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Are Stock-Financed Takeovers Opportunistic?

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Comments

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Are Stock-Financed Takeovers Opportunistic?

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Keywords: Takeovers, payment method, mispricing, capital structure, industry relatedness, geographic location

JEL Classifications: G32, G34, L2

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Are stock-financed takeovers opportunistic?*

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March 25, 2017

Abstract

The more the target knows about the bidder, the more difficult it is to pay with overpriced shares. Thus, under bidder opportunism, the fraction of stock in the deal payment is *lower* with better informed targets. We test this simple prediction using information proxies reflecting industry relatedness and geographic location specific to the merging firms. We find instead that public bidders systematically use *more* stock in the payment when the target knows more about the bidder. While inconsistent with opportunism, this is as predicted when bidders are primarily concerned with adverse selection on the target side of the deal. Moreover, tests based on exogenous variation in bidder market-to-book ratios, identified using aggregate mutual fund outflows, also fail to support bidder opportunism. Finally, "cash-only" targets and potential competition from private bidders appear to place significant external pressure on public bidders to pay in cash.

JEL classifications: G3, G34

Keywords: Takeover bidding, payment method, mispricing, cash payment, stock payment, information asymmetry, opportunism, governance, mutual fund flow

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1 Introduction

The dot.com bubble burst two months after the 2000 AOL TimeWarner merger agreement, causing a reduction of more than $100 billion in the market value of the merged firm. This dramatic price decline has made the AOL TimeWarner merger a poster child for the theoretical notion that opportunistic bidder firms may succeed in selling overpriced shares to target shareholders (Shleifer and Vishny, 2003; Rhodes-Kropf and Viswanathan, 2004).[1] The empirical relevance of such bidder opportunism in M&A activity is central to the debate over the efficiency of the market for corporate control. The larger concern is that the most overvalued rather than the most efficient bidder may be winning the target—potentially distorting the disciplinary role of the takeover market.

We develop and test a classical alternative to bidder opportunism, which we label "rational payment design", and which gives rise to interesting new evidence of relevance for this debate. Notice at the outset that the extant literature tends to make *indirect* inferences about bidder opportunism through the prism of the relative market-to-book ratio (M/B) of the bidder and target firms (Harford, 2005; Rhodes-Kropf, Robinson, and Viswanathan, 2005; Dong, Hirshleifer, Richardson, and Teoh, 2006). While we innovate and improve on this type of analysis as well, our main test design is different. Our most powerful inferences about the empirical validity of bidder opportunism versus rational payment design are based not on the role of M/B or another proxy for market pricing errors, but more fundamentally on how well the target knows how to value the bidder after completed merger negotiations.

In merger negotiations, non-disclosure and non-compete agreements backed up by state-law protection of trade secrets pave the way for a mutually beneficial exchange of proprietary information. If successful, this process may unravel much of the initial information asymmetry between the two parties, including that reflected in relative market value and M/B at the start of the negotiations. Indeed, Fu, Lin, and Officer (2013) show that high ratios of bidder to target M/B prior to the price discovery process typically do *not* translate into favorable deal terms for acquirers. Rather, bidders with greater M/B relative to the target *ex ante* tend to end up paying higher takeover premiums (less favorable exchange ratios) than what is implied by an extrapolation of the pre-bargaining M/B values. It is as if targets reverse-engineer initial market mispricing of the bidder shares, if any.

[1] "[T]he central feature of this acquisition is not technological synergies, but rather the attempt by the management of the overvalued AOL to buy the hard assets of Time Warner to avoid even worse returns in the long run" (Shleifer and Vishny, 2003, p.295).

Under our rational payment design hypothesis, bidders that choose to pay for the target with stock are *not* opportunistic but instead concerned with adverse selection on the target side of the deal. Intuitively, while payment in cash commits the bidder to a certain target value *ex ante*, the value of a stock payment effectively varies with the subsequent target value realization. This attractive feature of a stock payment creates a rational incentive for bidders to prefer payment in stock over cash.[2] The fraction of stock in the deal payment is scaled back only if the target undervalues the bidder, which is less likely the more the target knows about the bidder. In sum, under our rational payment design hypothesis, the better the target's skill in valuing the bidder, the higher should be the stock portion of the method of payment.

