-stock share issuance percent (or the indicator of all-stock issuance exceeding 20%), and their interaction term. The same set of control variables as in column 4 of Table 3 are included but not reported.

Panel A: Number and percent of mixed and stock deals.

	if-stock dilutive			if-stock accretive/neutral			All Deals		
All-stock Issue%	Mix	Stock	Total	Mix	Stock	Total	Mix	Stock	Total
<=20%	85	363	448	32	201	233	117	564	681
	(18.97%)	(81.03%)		**(13.73%)**	(86.27%)		(17.18%)	(82.82%)	
>20%	136	434	570	40	238	278	176	672	848
	(23.86%)	(76.14%)		**(14.39%)**	(85.61%)		(20.75%)	(79.25%)	
Total	221	797	1018	72	439	511	293	1236	1529
	(21.71%)	(78.29%)		(14.09%)	(85.91%)		(19.16%)	(80.84%)	

Panel B: Regression results

	Cash Percent			Paying EPS-friendly Cash		
Sample:	*Stock & Mixed Deals*					
	[1]	[2]	[3]	[4]	[5]	[6]
Dilutive$_{AS}$	0.035**	-0.002	0.014	0.051**	-0.003	0.009
	(2.23)	(-0.18)	(1.36)	(2.14)	(-0.09)	(0.32)
All-stock Issue Pct		-0.113***			-0.137*	
		(-3.44)			(-1.91)	
Dilutive$_{AS}$ x All-stock Issue Pct		0.108***			0.153**	
		(3.73)			(2.74)	
D[All-stock Issue>20%]			-0.038*			-0.074*
			(-1.90)			(-2.05)
Dilutive$_{AS}$ x D[All-stock Issue>20%]			0.040*			0.081*
			(1.86)			(2.05)
Firm & Deal Characteristics	YES	YES	YES	YES	YES	YES
Industry FE and Year FE	YES	YES	YES	YES	YES	YES
Observations	1049	1049	1049	1049	1049	1049
Adjusted R-squared	0.238	0.244	0.239	0.236	0.239	0.238

Table 5: Vote Avoidance and If-stock Dilutive Deals

This table reports the regression results for the proportion of cash in deal consideration. We calculate the all-stock issuance percentage as the product of the all-stock exchange ratio and the target's number of shares outstanding, scaled by the acquirer's shares outstanding. The main independent variables are an indicator of all-stock issue exceeding 20%, in which case shareholder voting would be required had the deal been paid in stock. We control for up to the third order polynomial terms of the gap between all-stock issue and 20% (All-Stock Issue minus 20%), their interaction terms with the dummy indicator, deal and firm characteristics as in columns 1, 2, 4 of Table 2, industry and year fixed effects. In the left (right) three columns, we report the results in the subsample of if-stock dilutive deals (if-stock non-dilutive deals). T-statistics are reported in parentheses, using robust standard errors clustered on years. *, **, and *** indicate statistical significance at 10%, 5%, and 1% level, respectively.

	Cash Percent					
Sample	*If-stock Dilutive*			*If-stock Accretive/Neutral*		
	[1]	[2]	[3]	[4]	[5]	[6]
D [All-Stock Issue > 20%]	0.13*	0.13**	0.11*	-0.073	-0.053	-0.062
	(1.77)	(2.11)	(1.76)	(-0.76)	(-0.45)	(-0.52)
(All-Stock Issue Pct minus 20%)	-6.05**	-5.30**	-4.48	8.93***	8.12**	9.29**
	(-2.28)	(-2.27)	(-1.69)	(3.06)	(2.48)	(2.46)
D [All-Stock Issue > 20%] x (All-Stock Issue Pct minus 20%)	6.00**	5.12**	4.44	-9.57***	-8.66***	-10.3**
	(2.28)	(2.13)	(1.63)	(-3.32)	(-2.79)	(-2.75)
Deal Value/Acq Mktcap		-0.12	-0.051		-0.24***	-0.13
		(-1.40)	(-0.59)		(-2.96)	(-1.08)
Deal Premium		0.11***	0.11*		0.053	0.082
		(3.22)	(2.03)		(1.43)	(1.54)
P/E Ratio (Tar/Acq)			0.0064			0.061
			(1.05)			(0.87)
MTB Acq		-0.043***	-0.071***		-0.016*	-0.010
		(-4.50)	(-5.90)		(-1.81)	(-1.03)
Leverage Acq		0.065	0.044		0.081	0.16
		(0.79)	(0.49)		(0.71)	(1.17)
Cash Holding Acq		-0.13**	0.011		0.027	0.078*
		(-2.58)	(0.12)		(0.66)	(1.72)
Tangibility Acq		-0.045	0.0071		0.033	-0.059
		(-0.36)	(0.05)		(0.19)	(-0.42)
Firm Size Tar		0.0068	-0.0085		-0.033**	-0.044***
		(0.80)	(-0.76)		(-2.44)	(-2.98)
MTB Tar		-0.0076	-0.019*		-0.025*	-0.040**
		(-0.85)	(-1.79)		(-1.82)	(-2.75)
Leverage Tar		-0.036	0.051		0.20***	0.27***

		(-0.53)	(0.60)		(3.10)	(3.82)
Cash Holding Tar		0.058	0.096		-0.020	0.076
		(1.16)	(1.60)		(-0.21)	(0.91)
Tangibility Tar		0.039	-0.0074		0.042	0.10
		(0.42)	(-0.06)		(0.30)	(0.86)
Constant	0.29***	0.36***	0.47***	0.45***	0.67***	0.67***
	(4.62)	(4.31)	(5.79)	(7.03)	(5.72)	(4.76)
Polynomials of (All-Stock Issue Pct minus 20%)			3-order with interaction terms			
Industry FE and Year FE	YES	YES	YES	YES	YES	YES
Observations	1873	1628	1264	751	632	548
Adjusted R-squared	0.270	0.333	0.382	0.189	0.217	0.247

Table 6: Acquirers' Market Reaction for Pure Stock Deals

This table reports the results of acquirer's market reaction regressed on the indicator of EPS accretion. The dependent variable is the three-day cumulative abnormal return, i.e., CAR [-1, +1], in Panel A and the cumulative abnormal return from day -1 to deal completion date, i.e., CAR [-1, C], in Panel B. The main independent variable is a dummy indicator of EPS-accretion, i.e., ΔEPS_{as}>0. The sample includes the completed pure stock deals with ΔEPS_{as} limited to a range around zero as follows. For column 1 and 4, the sample includes the deals with ΔEPS_{as} within [-0.001, 0.001]. For column 2 and 5, the sample includes deals with ΔEPS_{as} within [-0.002, 0.002], and we control for ΔEPS_{as} and its interaction with the accretion dummy. For column 3 and 6, the sample imposes no restriction on ΔEPS_{as}, and we control for up to the third polynomial terms of ΔEPS_{as} and their interactions with the accretion dummy. Each variable is winsorized at 1 percentile on both sides. T-statistics are reported in parentheses, using robust standard errors clustered on years. *, **, and *** indicate statistical significance at 10%, 5%, and 1% level, respectively.

Panel A: Three-day CAR around the announcement dates

	Acquirer CAR [-1, +1]					
Sample: |S_ΔEPS|<=	*0.001*	*0.002*	*full*	*0.001*	*0.002*	*full*
	[1]	[2]	[3]	[4]	[5]	[6]
Accretive	0.020***	0.020***	0.019**	0.018***	0.019**	0.016*
	(4.58)	(2.85)	(2.43)	(3.83)	(2.75)	(1.86)
Deal Premium				-0.020	-0.027**	-0.035***
				(-1.29)	(-2.20)	(-3.46)
High buy Low	-0.015**	-0.012*	-0.019***	-0.015**	-0.011	-0.014***
	(-2.22)	(-1.73)	(-4.56)	(-2.11)	(-1.41)	(-3.05)
Deal Value/Acq MktCap	-0.067**	-0.033*	-0.016	-0.065**	-0.033*	-0.017
	(-2.51)	(-1.85)	(-1.24)	(-2.50)	(-1.91)	(-1.40)
P/E Ratio (tar/acq)	0.0015	0.021***	0.0060***	-0.0036	0.018**	0.0053***
	(0.10)	(2.82)	(4.25)	(-0.21)	(2.41)	(3.66)
MTB Acq	0.00090	0.0015	-0.00039	0.00094	0.0017	0.00012
	(0.35)	(0.71)	(-0.25)	(0.39)	(0.86)	(0.08)
Leverage Acq	-0.018	0.0070	-0.0017	-0.023	0.0045	-0.0046
	(-0.72)	(0.30)	(-0.09)	(-0.98)	(0.17)	(-0.27)
Cash Holding Acq	-0.018	-0.015	-0.022	-0.016	-0.014	-0.023
	(-0.61)	(-0.72)	(-1.59)	(-0.55)	(-0.63)	(-1.60)
Tangibility	-0.046	-0.011	-0.048**	-0.055*	-0.021	-0.054**
	(-1.66)	(-0.35)	(-2.25)	(-1.99)	(-0.62)	(-2.42)
Firm Size Tar	0.00028	0.00055	-0.00020	-0.00094	-0.00074	-0.0011
	(0.08)	(0.23)	(-0.11)	(-0.27)	(-0.29)	(-0.64)
MTB Tar	0.00084	0.00040	-0.00099	-0.000063	-0.00043	-0.0015
	(0.30)	(0.22)	(-0.51)	(-0.02)	(-0.24)	(-0.79)
Leverage Tar	-0.0083	0.013	-0.0015	-0.0077	0.016	0.00073
	(-0.41)	(0.83)	(-0.20)	(-0.39)	(0.95)	(0.09)
Cash Holding Tar	-0.063*	-0.048**	-0.032	-0.062*	-0.046**	-0.029
	(-1.91)	(-2.47)	(-1.52)	(-1.91)	(-2.44)	(-1.37)
Tangibility Tar	0.082*	0.048	0.043**	0.090**	0.054	0.051**
	(1.97)	(1.40)	(2.26)	(2.28)	(1.64)	(2.75)
Constant	0.0018	-0.037	-0.0050	0.022	-0.019	0.0088
	(0.04)	(-1.69)	(-0.34)	(0.54)	(-0.91)	(0.60)
Polynomials of *S_ΔEPS*	NO	1-order	3-order	NO	1-order	3-order