The prediction is the exact opposite under bidder opportunism. Because better informed targets are more likely to detect bidder overvaluation, selling overpriced shares is more difficult, and so the stock portion should be *lower* with better informed targets. Since the two opposite predictions are nested within the *same* initial (pre-negotiation) information structure, a given set of proxies for the information structure (that is, for how informed the target is about the bidder) can be used to discriminate between the two hypotheses. Overall, the rational payment design hypothesis is also an important reminder that rational bidders may have a strong preference for paying in stock irrespective of the M/B value or derivative measures of "valuation errors" (Rhodes-Kropf, Robinson, and Viswanathan, 2005; Dong, Hirshleifer, Richardson, and Teoh, 2006).

We use several empirical proxies for the amount of bidder-specific valuation information that is available to the target. An important feature common to these information proxies is that they are specific to the bidder-target combination. The perhaps most straightforward proxy is the degree of industry complementarity—the degree to which the target and bidder input and output industries overlap (Fan and Lang, 2000). While such industry relatedness may also affect relative bargaining power (Ahern, 2012), our key test requires only that it is easier for the target to value a bidder that operate in similar product/labor markets and with a related production technology.

Another interesting information proxy is the geographical proximity of the two firms. While ours is the first paper to use location to study the form of payment method, there is a growing empirical literature suggesting that geographic location is economically relevant for a wide variety of reasons, ranging from market pricing (Garcia and Norli, 2012) to acquisition activity and investment (Kedia, Panchapagesan,

[2] For equilibrium models of the payment method choice that incorporate this and other features of a rational payment method choice, see e.g., Hansen (1985), Fishman (1989), Eckbo, Giammarino, and Heinkel (1990), and DeMarzo, Kremer, and Skrzypacz (2005).

and Uysal, 2008; Almazan, de Motto, Titman, and Uysal, 2010). Local sources of information, both physical and financial, may improve target insights about bidder fundamentals and therefore impact the payment method choice.

With a sample of 6,200 US public bidders, 1980-2014, the first important finding of this paper is that the fraction of stock in the deal payment is significantly *higher* when our information proxies indicate that the target knows *more* about bidder pricing. While consistent with the rational payment design hypothesis, the result is the opposite to that predicted by bidder opportunism. Importantly, this test does not depend on an explicit model for bidder mispricing (M/B or otherwise) as it simply works with the fundamental information asymmetry about bidder valuation that exists under either of the two competing hypotheses.

In addition, we provide a model-based test of the role of potential bidder mispricing for the use of stock. Here, we start with the finding that the likelihood of a stock-bid is increasing in bidder M/B. One interpretation of this evidence is that high-growth (high M/B) acquirers tend to be cash constrained beyond what is explicitly captured by the control factors included in the analysis (Harford, 2005). Another interpretation is that M/B is positively correlated with unobservable market pricing errors and that opportunistic bidders are successful in exploiting this mispricing despite the price discovery process afforded by merger negotiations (Rhodes-Kropf, Robinson, and Viswanathan, 2005; Dong, Hirshleifer, Richardson, and Teoh, 2006).

In order to discriminate between these two alternative interpretations, we start with the assumption that *exogenous* variation in bidder M/B may be correlated with variation in bidder mispricing, without otherwise affecting the bidder's choice of payment method. We identify this exogenous variation using large aggregate outflows from mutual funds holding stock in our sample bidders. Large fund outflows have been shown to significantly decrease stock prices (Coval and Stafford, 2007) and increase takeover probability (Edmans, Goldstein, and Jiang, 2012). To the extent that this exogenous price pressure lowers bidder M/B, it also reduces bidder pricing error and thus the scope for bidder opportunism. Hence, under our bidder opportunism hypothesis, this price pressure should cause a reduction in the use of stock in the deal payment. The second important finding of this paper is that the use of stock in the deal is statistically *independent* of the bidder price pressure, which fails to support bidder opportunism. This conclusion is robust to whether we instrument M/B or its firm-specific component, using the decomposition technique of Rhodes-Kropf, Robinson, and Viswanathan (2005).

In arriving at these two main empirical results, we control for baseline effects of bidder capital structure and cash balances on the payment method choice, much as suggested by the extant literature.[3] The baseline model shows that the fraction of stock is higher for relatively small, high growth companies with high *R&D* spending and few pledgable assets. Also interesting, notwithstanding the widespread cumulation of cash balances in recent decades, bidder cash holdings are *not* a determinant of the fraction of stock in the deal.

When developing the baseline model, we also find that the fraction of stock in the deal is significantly affected by two hitherto undocumented *external* sources of pressures on public bidders to pay in cash. The first source is from what we label "cash-only sellers": sellers who almost always demand settlement in cash, including targets that are subsidiaries (Officer, 2007) or owned by a financial sponsor such as a private equity fund. The second source of external pressure to pay in cash is indirect: potential competition from relatively illiquid *private* bidders in the industry of the target. We argue that, as private bidders within a given target industry compete with public bidders by offering cash, they exert pressure on public bidders to also do so. We therefore include cash-only sellers and potential private bidder competition in our baseline model. Interestingly, both these two proxies are consistently found to reduce the fraction of stock in the deal payment.

Given the paper's central focus on asymmetric information, we end the empirical analysis with a more standard analysis of short- and long-run effects on bidder stock returns of the payment method choice. The bidder opportunism and rational payment design hypotheses both allow for negative announcement effects due to adverse selection on the bidder side (Myers and Majluf, 1984). However, the latter hypothesis also implies that the bidder announcement returns should be monotonically decreasing in the fraction of the deal paid in stock (Eckbo, Giammarino, and Heinkel, 1990). Consistent with earlier work, we find some evidence consistent with this prediction, but only when the target is publicly traded (Fuller, Netter, and Stegemoller, 2002). Furthermore, we find no evidence of statistically significant bidder long-run (36 month) abnormal stock returns following the announcement of all-stock offers, even for high M/B bidders. This is as expected when the information in the merger announcement largely resolves the initial information asymmetry between the bidder firm and the market, and it again fails to support the notion that bidder opportunism is economically and statistically important.

[3] See, e.g., Martin (1996), Harford (1999), Faccio and Masulis (2005), Morellec and Zhdanov (2008), Harford, Klasa, and Walcott (2009), Karampatsas, Petmezas, and Travlos (2014).

The rest of the paper is organized as follows. Section 2 describes the data selection and show time trends in the payment method form for our large sample of takeovers. This section also highlights the significant presence of cash-only sellers and potential competition from private bidders after year 2000. Section 3 presents our information-based tests of the bidder opportunism versus the rational payment design hypotheses. Section 4 reports the instrumental variable (IV) test results where we condition on a proxy for the market's error in valuing the bidder. Section 5 provides estimates of bidder short- and long-run stock return performance as a check on the information content of the payment method choice. Section 6 concludes the paper.

2 Trends in payment methods and external pressures to pay in cash

The sample of this paper consists of 6,200 takeover bids for US targets by US public nonfinancial acquirers, 1980-2014. Bids are identified using the "Merger" transaction form in SDC Platinum Mergers & Acquisitions. Bidders must also be available on both CRSP and Compustat. Moreover, to be included, deal size must be a minimum of $10 million and 1% of bidder total book assets, and we require information on the bidder capital structure variables in Table 2. The sample includes both successful and unsuccessful bids. Details of the sample characteristics are discussed in Section 3 below.

2.1 Payment method time trends

Panel A of Figure 1 shows the annual distribution of the 6,200 sample bids and a breakdown by payment method. The period with the greatest number of bids is 1995-2000, which covers 40% of the total sample. The unusually high takeover activity by public bidders is followed by a fifty percent drop in the annual average number of bids, from 314 in the 1990s to 168 in 2001-2014. The downward shift in the number of takeover bids by public bidders mirrors the 50% drop in the number of publicly listed US companies from 1996 to 2012 (Doidge, Karolyi, and Stulz, 2016). As a result, the overall takeover propensity of public firms has remained relatively unchanged over the sample period.

As reported by Boone, Lie, and Liu (2014) and De Bodt, Cousin, and Roll (2016) as well, Panel B of Figure 1 shows a dramatic drop in the fraction of all-stock bids after year 2000. The average annual number of all-stock bids falls by 83%, from 166 in the 1991-2000 period to 28 in 2001-2014, accounting for 95% of the total reduction in public bidder takeover activity. At the same time, the average annual number of all-cash bids increases by one-third (from 63 to 82), while mixed offers declines by one-third after year 2000 (from 85 to 57). The sample proportion of mixed offers, however, remains relatively stable over the entire sample period. Moreover, the average fraction of all-stock bids declines from 53% in the 1990s to only 16% after year 2000, while the proportion of all-cash bids increases from 21% to 50%.