Industry FE and Year FE	YES	YES	YES	YES	YES	YES
Observations	257	399	829	256	398	822
Adjusted R-squared	0.194	0.152	0.104	0.199	0.160	0.116

Panel B: CAR from one day before announcement till deal completion

	Acquirer CAR [-1, C]					
Sample: | S_ΔEPS |<=	*0.001*	*0.002*	*full*	*0.001*	*0.002*	*full*
	[1]	[2]	[3]	[4]	[5]	[6]
Accretive	0.0094	-0.019	-0.013	0.0068	-0.022	-0.020
	(0.32)	(-0.50)	(-0.50)	(0.21)	(-0.61)	(-0.72)
Deal Premium				-0.014	-0.053	-0.060
				(-0.17)	(-0.91)	(-1.39)
High buy Low	0.014	-0.0034	-0.0039	0.013	-0.00089	0.0035
	(0.34)	(-0.09)	(-0.21)	(0.32)	(-0.02)	(0.18)
Deal Value/Acq MktCap	-0.10	-0.12**	-0.074**	-0.10*	-0.12**	-0.077**
	(-1.69)	(-2.52)	(-2.38)	(-1.74)	(-2.53)	(-2.51)
P/E Ratio (tar/acq)	0.065	0.023	-0.012	0.060	0.016	-0.014
	(0.84)	(0.43)	(-1.02)	(0.62)	(0.29)	(-1.07)
MTB Acq	0.010	0.013	0.0038	0.011	0.013	0.0048
	(0.65)	(1.14)	(0.30)	(0.70)	(1.27)	(0.39)
Leverage Acq	-0.051	-0.052	-0.013	-0.061	-0.063	-0.018
	(-0.34)	(-0.54)	(-0.24)	(-0.41)	(-0.61)	(-0.31)
Cash Holding Acq	0.053	-0.0057	-0.042	0.052	-0.0039	-0.045
	(0.52)	(-0.08)	(-1.11)	(0.50)	(-0.05)	(-1.22)
Tangibility	0.33**	0.0072	-0.096	0.32**	-0.011	-0.11
	(2.39)	(0.05)	(-0.94)	(2.37)	(-0.08)	(-1.08)
Firm Size Tar	0.0017	0.0044	0.0044	0.0019	0.0025	0.0028
	(0.11)	(0.49)	(0.62)	(0.10)	(0.25)	(0.38)
MTB Tar	-0.032	-0.028	-0.021	-0.032	-0.030	-0.022
	(-1.41)	(-1.30)	(-1.37)	(-1.26)	(-1.28)	(-1.40)
Leverage Tar	0.0026	0.019	-0.0086	0.0070	0.028	-0.0030
	(0.03)	(0.24)	(-0.15)	(0.07)	(0.32)	(-0.05)
Cash Holding Tar	-0.20**	-0.11**	-0.051	-0.20**	-0.11**	-0.044
	(-2.38)	(-2.14)	(-0.85)	(-2.48)	(-2.12)	(-0.75)
Tangibility Tar	-0.30	0.017	-0.0049	-0.29*	0.032	0.0076
	(-1.66)	(0.13)	(-0.04)	(-1.80)	(0.25)	(0.06)
Constant	-0.069	-0.053	0.0062	-0.060	-0.021	0.033
	(-0.32)	(-0.57)	(0.10)	(-0.21)	(-0.19)	(0.46)
Polynomials of *S_ΔEPS*	NO	1-order	3-order	NO	1-order	3-order
Industry FE and Year FE	YES	YES	YES	YES	YES	YES
Observations	259	399	828	258	398	822
Adjusted R-squared	0.151	0.153	0.088	0.145	0.152	0.089

Table 7: Financial Policies around Deal Announcement

This table reports the OLS regression results using quarterly data. The dependent variables are the change in cash holding, net debt issuance, and net equity issuance for the acquirer. The main independent variables are the total value of each type of deal announced during the future two quarters, i.e., quarter *q+1* and *q+2*, in Panel A, and the total value of deals announced during the current quarter and the previous quarter, i.e., quarter *q* and *q-1,* in Panel B. In particular, for column 1, 4, and 7, we measure the total value of stock payment for deals announced during the two quarters; for column 2, 4, and 6, we measure the total value of cash payment for deals announced in the two quarters; for column 3, 6, and 9, we separately measure the total value of cash payment for the if-stock dilutive deals and the value of cash payment for other deals during the corresponding quarters. These payment values are scaled by the acquirer's total assets at the end of quarter *q*, and the dependent variables are scaled by the acquirer's total assets at the beginning of quarter *q*. T-statistics are reported in parentheses, using robust standard errors clustered on firms. *, **, and *** indicate statistical significance at 10%, 5%, and 1% levels, respectively.

Panel A: The financial policies before deal announcement

	Cash Increase or Decrease [q]			Net Debt Issue [q]			Net Equity Issue [q]		
	[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]	[9]
Stock Payment [q+1, q+2]	0.001			0.001			0.001		
	(0.38)			(0.98)			(0.43)		
Cash Payment [q+1, q+2]		0.006**			-0.006*			-0.004*	
		(2.10)			(-1.73)			(-1.86)	
Cash Payment (if-stock dilutive deals)			0.007**			-0.005			-0.003
			(1.96)			(-1.29)			(-1.41)
Cash Payment (if-stock non-dilutive)			0.003			-0.008			-0.009
			(0.74)			(-1.19)			(-1.33)
Tobin's Q [q-1]	0.005***	0.005***	0.005***	0.001***	0.001***	0.001***	0.008***	0.008***	0.008***
	(17.02)	(17.08)	(17.08)	(3.03)	(3.11)	(3.11)	(18.40)	(18.43)	(18.43)
Ln(MktCap) [q-1]	-0.004***	-0.004***	-0.004***	0.002***	0.002***	0.002***	-0.005***	-0.005***	-0.005***
	(-15.13)	(-15.16)	(-15.16)	(6.08)	(6.06)	(6.05)	(-17.17)	(-17.20)	(-17.20)
Excess Ret [q-1]	0.008***	0.008***	0.008***	-0.001**	-0.001**	-0.001**	0.014***	0.014***	0.014***
	(10.48)	(10.49)	(10.49)	(-2.48)	(-2.49)	(-2.49)	(20.05)	(20.04)	(20.04)
Cash Flow [q-1]	0.126***	0.125***	0.125***	0.032	0.032	0.032	0.079***	0.080***	0.080***
	(3.82)	(3.81)	(3.81)	(1.10)	(1.12)	(1.12)	(3.24)	(3.26)	(3.26)
Book Leverage [q-1]	0.002	0.002	0.002	-0.078***	-0.078***	-0.078***	0.023***	0.023***	0.023***
	(1.53)	(1.57)	(1.57)	(-35.37)	(-35.33)	(-35.33)	(14.45)	(14.42)	(14.41)
Tangibility [q-1]	0.040***	0.040***	0.040***	0.033***	0.033***	0.033***	0.000	0.000	0.000
	(17.04)	(17.04)	(17.04)	(12.59)	(12.57)	(12.57)	(0.15)	(0.14)	(0.14)
Sales Growth [q-1]	0.007***	0.007***	0.007***	-0.008***	-0.008***	-0.008***	0.002***	0.002***	0.002***
	(5.49)	(5.49)	(5.49)	(-5.97)	(-5.97)	(-5.97)	(4.78)	(4.78)	(4.78)
ROA [q-1]	-0.083**	-0.083**	-0.083**	-0.062**	-0.062**	-0.062**	-0.099***	-0.100***	-0.100***