In light of the significant reduction in listed firms after year 2000, the shift in payment method likely reflects a combination of changing firm characteristics and a given public bidder's propensity to pay with cash. Boone, Lie, and Liu (2014) argue that the shift is related to changes in asymmetric information and adverse selection, while De Bodt, Cousin, and Roll (2016) suggest that the 2001-abolishment of pooling accounting in takeovers may also have contributed to lowering (earnings-based) managerial incentives to make all-stock bids. The cross-sectional regressions below shed further light on this issue as they condition the payment method choice more directly on firm characteristics that may distinguish between rational payment design and bidder opportunism.

2.2 Time trends in external all-cash pressures

While hitherto unexplored in the literature, there exist certain *external* pressures on public bidders to pay in cash. We identify two sources of such external pressure, and which we also integrate into the regression analysis below. The first pressure is from "cash-only" sellers. These are sellers who are likely to demand cash regardless of the public status of the bidder. Examples of cash-only sellers are private targets that are portfolio companies of financial sponsors (e.g., private equity funds) and targets that are subsidiaries. Our labeling of subsidiary-targets as cash-only sellers is supported by the large-sample evidence in Officer (2007) where as much as 94% of subsidiary targets are paid for in cash.

The second source of external pressure on our public bidders to pay in cash is more suggestive but, as it turns out, also highly significant: potential competition for the target from cash-paying *private* bidders. Due to their own-stock illiquidity, private bidders often have little choice but to pay with cash when competing with public bidders for the same target. As potential competition from private bidders intensifies, public bidders may be pushed towards more cash in the payment structure. While we do not have direct evidence of such a competitive effect, the simple time-series correlation between the percent private bidders in the overall population of takeover bids and the fraction of all-cash bids by our public bidders is surprisingly high.

Panel A of Figure 2 plots the time series of *% Cash-Only Sellers* and *% Private Bidders* over the sample period. To construct these series, we use an expanded sample of N^e=18,289 merger bids by US bidders for US targets, 1980-2014. As before, we sample mergers and require a deal size of at least $10 million and 1% of bidder total assets. N^e is the sum of our N=6,200 bids by nonfinancial public bidders, N_1=3,639 bids by financial public bidders, N_2=3,325 bids by nonfinancial public bidders with missing information on the bidder characteristics in Table 2, and N_3=5,125 bids by private bidders. Of the private bidders (N_3), 63% are financial institutions or sponsors, and 37% are strategic acquirers.

In panel A, the time series of *% Cash-Only Sellers*, which is the fraction of targets in N^e that are subsidiary targets or financial-sponsor targets, is high (18%) in the early 1990s, low in the late 1990s, and high again in the period after year 2000, reaching 24% in 2012. Moreover, *% Private Bidders*, which is the value of N_3/N^e, averages 28% over the sample period, reaching a high of 56% in 1988, a low of 14% in 1996, and rebounding to 48% in 2011. Interestingly, the time-series correlations between the fraction of all-cash bids by the public bidders in our sample (repeated for illustrational purpose from Panel B of Figure 1) and the values of *% Cash-Only Sellers* and *% Private Bidders* are substantial. The former correlation is 0.21, while the latter is an impressive 0.72. If competition from private bidders truly constitutes an important external pressure on public bidders to pay in cash, then the rise in all-cash sellers after year 2000 likely helps explain the parallel rise in all-cash deals.

We further investigate this issue in the context of the multivariate regressions below, where we include target-specific values of *Cash-Only Seller* and *% Private Bidders* as determinants of the payment method choice. Since credit market conditions may fuel both competition from cash-based bidders and cash-use by the winning public bidder, we also control for year-fixed effects and, alternatively, the credit spread. As discussed below, both cash-pressure variables remain strongly negatively correlated with the fraction of stock payment in bids by public bidders also after controlling for year-fixed effects or credit spread. It seems clear that external all-cash pressures have an important impact on the payment method choice of public bidders.

3 The stock-payment choice with relatively informed targets

3.1 Sample characteristics

Table 1 lists a complete set of definitions of and sample source for the variables used throughout the paper. Table 2 shows the mean and median values of central characteristics sorted by payment method.

In the total sample, 46% of the targets are publicly listed and the average relative deal size (deal value divided by acquirer total assets) is 1.0 with a median of 0.28. Moreover, 88% of the sample bids are successful, classified in SDC as "completed".