	(-2.48)	(-2.47)	(-2.47)	(-2.05)	(-2.06)	(-2.06)	(-4.09)	(-4.11)	(-4.11)
Firm FE and Year FE	YES	YES	YES	YES	YES	YES	YES	YES	YES
SIC2 x Quarter FE	YES	YES	YES	YES	YES	YES	YES	YES	YES
Observations	208,049	208,049	208,049	206,452	206,452	206,452	206,920	206,920	206,920
Adjusted R-squared	0.020	0.020	0.020	0.062	0.062	0.062	0.103	0.103	0.103

Panel B: Financial policies after deal announcement

	Cash Increase or Decrease [q]			Net Debt Issue [q]			Net Equity Issue [q]		
	[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]	[9]
Stock Payment [q-1, q]	0.002			-0.004**			-0.001		
	(0.58)			(-2.51)			(-0.56)		
Cash Payment [q-1, q]		0.000			0.064***			0.008**	
		(0.02)			(6.16)			(2.27)	
Cash Payment (if-stock dilutive deals)			0.002			0.067***			0.004*
			(0.52)			(5.73)			(1.73)
Cash Payment (if-stock non-dilutive deals)			-0.013			0.048***			0.029
			(-0.85)			(2.73)			(1.58)
Tobin's Q [q-1]	0.005***	0.005***	0.005***	0.001***	0.001***	0.001***	0.008***	0.008***	0.008***
	(17.02)	(17.09)	(17.09)	(3.17)	(3.23)	(3.24)	(18.41)	(18.44)	(18.43)
Ln(MktCap) [q-1]	-0.004***	-0.004***	-0.004***	0.002***	0.002***	0.002***	-0.005***	-0.005***	-0.005***
	(-15.15)	(-15.17)	(-15.17)	(6.06)	(5.77)	(5.77)	(-17.21)	(-17.23)	(-17.23)
Excess Ret [q-1]	0.008***	0.008***	0.008***	-0.001**	-0.001**	-0.001**	0.014***	0.014***	0.014***
	(10.50)	(10.48)	(10.48)	(-2.53)	(-2.44)	(-2.44)	(20.05)	(20.05)	(20.05)
Cash Flow [q-1]	0.125***	0.126***	0.126***	0.033	0.027	0.027	0.079***	0.079***	0.079***
	(3.81)	(3.82)	(3.82)	(1.13)	(0.92)	(0.93)	(3.25)	(3.22)	(3.21)
Book Leverage [q-1]	0.002	0.002	0.002	-0.078***	-0.078***	-0.078***	0.023***	0.023***	0.023***
	(1.53)	(1.54)	(1.53)	(-35.37)	(-35.59)	(-35.60)	(14.45)	(14.43)	(14.43)
Tangibility [q-1]	0.040***	0.040***	0.040***	0.033***	0.033***	0.033***	0.000	0.000	0.000
	(17.04)	(17.03)	(17.03)	(12.58)	(12.80)	(12.80)	(0.14)	(0.18)	(0.19)
Sales Growth [q-1]	0.007***	0.007***	0.007***	-0.008***	-0.008***	-0.008***	0.002***	0.002***	0.002***
	(5.49)	(5.49)	(5.49)	(-5.96)	(-6.00)	(-6.00)	(4.78)	(4.77)	(4.76)
ROA [q-1]	-0.083**	-0.083**	-0.083**	-0.063**	-0.057*	-0.057*	-0.100***	-0.099***	-0.099***
	(-2.47)	(-2.48)	(-2.48)	(-2.09)	(-1.88)	(-1.88)	(-4.11)	(-4.07)	(-4.07)
Firm FE and Year FE	YES	YES	YES	YES	YES	YES	YES	YES	YES
SIC2 x Quarter FE	YES	YES	YES	YES	YES	YES	YES	YES	YES
Observations	208,049	208,049	208,049	206,452	206,452	206,452	206,920	206,920	206,920
Adjusted R-squared	0.020	0.020	0.020	0.062	0.064	0.064	0.103	0.103	0.103

Table 8: Investment Distortion Prior to If-stock Dilutive Deals

This table reports the OLS regression results using quarterly data. The dependent variable is the acquirer's capital expenditure. The main independent variables are the values of each type of payments for deals announced during the next two quarters, i.e., quarter *q+1* and *q+2*. In particular, for column 1, we measure the total value of stock payments for deals announced during the two quarters; for column 2, we measure the total value of cash paid for deals announced in the two quarters; for column 3, we separately measure the total value of cash paid for the if-stock dilutive deals and the value of cash paid for other deals. These payment values are scaled by the acquirer's total assets at the end of quarter *q*, and the dependent variable are scaled by the acquirer's Property, Plant and Equipment Net (PPENT) at the beginning of quarter *q*. We control for lagged firm characteristics, firm and year fixed effects, and industry-quarter fixed effects. T-statistics are reported in parentheses, using robust standard errors clustered on firms. *, **, and *** indicate statistical significance at 10%, 5%, and 1% levels, respectively.

	Capital Expenditure [q]		
	[1]	[2]	[3]
Stock Payment [q+1, q+2]	0.001		
	(0.63)		
Cash Payment [q+1, q+2]		-0.009**	
		(-2.46)	
Cash Payment (if-stock dilutive) [q+1, q+2]			-0.010**
			(-2.32)
Cash Payment (if-stock non-dilutive) [q+1, q+2]			-0.006
			(-0.90)
Tobin's Q [q-1]	0.013***	0.013***	0.013***
	(21.13)	(21.19)	(21.19)
Ln(MktCap) [q-1]	0.000	0.000	0.000
	(0.08)	(0.07)	(0.08)
Excess Ret [q-1]	0.000	0.000	0.000
	(0.32)	(0.30)	(0.30)
Cash Holding [q-1]	0.065***	0.065***	0.065***
	(16.36)	(16.36)	(16.36)
Book Leverage [q-1]	-0.038***	-0.038***	-0.038***
	(-12.15)	(-12.16)	(-12.16)
ROA [q-1]	0.190***	0.190***	0.190***
	(16.42)	(16.44)	(16.44)
Constant	0.044***	0.044***	0.044***
	(12.36)	(12.37)	(12.36)
Firm Characteristics	YES	YES	YES
Firm FE and Year FE	YES	YES	YES
SIC2 x Quarter FE	YES	YES	YES
Observations	211636	211636	211636
Adjusted R-squared	0.322	0.322	0.322

Table 9: Total Shareholder Gains and Cash Payment in If-stock Dilutive Deals

This table reports the results of cumulative abnormal returns from 42 trading days before the deal announcement to the completion date, i.e., CAR [-42, C], regressed on an indicator for an if-stock dilutive deal, the proportion of cash in deal consideration (or the indicator of cash and mixed deals), and the respective interaction terms. The sample includes all the completed deals. We control for deal and firm characteristics, and the year and industry fixed effects. T-statistics are reported in parentheses, using robust standard errors clustered on years. *, **, and *** indicate statistical significance at 10%, 5%, and 1% levels, respectively.

	CAR [-42, C] Combined		CAR [-42, C] Acquirer		CAR [-42, C] Target	
	[1]	[2]	[3]	[4]	[5]	[6]
Dilutive$_{AS}$	0.017	0.012	0.0047	-0.0014	0.042	0.037
	(1.01)	(0.71)	(0.26)	(-0.07)	(1.53)	(1.36)
Cash%	0.095***		0.098***		-0.017	
	(3.44)		(3.39)		(-0.36)	
Dilutive$_{AS}$ x Cash%	-0.074**		-0.079**		0.061	
	(-2.64)		(-2.65)		(1.19)	
Paying Cash		0.044*		0.041		-0.048
		(1.92)		(1.53)		(-1.20)
Dilutive$_{AS}$ x Paying Cash		-0.041*		-0.041		0.071
		(-1.92)		(-1.63)		(1.65)
Deal Value/Acq Mktcap	0.079**	0.070**	0.0030	-0.0062	-0.11***	-0.12***
	(2.44)	(2.08)	(0.08)	(-0.16)	(-4.16)	(-4.53)
P/E Ratio (Tar/Acq)	0.0032	0.0032	0.0035	0.0035	0.0046	0.0048
	(0.49)	(0.47)	(0.52)	(0.50)	(0.53)	(0.55)
MTB Acq	-0.015	-0.016	-0.019	-0.019	0.020	0.019
	(-0.93)	(-0.98)	(-1.06)	(-1.12)	(1.52)	(1.45)
Leverage Acq	0.052	0.055	0.084	0.087	-0.12*	-0.12*
	(0.99)	(1.06)	(1.53)	(1.59)	(-2.00)	(-2.00)
Cash Holding Acq	-0.062	-0.063	-0.081	-0.082	-0.026	-0.025
	(-1.36)	(-1.38)	(-1.58)	(-1.60)	(-0.42)	(-0.40)
Tangibility Acq	-0.082	-0.087	-0.088	-0.094	-0.031	-0.033
	(-0.99)	(-1.05)	(-1.01)	(-1.06)	(-0.33)	(-0.35)
Firm Size Tar	-0.0058	-0.0067	-0.0058	-0.0068	-0.014	-0.014
	(-1.13)	(-1.28)	(-0.98)	(-1.11)	(-1.44)	(-1.51)
MTB Tar	-0.0100	-0.011	-0.0063	-0.0074	-0.056***	-0.057***
	(-1.03)	(-1.11)	(-0.58)	(-0.67)	(-4.39)	(-4.42)
Leverage Tar	0.039	0.045	0.0041	0.010	0.24***	0.24***
	(0.91)	(1.04)	(0.09)	(0.23)	(4.46)	(4.48)
Cash Holding Tar	0.026	0.029	0.042	0.045	0.032	0.035
	(0.68)	(0.77)	(0.97)	(1.04)	(0.58)	(0.64)
Tangibility Tar	0.033	0.033	0.029	0.029	-0.038	-0.037
	(0.50)	(0.50)	(0.39)	(0.39)	(-0.47)	(-0.46)
Constant	0.021	0.043	0.016	0.041	0.40***	0.42***
	(0.49)	(0.96)	(0.29)	(0.71)	(6.07)	(6.70)
Year FE and Industry FE	YES	YES	YES	YES	YES	YES
Observations	1580	1580	1582	1582	1612	1612
Adjusted R-squared	0.065	0.061	0.056	0.052	0.119	0.119

Table 10: Relative P/E Ratios and Deal Type

This table reports the number and proportion of cash, mixed, and stock deals based on the relative P/E ratio of acquirer and target. P/E is measured as the ratio of stock price two days before the deal announcement date and the median forecast of annual EPS before the announcement. When both the target and acquirer have a positive P/E, we separate them into two groups according to their relative levels. The numbers in the parentheses are the row percentages, and the numbers in the brackets are the column percentages.

	Both Positive P/E		Non-Positive or missing P/E	Total
	High-buys-Low (P/E Acq > P/E Tar)	Low-buys-High (P/E Acq ≤ P/E Tar)	P/E Acq ≤ 0 and/or P/E Tar ≤ 0	
Cash Deals	246	386	375	1007
	(38.92%)	(61.08%)		
	[26.48%]	[38.64%]	[26.96%]	[30.34%]
Mixed Deals	114	137	208	459
	(45.42%)	(54.58%)		
	[12.27%]	[13.71%]	[14.95%]	[13.83%]
Stock Deals	569	476	808	1853
	(54.45%)	(45.55%)		
	[61.25%]	[47.65%]	[58.09%]	[55.83%]
Total	929	999	1391	3319
	(48.18%)	(51.82%)		

Table 11: Subsample: Before and After 2001

This table reports the regression results using the sample of deals announced before and after 2001 (in Panels A and B, respectively). The dependent variables are the fraction of cash payment, the dummy indicator of cash and mixed deals, and the dummy indicator of cash and mixed deals with the intended EPS higher than the all-stock EPS. The regression settings resemble columns 1, 2, 4 in Table 2 and columns 1, 2, 4 in Panel B of Table 3. The corresponding control variables are included but not reported.

Panel A: 1990-2001

	Cash Percent			Paying Cash Dummy			Paying EPS-friendly Cash Dummy		
Dilutive$_{AS}$	0.092***	0.057**	0.029	0.096**	0.065*	0.024	0.077**	0.033	0.022
	(3.63)	(2.39)	(1.28)	(2.55)	(1.87)	(0.75)	(2.51)	(1.18)	(0.91)
Polynomials of *S_ΔEPS*$_{as}$				3-order with interactions					
Control Variables	NO	YES	YES	NO	YES	YES	NO	YES	YES
Other Control (P/E ratio)	NO	NO	YES	NO	NO	YES	NO	NO	YES
Industry FE and Year FE	YES	YES	YES	YES	YES	YES	YES	YES	YES
Observations	1310	1048	878	1310	1048	878	1310	1048	878
Adjusted R-squared	0.060	0.154	0.168	0.056	0.153	0.175	0.059	0.135	0.172

Panel B: 2002-2017

	Cash Percent			Paying Cash Dummy			Paying EPS-friendly Cash Dummy		
Dilutive$_{AS}$	0.16***	0.12***	0.10***	0.12**	0.11**	0.098**	0.16***	0.12**	0.12**
	(3.22)	(3.03)	(3.57)	(2.77)	(2.28)	(2.80)	(4.05)	(2.75)	(2.67)
Polynomials of *S_ΔEPS*$_{as}$				3-order with interactions					
Control Variables	NO	YES	YES	NO	YES	YES	NO	YES	YES
Other Control (P/E ratio)	NO	NO	YES	NO	NO	YES	NO	NO	YES
Industry FE and Year FE	YES	YES	YES	YES	YES	YES	YES	YES	YES
Observations	984	921	729	984	921	729	984	921	729
Adjusted R-squared	0.327	0.416	0.476	0.198	0.243	0.280	0.192	0.252	0.260

Table 12: Premium for Stock Deals Involving "High-Buys-Low"

This table reports the results of deal premium and the target's three-day CAR around deal announcement dates regressed on the indicator of EPS accretion. The sample includes the pure stock deals with acquirer's P/E ratio higher than the target's P/E and ΔEPS_{as} limited to a range around zero specified as follows. For column 1 and 4, the sample includes deals with ΔEPS_{as} within [-0.001, 0.001]; for column 2 and 5, the sample includes ΔEPS_{as} within [-0.002, 0.002], and we control for ΔEPS_{as} and its interaction with the accretion dummy; for column 3 and 6, we impose no restriction on the value of ΔEPS_{as}, and control for up to the third polynomial terms of ΔEPS_{as} and their interactions with the accretion dummy. Each variable is winsorized at 1 percentile on both sides. T-statistics are reported in parentheses, using robust standard errors clustered on years. *, **, and *** indicate statistical significance at 10%, 5%, and 1% level, respectively.

	Premium			Target CAR [-1, +1]		
Sample: |S_ΔEPS |<=	*0.001*	*0.002*	*full*	*0.001*	*0.002*	*full*
	[1]	[2]	[3]	[4]	[5]	[6]
Accretive	-0.18***	-0.13**	-0.15***	-0.12***	-0.094***	-0.090***
	(-7.73)	(-2.69)	(-6.69)	(-7.06)	(-3.31)	(-4.47)
Deal Value/Acq Mktcap	0.094	0.100	0.076**	-0.016	0.0024	-0.025
	(1.30)	(1.61)	(2.09)	(-0.32)	(0.06)	(-0.88)
P/E Ratio (Tar/Acq)	-0.89***	0.0048	-0.0028	-0.59***	-0.57***	-0.43***
	(-6.35)	(0.46)	(-0.24)	(-5.19)	(-5.70)	(-9.69)
MTB Acq	0.0048	-0.094	-0.041	0.0075	0.0057	-0.0019
	(0.37)	(-0.93)	(-0.68)	(0.81)	(0.77)	(-0.34)
Leverage Acq	-0.23*	0.032	-0.020	-0.21**	-0.14*	-0.12
	(-1.84)	(0.28)	(-0.36)	(-2.28)	(-1.87)	(-1.67)
Cash Holding Acq	0.013	-0.16	-0.097	0.0011	0.0085	-0.011
	(0.09)	(-1.28)	(-1.03)	(0.01)	(0.11)	(-0.34)
Tangibility Acq	-0.35	-0.018**	-0.016**	-0.35**	-0.23*	-0.18*
	(-1.63)	(-2.65)	(-2.48)	(-2.21)	(-1.92)	(-2.02)
Firm Size Tar	-0.020	-0.032***	-0.014	-0.011	-0.0021	0.00066
	(-1.60)	(-3.00)	(-1.50)	(-1.20)	(-0.31)	(0.09)
MTB Tar	-0.028**	0.029	0.031	-0.031**	-0.025***	-0.0080
	(-2.38)	(0.44)	(0.53)	(-2.83)	(-3.61)	(-0.84)
Leverage Tar	0.052	0.024	0.091*	0.0065	-0.0032	0.012
	(0.46)	(0.30)	(1.87)	(0.07)	(-0.09)	(0.32)
Cash Holding Tar	0.054	0.038	0.074	-0.042	-0.045	0.0031
	(0.65)	(0.33)	(0.90)	(-0.68)	(-1.37)	(0.11)
Tangibility Tar	0.22	-0.89***	-0.69***	0.32**	0.15	0.18**
	(0.96)	(-7.81)	(-14.03)	(2.13)	(1.33)	(2.12)
Constant	1.28***	1.22***	1.01***	0.89***	0.80***	0.63***
	(9.70)	(9.91)	(12.54)	(9.59)	(7.77)	(8.83)
Polynomials of *S_ΔEPS*	NO	1-order	3-order	NO	1-order	3-order
Industry FE and Year FE	YES	YES	YES	YES	YES	YES
Observations	207	300	504	190	273	456
Adjusted R-squared	0.473	0.451	0.394	0.382	0.355	0.286