In addition to *Size* (natural log of total assets), the bidder capital structure variables in Table 2 include *Leverage* (book value of total debt), *Cash Holding*, *Asset Tangibility* (property plant and equipment), and *R&D*, all scaled by total assets. Moreover, capital structure variables include *M/B*, *Dividend Dummy* and *Operating Efficiency* (defined as cost of goods sold + sales general and administrative expenses)/net operating assets). The table shows that all-stock acquirers are on average smaller than all-cash acquirers, and they have higher cash holdings, *M/B* and R&D expenses, and lower leverage and asset tangibility. Also, the fraction of dividend payers is 0.31 for all-stock bidders and 0.48 for all-cash bidders.

Among the industry and time period characteristics in Table 2, *Industry Wave* is constructed as in Maksimovic, Phillips, and Yang (2013). Specifically, for each FF49 industry and year, we calculate the aggregate dollar volume of mergers scaled by the total assets of all Compustat firms in the industry. $Industry\ Wave$ is the annual value of industry mergers-to-total assets, normalized by its time-series mean and standard deviation over the sample period. On average, all-stock bids have significantly higher values of $Industry\ Wave$ than all-cash bids.

Post Bubble is a dummy for the 2001-2014 period, which covers 45% of the sample bids (60% of the all-cash offers and 28% of the all-stock bids). The variable *High-Tech* is a dummy that takes on a value of one if the bidder is in what the American Electronic Association identifies as a high-tech industry (comprising 47 four-digit SIC codes in the two-digit industries 28, 35, 36, 38, 48, and 73). In our sample, 43% of the bidders are high-tech, accounting for 54% of the all-stock offers and 36% of the all-cash bids.

Table 3 shows the distribution of the sample across the acquirer's FF49 industries. Of the sample bids, 37% are paid in all-stock, 33% in all-cash, and 30% in a mix of cash and stock, in which the average fraction of stock is 57%. Two-thirds of the bids take place in the ten most active FF49 industries, with a minimum of 218 bids over the sample period. Of these ten industries, the three with the highest fraction of all-stock offers are Computers (54%), Computer Software (49%) and Electronic Equipment (47%).

3.2 Preliminaries: baseline choice model estimation

Our main inferences concerning the validity of bidder opportunism condition on a baseline cross-sectional model for the fraction of stock in the deal payment, *Stock* $\in [0,\ 1]$, estimated using Tobit.[4] This model is shown in Table 4. We are primarily interested in the choice of *Stock* because bidder opportunism may exist across the spectrum of mixed cash-stock deals. However, we show in Table 5 that key baseline-model coefficient estimates are similar also when using a multinomial probit estimation, where the choice is between all-stock and mixed offers with all-cash as the base outcome.

As detailed below, the baseline choice model contains four groups of determinants: (1) Capital structure, referring to internal capital structure considerations, (2) External pressure to pay in cash, referring to the cash-only sellers and competition from private bidders discussed above, (3) Deal characteristics, including relative deal size and whether the target is public, and (4) Industry/time characteristics, including industry wave, high-tech industry, and post-bubble period. In addition, most of the regression models include bidder industry dummies based on the FF49 industry definitions.

3.2.1 Capital structure characteristics

The extant literature suggests that financing large investments such as mergers and acquisitions may trigger post-merger leverage adjustments (Harford, Klasa, and Walcott, 2009) and, of primary concern here, a deliberate payment method choice reflecting capital structure considerations (Faccio and Masulis, 2005; Uysal, 2011; Karampatsas, Petmezas, and Travlos, 2014). As buyers assume or refinance the target's outstanding debt, the payment method directly affects the combined firm's leverage ratio. In our context, irrespective of the target's leverage ratio, and unless the cash bid is financed with an equity issue, the post-takeover leverage of the combined firm is always lower for a stock bid than for a cash bid.

The baseline model estimation includes eight capital structure characteristics. In the Tobit estimation in tables 4 and 6, *Size* (log of total assets), *M/B*, *R&D* and *Asset Tangibility* are all reliably significant across all specifications, with stock-financing increasing in *M/B* and *R&D* and decreasing in *Asset Tangibility* and *Size*.[5] Table 5 further shows that the positive effect of *M/B* is restricted to the choice between all-stock and all-cash, with a statistically insignificant coefficient for mixed offers. Also in

[4] While we observe the full range of *Stock* itself, *Stock* is a bounded representation of the underlying function driving the true payment method choice, thus the Tobit estimation (Maddala, 1983).