Appendix A:

Variable Definitions

Variables	Definition
Cash (/Stock/Mixed) Deals	A merger or acquisition deal in which the holders of common stocks in target firm receive cash (/stock/a combination of cash and stock) from the acquirer.
Cash%	Proportion of cash in deal payment. It equals 1 for pure stock deal, 0 for pure cash deal, and is between 0 and 1 for mixed deals.
x	Exchange ratio - the number of shares in the combined company per legacy target share.
x_{as}	All-stock exchange ratio - the exchange ratio if the entire deal consideration had been paid in stock. For a cash or mixed deal, it is measured by the ratio of "offer price per share" (dollar value per target common stock) and the acquirer's stock price two days before deal announcement. For a pure stock deal, it is the same as the actual exchange ratio.
All-stock EPS	The combined EPS using all-stock exchange ratio, $\mathrm{e}_{\mathrm{as}} = \frac{e_t \cdot n + e_b \cdot m}{n \cdot x_{as} + m}$. Detailed descriptions are in Section II.2.
Intended EPS	The intended EPS according to deal terms, $\mathrm{e}_{\mathrm{int}} = \frac{e_t \cdot n + e_b \cdot m - (1-\tau)E(R)C}{n \cdot x + m}$ Detailed descriptions are in Section II.4.
S_ΔEPS$_{as}$	The standardized change from the acquirer's pre-deal EPS to the all-stock EPS EPS, $S\_\Delta EPS_{as} = \frac{\mathrm{e}_{\mathrm{as}} - e_B}{p_{B,t-2}}$. Detailed descriptions are in Section II.2.
ΔEPS$_{as}$	The absolute change from the acquirer's pre-deal EPS to the all-stock EPS EPS, $\Delta EPS_{as} = \mathrm{e}_{\mathrm{as}} - e_B$.
Dilutive$_{AS}$	An indicator of deals with *S_ΔEPS$_{as}$ <0.*
S_ΔEPS$_{INT}$	The standardized intended change in EPS according to deal terms, $S\_\Delta EPS_{INT} = \frac{e_{int} - e_B}{p_{B,t-2}}$.
EPS-friendly cash	An indicator of cash and mixed deals with $\mathrm{e}_{int} > e_{as}$
EPS-unfriendly cash	An indicator of cash and mixed deals with $\mathrm{e}_{int} < e_{as}$
Treasury Rate	The three-month treasury rate at the deal announcement, which proxies investors' perceived interest cost of financing the cash payment.
Implied Interest Rate	A proxy of the acquirer's borrowing cost constructed as follows. If the acquirer is holding excess cash (defined below), we assume the opportunity cost of not holding cash is the three-month treasury bill rate at deal announcement. If the excess cash does not fully cover the deal value, we assume the uncovered component is financed with debt at the implied interest rate of the acquirer, which is estimated using total interest expenses scaled by lagged total debt. When the acquirer has a missing value on the implied interest rate, we substitute the median value of firms in the same (Fama-French 49) industry and size quintile.

Excess Cash	The excess cash holding is defined as the residual term of OLS regression of cash holding on firm characteristics controlling for the industry and year fixed effects following the specification in Pinkowitz, Stulz, and Williamson (2015).
C	The amount of cash payment paid to the target investors.
All-stock Issue	The share issuance if a deal were fully paid with stock as percentage of the acquirer's number of shares outstanding before deal announcement, $\frac{n \cdot x_{as}}{m}$.
Firm Size	The natural logarithm of total assets.
Leverage	The book leverage ratio - the sum of short-term and long-term liability scaled by lagged total assets.
MTB	The market-to-book ratio of equity.
Cash Holding	Cash and equivalents scaled by lagged total assets.
Tangibility	The PPENT scaled by lagged total assets.
Deal Value/Acq MktCap	The ratio of deal transaction value and the market capitalization of the acquirer before announcement.
Premium	The percentage premium of the "offer price per share" relative to the target's stock price 2 days before deal announcement.
P/E Ratio (Tar/Acq)	The ratio of the target's and acquirer's price-to-earnings ratio before deal announcements. The ratio is non-missing for the deals with positive earnings for both the target and acquirer.
Cash Increase/Decrease	Cash and cash equivalents increase/decrease (chech), scaled by the lagged total assets. The information comes from the quarterly statements of cash flows. We back out the quarterly flows from the year-to-date numbers.
Net Debt Issue	Long-term debt issuance (dltis) minus long-term debt reduction (dltr) plus changes in current debt (dlcch), and then scale it by the lagged total assets. The information comes from the quarterly statements of cash flows. We back out the quarterly flows from the year-to-date numbers.
Net Equity Issue	Sale of common and preferred stock (sstk) minus purchase of common and preferred stock (prstkc), and then scale it by the lagged total assets. The information comes from the quarterly statements of cash flows. We back out the quarterly flows from the year-to-date numbers.
Stock Value [q+x, q+y]	The total value of the stock (component of) deals announced from quarter *q+x* to the quarter of *q+y* (*x* and *y* could be negative), scaled by the total assets of quarter *q*.
Cash Value [q+x, q+y]	The total value of cash (component of) deals announced from quarter *q+x* to the quarter of *q+y* (*x* and *y* could be negative), scaled by the total assets of quarter q.
Capital Expenditure	Capital expenditure scaled by lagged property, plants and equipment (PPENT). The information comes from the quarterly statements of cash flows. We back out the quarterly capital expenditure from the year-to-date numbers.
Tobin's Q	The market value of assets scaled by the book value of assets.

Ln(MktCap)	The natural logarithm of market capitalization.
Excess Ret	The firm's stock return minus the market return of the same period.
Sales Growth	The growth rate of revenue.
ROA	The return on assets.
CAR [-1, +1]	The cumulative abnormal return during a three-day event window (from one day before to one day after deal announcement). We estimate the parameters of the market model using the CRSP value-weighted index returns from 253 trading days to 43 trading days before deal announcement. We then compute the daily abnormal returns and sum them up over the event window.
CAR [-1, C]	The cumulative abnormal return from one day before the deal announcement to the completion date. We estimate the parameters of the market model using the CRSP value-weighted index returns from 253 trading days to 43 trading days before deal announcement. We then compute the daily abnormal returns and sum them up over the event window.
CAR [-42, C]	The cumulative abnormal return from 42 trading days before announcement to deal completion. We estimate the parameters of the market model using the CRSP value-weighted index returns from 253 trading days to 43 trading days before deal announcement. We then compute the daily abnormal returns and sum them up over the event window.

Appendix Table A1: Robustness of Discontinuity Results to 5% Perturbations of the Offer Price/the All-stock Exchange Ratio

This table shows the robustness of the discontinuity results in Table 2 and Table 3 (Panel B) by assigning a 5% random perturbation to the offer price per share when constructing the all-stock exchange ratio. In particular, for cash and mixed deals, after taking the ratio of offer price per share and acquirer share price, we multiply this ratio with one plus a number that is randomly drawn from the uniform distribution from -5% to +5%; for stock deals, the all-stock exchange ratio remains as the actual exchange ratio in deal consideration. Then we measure the all-stock change in EPS using the perturbed number. In Panel A, we report the distribution of $S\_\Delta EPS_{as}$ based on our baseline measure and $S\_\Delta EPS_{as}$ using the perturbed numbers. The sample excludes the deals with *both* $S\_\Delta EPS_{as}$ value outside the [-0.002, +0.002] range. The diagonal items show that a high fraction of slightly accretive (dilutive) deals remain slightly accretive (dilutive) after the random perturbation. In Panel B,we estimate the regressions in Table 2 and Panel B of Table 3 using $S\_\Delta EPS_{as}$ after perturbation. We repeat the process 100 times for different vectors of random numbers for the sample deals. We report the average estimate of the if-stock dilutive dummy, as well as the 1 and 99 percentile confidence intervals of all the estimates.

Panel A: Distribution of deals with $S\_\Delta EPS_{as}$ close to zero

	$S\_\Delta EPS_{as}$ after 5% perturbation of x_{as}				
$S\_\Delta EPS_{as}$	[-0.002, 0)	0	(0, 0.002]	<-0.002 OR >0.002	Total
[-0.002, 0)	**567**	5	3	10	585
	96.92%	0.85%	0.51%	1.71%	
0	6	**95**	5	0	106
	5.66%	**89.62%**	4.72%	0.00%	
(0, 0.002]	2	4	**234**	8	248
	0.81%	1.61%	**94.35%**	3.23%	
<-0.002 OR >0.002	10	0	1	0	11
	90.91%	0.00%	9.09%	0.00%	
Total	585	104	243	18	950
	61.58%	10.95%	25.58%	0	

Panel B: Regressions using the perturbed $S\_\Delta EPS_{as}$ measure

Sample	*Full Sample*					*$S\_\Delta EPS_{as}$ in [-0.002, 0.002]*	
	Proportion of Cash in Deal Consideration						
$Dilutive_{AS}$	0.128	0.092	0.043	0.059	0.147	0.105	0.109
	[0.112, 0.139]	[0.076, 0.105]	[0.027, 0.058]	[0.040, 0.074]	[0.103, 0.195]	[0.061, 0.145]	[0.064, 0.151]
	Dummy of Paying Cash						
$Dilutive_{AS}$	0.114	0.090	0.047	0.055	0.098	0.066	0.072
	[0.099, 0.126]	[0.075, 0.104]	[0.029, 0.068]	[0.039, 0.072]	[0.063, 0.132]	[0.015, 0.098]	[0.020, 0.109]
	Dummy of Paying EPS-friendly Cash						
$Dilutive_{AS}$	0.126	0.087	0.040	0.064	0.098	0.063	0.057
	[0.108, 0.139]	[0.070, 0.100]	[0.019, 0.059]	[0.045, 0.080]	[0.051, 0.140]	[0.021, 0.103]	[0.015, 0.100]
Polynomials of $S\_\Delta EPS_{as}$	3-order				1-order		
Control Variables	NO	YES	YES	YES	NO	YES	YES
PE ratio	NO	NO	NO	YES	NO	NO	YES
Industry FE and Year FE	YES	YES	NO	YES	YES	YES	YES
AcqSIC1 x TarSIC1 x Year FE	NO	NO	YES	NO	NO	NO	NO

Appendix Table A2: Deal and Acquirer Characteristics of the Cash and Mixed Deals vs. Stock Deals

Panel A reports the mean values of each variable for the cash and mixed deals in column (1) and for stock deals in column (2). The last two columns report the average difference between column (1) and (2), and the T-statistics of the difference. *Firm Size* is the natural logarithm of total assets before deal announcement. The *HP (WW) index* are the financial constraint index following Hadlock and Pierce (2010) (Whited and Wu (2006)). *Financial Constrained%* refers to the proportion of the acquirers that are associated with a financial constraint index value higher than the median level for the SIC two-digit industry in the year before the deal announcement. *[Excess Cash>0]%* is the proportion of deals with the acquirer having a positive level of excess cash holding before the deal announcement. *Treasury Rate* is the three-month treasury rate at deal announcement. *Implied Interest Rate* is assumed to be the treasury rate if the acquirer's excess cash holding exceeds the deal's cash amount; for the (component of) cash consideration that exceeds the acquirer's excess cash holding, the implied interest rate is the ratio of acquirer's interest expense and total lagged debt during the year before the deal announcement. Panel B reports the number of stock deals based on the relation between the all-stock EPS and the "intended EPS," which is the hypothetical EPS assuming the entire consideration were paid with cash. All variables are winsorized at 1 percentile on both sides. *, **, and *** indicate statistical significance at 10%, 5%, and 1% levels, respectively.

Panel A: Deal and firm characteristics

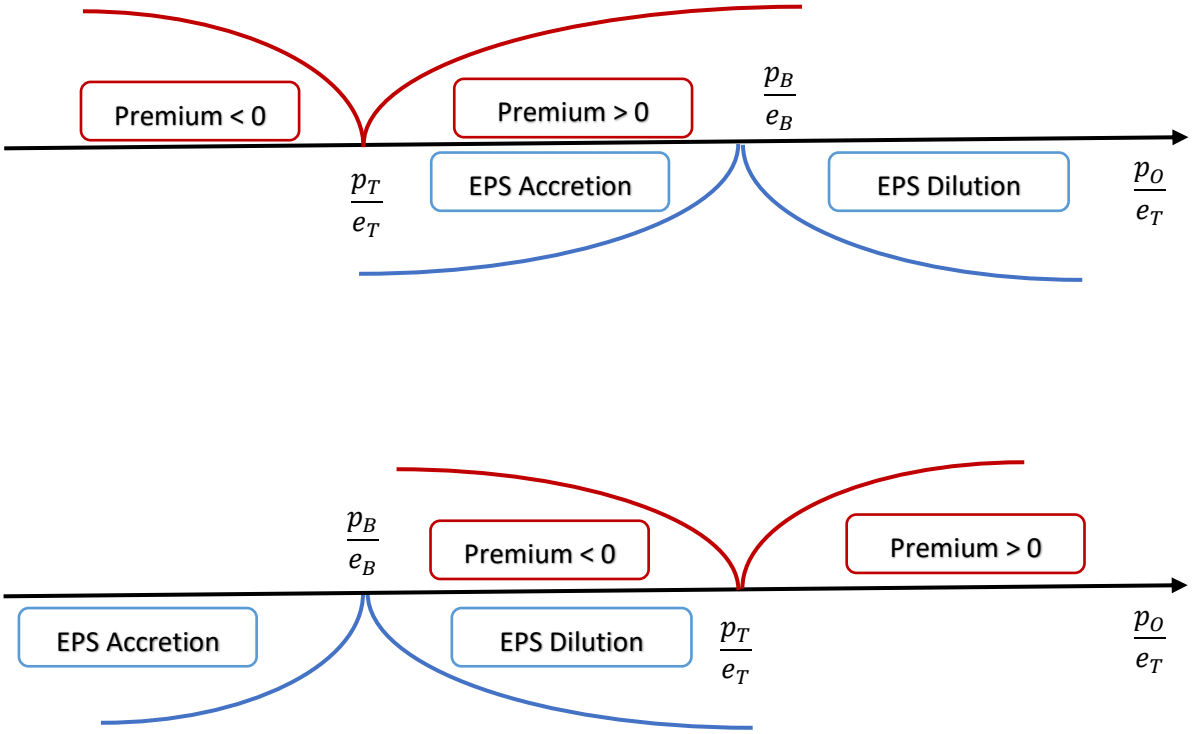
	Cash & Mixed Deals	Stock Deals	Difference	
	(1)	(2)	(1)-(2)	T-stat
Deal Value/Acq Mktcap	0.253	0.353	-0.100***	(-8.802)
Firm Size Acq	7.818	7.412	0.407***	(5.680)
Firm Size Tar	5.760	5.807	-0.048	(-0.645)
Financial Constrained% (HP Index)	25.7%	28.5%	-0.028*	(-1.826)
Financial Constrained% (WW Index)	20.7%	27.4%	-0.067***	(-4.317)
[Excess cash>0]%	37.1%	44.9%	-0.078***	(-4.549)
Treasury Rate	2.8%	4.1%	-0.013***	(-17.996)
Implied Interest Rate	6.5%	7.9%	-0.014***	(-6.630)
Observations	1466	1853	3319	

Panel B: Distribution of stock deals

Interest rate proxy	*EPS-unfriendly* $e_{int} < e_{as}$	*EPS-neutral* $e_{int} = e_{as}$	*EPS-friendly* $e_{int} > e_{as}$	Total (non-missing)
Treasury rate	342	50	824	1216
	(28.13%)	(4.11%)	(67.76%)	
Implied interest rate	553	32	539	1124
	(49.2%)	(2.85%)	(47.95%)	

Appendix Figure A1: Deal Premium and the Feasibility of EPS Accretive in Pure Stock Deals

The upper figure shows the scenario where the acquirer has a higher P/E ratio than the target. As illustrated, there is a range of deal multiple, $\frac{p_O}{e_T}$, between the target's and acquirer's P/E ratio that allows for a positive premium paid to the target and at the same time EPS accretion to the acquirer in the case of pure stock deals. The lower figure shows the other scenarios where the acquirer has a lower P/E ratio than the target. As illustrated, paying a positive premium to the target would imply EPS dilution to the acquirer in the case of pure stock deal.



Online Appendix A for

“EPS-Sensitivity and Mergers”

Appendix Table OA1: Balance Test in the Full sample

This table shows the mean value of the control variables within each value range of $S\_\Delta EPS_{as}$ in the left three columns. In the last two columns, we report the result of discontinuity tests. In particular, we use the sample of deals with $S\_\Delta EPS_{as}$ in the range of [-0.002, 0.002], and regress each variable on the if-stock dilutive dummy, $S\_\Delta EPS_{as}$, and their interaction, controlling for the other control variables, and industry and year fixed effects. The regression setting resembles Column 6 of Table 2. The estimate of the coefficient on the indicator of if-stock dilution and its t-statistic (using robust standard errors clustered on years) are reported in the last two columns, respectively.

	$S\_\Delta EPS_{as}$			RD Test	
	[-0.002, 0)	0	(0, 0.002]	Coeff.	T-stat
Deal Value/Acq Mktcap	0.178	0.156	0.303	-0.078**	(-2.49)
Deal Premium	0.328	0.303	0.294	0.041	(1.39)
MTB Acq	1.874	1.930	2.308	-0.007	(-0.04)
Leverage Acq	0.186	0.179	0.173	0.028	(1.67)
Cash Holding Acq	0.195	0.184	0.242	0.006	(0.22)
Tangibility Acq	0.134	0.156	0.158	0.006	(0.40)
Firm Size Tar	5.928	5.564	5.803	0.120	(1.13)
MTB Tar	1.682	1.587	1.711	0.006	(0.00)
Leverage Tar	0.137	0.175	0.161	-0.027	(-1.45)
Cash Holding Tar	0.228	0.201	0.234	-0.023	(-1.06)
Tangibility Tar	0.132	0.158	0.155	0.008	(0.80)
Num. Obs.	583	106	248	825	

Appendix Table OA2: Robustness with Local Estimation of the Discontinuity

Panel A shows the OLS regression results using a sample of deals with $S\_\Delta EPS_{as}$ in the small range of [-0.001, 0.001]. The regression setting resembles the last three columns of Table 2. Panel B reports the non-parametric estimator of the RD effects. In particular, we follow Calonico, Cattaneo and Titiunik (2014) to choose the optimal bandwidths and estimate the local-polynomial regressions with triangular kernels on each side of zero $S\_\Delta EPS_{as}$. We control for the deal and firm characteristics as in columns 3 and 6 of Panel A. We report the bias-corrected point estimate of the RD effect and the corresponding z-statistics. The standard errors are clustered on year level using the nearest-neighbor method following Abadie and Imbens (2008). All variables are winsorized at 1 percentile on both sides. *, **, and *** indicate statistical significance at 10%, 5%, and 1% levels, respectively.

Panel A: OLS regression

	Paying Cash Dummy			Cash Percent		
Sample:	*$S\_\Delta EPS_{as}$ in [-0.001, 0.001]*					
	[1]	[3]	[3]	[4]	[5]	[6]
$Dilutive_{AS}$	0.14**	0.11	0.11*	0.18***	0.15**	0.15**
	(2.55)	(1.68)	(1.77)	(3.29)	(2.55)	(2.59)
$S\_\Delta EPS_{as}$	-8.86	127.7	155.4	9.15	150.4	176.1
	(-0.07)	(1.10)	(1.36)	(0.07)	(1.43)	(1.66)
$Dilutive_{AS}$ x *$S\_\Delta EPS_{as}$*	65.8	-166.2	-204.3	66.1	-152.7	-177.5
	(0.41)	(-0.96)	(-1.23)	(0.40)	(-0.97)	(-1.20)
Deal Value/Acq Mktcap		-0.47***	-0.47***		-0.53***	-0.52***
		(-4.78)	(-4.69)		(-6.00)	(-5.74)
Deal Premium		0.024	0.028		0.058	0.073
		(0.36)	(0.43)		(0.85)	(1.08)
P/E Ratio (Tar/Acq)			0.026			0.041**
			(1.48)			(2.42)
MTB Acq		-0.022	-0.022		-0.020	-0.017
		(-1.21)	(-1.24)		(-1.09)	(-0.90)
Leverage Acq		0.043	0.027		0.10	0.079
		(0.25)	(0.14)		(0.62)	(0.47)
Cash Holding Acq		0.14*	0.18***		0.066	0.087*
		(1.77)	(3.01)		(0.93)	(1.88)
Tangibility Acq		0.25	0.24		0.21	0.18
		(1.54)	(1.40)		(1.22)	(1.03)
Firm Size Tar		-0.0042	-0.0083		-0.014	-0.017
		(-0.31)	(-0.53)		(-0.93)	(-1.13)
MTB Tar		-0.029*	-0.033*		-0.024*	-0.030*
		(-1.90)	(-1.83)		(-1.71)	(-1.89)
Leverage Tar		0.15	0.21**		0.20**	0.27***
		(1.50)	(2.10)		(2.31)	(2.96)
Cash Holding Tar		0.12	0.13		0.12	0.14
		(1.12)	(1.18)		(1.18)	(1.30)
Tangibility Tar		-0.016	-0.088		-0.078	-0.13
		(-0.09)	(-0.43)		(-0.36)	(-0.56)
Constant	0.42***	0.46***	0.44***	0.34***	0.45***	0.41***
	(12.18)	(4.16)	(3.75)	(9.39)	(4.17)	(3.75)
Polynomials of *$S\_\Delta EPS_{as}$*			1-order			
Industry FE and Year FE	YES	YES	YES	YES	YES	YES
Observations	584	523	506	584	523	506
Adjusted R-squared	0.264	0.333	0.341	0.280	0.376	0.386

Panel B: Non-parametric estimation

	Paying Cash Dummy		Cash Percent	
Dilutive$_{AS}$	0.137*	0.145*	0.133*	0.146*
	(1.765)	(1.760)	(1.900)	(1.864)
Deal and Firm Characteristics	YES	YES	YES	YES
Order Local Polynomial terms(p)	1	2	1	2
Order bias(q)	2	3	2	3
BW est. left(h)	0.011	0.014	0.011	0.013
BW est. right(h)	0.008	0.010	0.011	0.011
Num. Obs.	1610	1610	1610	1610
Effective Num. Obs. left	970	1023	972	1008
Effective Num. Obs. right	443	446	453	453

Appendix Table OA3: Robustness of EPS-friendly Cash

This is a robustness check for Table 3 using the acquirer's implied interest cost to measure the intended EPS. In particular, the implied interest rate is assumed to be the treasury rate if the acquirer's excess cash holding exceeds the deal's cash amount; for the (component of) cash consideration that exceeds the acquirer's excess cash holding, the interest rate is the same as the ratio of acquirer's interest expense and total lagged debt during the year before the deal announcement. We denote the cash payment as EPS-friendly (EPS-unfriendly) if the all-stock EPS is smaller than (larger than) the intended EPS. Before the comparison, both EPS metrics have been rounded to the nearest cent. Panel A shows the number and fraction of each type of deal within each range of $S\_\Delta EPS_{as}$. In Panel B, we examine the discontinuous propensity of paying cash that is EPS friendly/unfriendly. We replace the dependent variable in Table2 with (1) the indicator of EPS-friendly cash and mixed deals, (2) the indicator EPS-unfriendly cash and mixed deals (leaving the EPS-friendly cash and mixed deals out of the sample). The specification resembles Panel B of Table 2. Control variables and fixed effects are included but not reported.

Panel A: Distribution of cash and mixed deals

$S\_\Delta EPS_{as}$	*EPS-unfriendly* $e_{int} < e_{as}$	*EPS-neutral* $e_{int} = e_{as}$	*EPS-friendly* $e_{int} > e_{as}$	Total Num. of cash and mixed deals
<-0.002	125	26	334	485
	(25.77%)	(5.36%)	(68.87%)	
[-0.002, 0.000)	64	30	204	298
	(21.48%)	(10.07%)	(68.46%)	
0	11	8	21	40
	(27.50%)	(20.00%)	(52.50%)	
(0.000, 0.002]	41	3	45	89
	(46.07%)	(3.37%)	(50.56%)	
>0.002	42	3	27	72
	(58.33%)	(4.17%)	(37.50%)	
Total	283	70	631	984
	(28.76%)	(7.11%)	(64.13%)	

Panel B: Propensity of paying cash that is friendly/unfriendly to EPS

Sample:	*Full Sample*				$S\_\Delta EPS_{as}$ *in [-0.002, 0.002]*		
	(1) Dummy of EPS-friendly Cash (vs. the Other Deals)						
$Dilutive_{AS}$	0.13***	0.091***	0.049**	0.063**	0.11**	0.059	0.054
	(4.77)	(3.62)	(2.10)	(2.26)	(2.60)	(1.24)	(1.21)
Observations	2294	1969	1969	1607	934	825	792
	(2) Dummy of EPS-unfriendly Cash (vs. Equity Deals)						
$Dilutive_{AS}$	0.027	0.034	0.015	0.012	0.027	0.044	0.063*
	(1.28)	(1.43)	(0.60)	(0.54)	(0.87)	(1.30)	(1.90)
Observations	1593	1339	1339	1060	623	544	525
Polynomials of $S\_\Delta EPS_{as}$	3-order with interactions				1-order with interaction		
Industry FE and Year FE	YES	YES	NO	YES	YES	YES	YES
AcqSIC1 x TarSIC1 x Year	NO	NO	YES	NO	NO	NO	NO

Appendix Table OA4: Deal and Acquirer Characteristics of the Cash Deals vs. Mixed Deals

This table reports the mean values of each variable for the cash deals in column (1) and for the mixed deals in column (2). The last two columns report the average difference between column (1) and (2), and the T-statistics of the difference. *Firm Size* is the natural logarithm of the total assets before deal announcement. The *HP (WW) index* are the financial constraint index following Hadlock and Pierce (2010) (Whited and Wu (2006)). *Financial Constrained%* refers to the proportion of the acquirers that are associated with the financial constraint index value higher than the median level for the SIC two-digit industry in the year before the deal announcement. *[Excess Cash>0]%* is the proportion of deals with the acquirer having a positive level of excess cash holding before the deal announcement. All variables are winsorized at 1 percentile on both sides. *, **, and *** indicate statistical significance at 10%, 5%, and 1% levels, respectively.

	Cash Deals	Mixed Deals	Difference	
	(1)	(2)	(1)-(2)	T-stat
Deal Value/Acq Mktcap	0.189	0.393	-0.205***	(-11.328)
Acquirer Firm Size	7.925	7.614	0.311***	(2.810)
Target Firm Size	5.469	6.470	-1.000***	(-8.652)
Financial Constrained% (HP Index)	22.3%	33.1%	-10.8%***	(-4.205)
Financial Constrained% (WW Index)	15.9%	31.5%	-15.6%***	(-6.116)
[Excess Cash>0]%	37.6%	36.0%	1.6%	(0.597)
Observations	1007	459	1466	

Appendix Table OA5: Deal Completion and Shareholder Voting

This table shows the regression of deal completion dummy on the indicator of registered share issuance exceeding 20%, controlling for up to the second-order polynomial terms of the gap between share issuance and 0.2, and their interactions with the dummy indicator of share issuance exceeding 20%. We also control for the same set of deal and firm characteristics and fixed effects as in Table 2. The sample includes the stock deals for which we could find information on the number of shares registered with stock exchanges from S-4 filings and proxy statements. The left (right) two columns use the sample of dilutive (accretive) stock deals according to our combined EPS measure. T-statistics are reported in parentheses, using robust standard errors clustered on years. *, **, and *** indicate statistical significance at 10%, 5%, and 1% level, respectively.

	Completion			
Sample:	*Dilutive Stock Deals*		*Accretive Stock Deals*	
D[Registered Share>20%]	-0.095*	-0.084*	0.00072	-0.019
	(-1.79)	(-1.81)	(0.02)	(-0.48)
Deal Value/Acq Mktcap		0.048		-0.032
		(1.41)		(-0.39)
Deal Premium		0.034		0.019
		(1.46)		(0.60)
MTB Acq		-0.0053		0.012
		(-1.10)		(1.72)
Leverage Acq		0.14***		0.084*
		(3.01)		(1.78)
Cash Holding Acq		0.015		-0.0083
		(0.47)		(-0.58)
Tangibility Acq		-0.032		0.098
		(-0.41)		(1.01)
Firm Size Tar		0.000033		-0.0097
		(0.00)		(-1.54)
MTB Tar		0.0091		-0.0033
		(1.21)		(-0.48)
Leverage Tar		0.024		0.10
		(0.35)		(1.67)
Cash Holding Tar		-0.023		0.017
		(-0.29)		(0.45)
Tangibility Tar		0.070		-0.11
		(0.61)		(-0.96)
Constant	1.06***	1.00***	0.98***	0.99***
	(29.66)	(17.76)	(26.96)	(19.04)
Polynomials of (Registered Share Pct minus 20%)	2-order with interaction terms			
Industry FE and Year FE	YES	YES	YES	YES
Observations	595	516	325	279
Adjusted R-squared	0.047	0.053	0.034	0.090

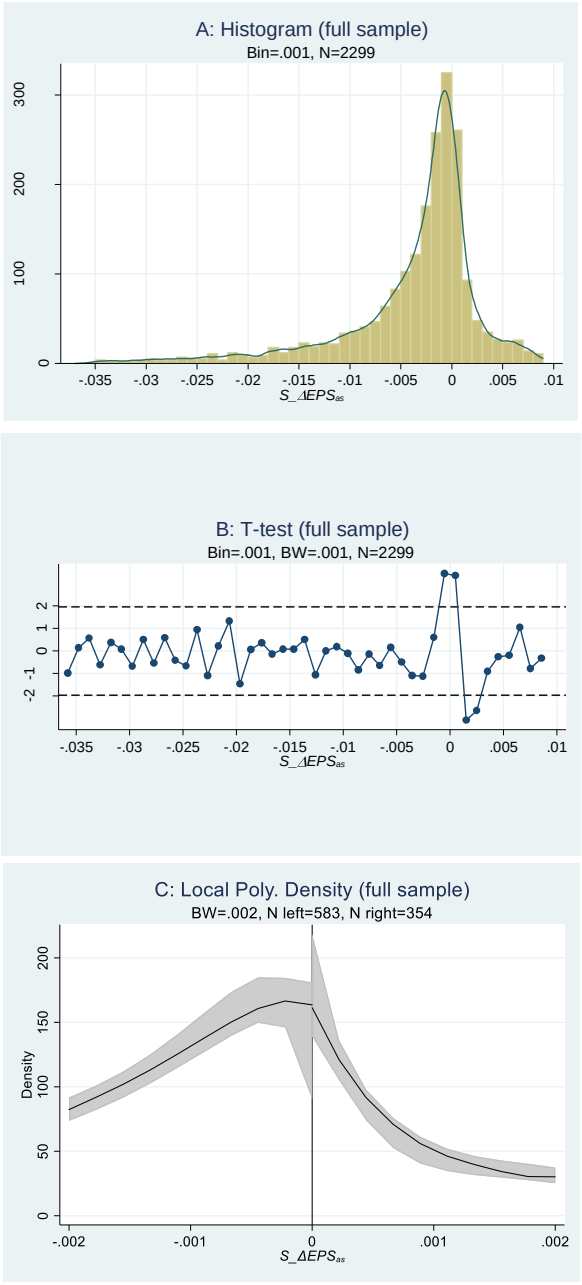
Appendix Table OA6: Balance Test for Stock Deals

This table shows the mean values of the control variables within each value range of $S\_\Delta EPS_{as}$ in the left three columns. The last two columns report the discontinuity test results for each variable. In particular, for these tests, we use the sample of stock deals with $S\_\Delta EPS_{as}$ in the range of [-0.002, 0.002], and regress each variable on the if-stock dilutive dummy, $S\_\Delta EPS_{as}$, and their interaction , controlling for the other control variables, and industry and year fixed effects. The regression setting resembles column 6 of Table 2. The estimate of the coefficient on the indicator of if-stock dilution and its t-statistic (using robust standard errors clustered on years) are reported in the last two columns, respectively.

	$S\_\Delta EPS_{as}$			RD Test	
	[-0.002, 0)	0	(0, 0.002]	Coeff.	T-stat
Deal Value/Acq Mktcap	0.235	0.167	0.363	-0.068	(-1.54)
Deal Premium	0.299	0.266	0.305	0.043	(1.03)
MTB Acq	2.120	2.113	2.839	0.023	(0.07)
Leverage Acq	0.175	0.165	0.168	0.011	(0.48)
Cash Holding Acq	0.226	0.165	0.257	0.11*	(1.99)
Tangibility Acq	0.117	0.146	0.146	0.015*	(1.73)
Firm Size Tar	6.153	5.678	5.705	0.10	(0.72)
MTB Tar	1.642	1.593	2.101	-0.017	(-0.07)
Leverage Tar	0.139	0.142	0.146	0.0038	(0.25)
Cash Holding Tar	0.177	0.202	0.251	-0.022	(-0.94)
Tangibility Tar	0.121	0.150	0.134	0.016	(1.25)
Observations	265	64	156	417	

Appendix Figure OA1: Distribution of $S\_\Delta EPS_{as}$ in the full sample

This figure shows the distribution of $S\_\Delta EPS_{as}$ in the full sample. In Panel A, we choose the optimal bin size following Bollen and Pool (2009) and report the histogram and a fitted smooth density function. In Panel B, we report the t-statistics for the difference between the actual number of observations in each bin and the estimated number of observations from the smooth density curve as shown in Panel A. The dashed lines indicate the 95% confidence interval for the t-tests. In Panel C, we show the local-polynomial density estimation following Cattaneo, Jansson, and Ma (2019). We report in the subtitle the bandwidth used for estimation and the number of observations within the bandwidth on both sides of zero. The shaded area indicates the 95% confidence interval calculated using the bias-corrected robust errors. For the histogram, the running variable has been truncated at 5 percentile on both sides; for the tests, the running variable is winsorized at 2.5 percentile on both sides but the outlier bins are not shown in the graph.



Appendix Figure OA2: Distribution of $S\_\Delta EPS_{as}$ among stock deals

This figure shows the distribution of $S\_\Delta EPS_{as}$ among pure stock deals. In Panel A, we choose the optimal bin size following Bollen and Pool (2009) and report the histogram and a fitted smooth density function. In Panel B, we report the t-statistics for the difference between the actual number of observations in each bin and the estimated number of observations from the smooth density curve as shown in Panel A. The dashed lines indicate the 95% confidence interval for the t-tests. In Panel C, we show the local-polynomial density estimation following Cattaneo, Jansson, and Ma (2019). We report in the subtitle the bandwidth used for estimation and the number of observations within the bandwidth on both sides of zero. The shaded area indicates the 95% confidence interval calculated using the bias-corrected robust errors. For the histogram, the running variable has been truncated at 5 percentile on both sides; for the tests, the running variable is winsorized at 2.5 percentile on both sides but the outlier bins are not shown in the graph.