[5] The reduction in sample size from 6,200 to 5,841 in Table 4 is caused by missing data on the exact fraction stock in the total deal payment.

Table 5, *Asset Tangibility* is not significant for mixed offers after adding industry-fixed effects. Overall, as reported by extant studies as well, the fraction stock in the deal tends to be higher for relatively small, growth firms with high *R&D* and low asset tangibility.

Perhaps surprising, *Leverage* and *Cash Holding* have a largely insignificant impact on the fraction stock in Table 4 and on the probability of an all-stock offer in Table 5. To examine this finding further, we add two pieces of information. First, Panel B of Figure 2 plots the average cash balances for the sample bidders and the population of Compustat firms. It shows that bidder average cash holdings rise to about 18% already in year 1990 and remain approximately at that level until 2014. Thus, high bidder cash balances are indeed an unlikely explanation for the dramatic increase in all-cash bids after year 2000 shown earlier in Panel B of Figure 1.

Second, in Table 6, we decompose *Leverage* (*Cash Holding*) into *Target Leverage* (*Target Cash Holding*) and the deviation from the target leverage (deviation from target cash holding). This is done using the fitted values of the following two (OLS) regressions across the universe of industrial Compustat firms in a given acquisition year t:

$$Leverage_t = f(X_{t-1}) + e_t, \tag{1}$$

$$Cash\ Holding_t = f(X_{t-1},\ Leverage_{t-1}) + g_t, \tag{2}$$

where the vector X_{t-1} of lagged firm characteristics lagged contains *Size*, *Operating Efficiency*, *M/B*, *R&D*, *Missing R&D*, *Asset tangibility*, and a dummy for the acquirer's FF49 industry. *Missing R&D* is a dummy indicating a missing Compustat value. The variables *Deviation from Target Leverage* and *Deviation from Target Cash* are the fitted residuals from these two regressions. The table shows results using either book or market leverage ratios.

The first three columns of Table 6 report coefficient estimates using market leverage, while the last three columns are based on book leverage ratios. With book leverage, *Target Leverage* and *Deviation from Target Leverage* are both insignificant (columns 4-6). However, when using market leverage, greater *Target Leverage* lowers the fraction of stock in the deal payment, while greater *Deviation from Target Leverage* increases the fraction stock in all specifications (columns 1-3). This suggests that acquirers with relatively high target market leverage ratios tend to use more cash as deal payment. Moreover, consistent with the evidence in Harford, Klasa, and Walcott (2009), "overleveraged" acquirers tend to increase the use of stock, which reduces excess leverage.

Turning to the cash-balance decomposition, greater *Target Cash Holding* is associated with significantly lower fraction of stock in the deal payment, while *Deviation from Target Cash* has no impact on the payment method choice. This suggests that firms holding large target cash balances relative to total equity tend to have a preference for paying for the target in cash. This conclusion differs from in Pinkowitz, Sturgess, and Williamson (2013) who find that that being relatively "cash rich" tends to increase the likelihood that the deal is paid in stock. Note, however, that Pinkowitz, Sturgess, and Williamson (2013) include small asset acquisitions along with merger transactions, which results in a much greater sample proportion of all-cash offers than in our sample (60% versus 33% in this paper).

Finally, Table 6 demonstrates that, although the use of market leverage leads to a significant coefficient for *Deviation from Target Leverage* when book leverage does not, the choice of market versus book leverage has no discernable impact on the remaining regression coefficients in the baseline model. In the following, we use book leverage when conditioning the bidder opportunism hypothesis on capital structure characteristics. We use book leverage because the IV tests in Section 4 below rely on a single instrument to identify exogenous variation in bidder M/B and so are restricted to one endogenous variable driven by market value. The results in Table 6, however, suggests that our choice of book- over market leverage should have only minimal impact on the ensuing test results.

3.2.2 External pressure to pay in cash

The characteristics categorized as *External pressure to pay in cash* include two variables: *Competition from Private Buyers* and *Cash-only Seller*. The former variable is defined as *% Private Bidders* in Section 2.2 above, but now calculated for the target's FF49 industry and year. The latter is a binary variable with a value of one if the target is a subsidiary target or a financial-sponsor target and zero otherwise.

Competition from Private Buyers receives an economically and statistically significant negative coefficient in all regression specifications throughout the paper. While we interpret this as evidence of external pressure on public bidders to pay in cash, it is also possible that credit market conditions fuel both competition from cash-based private bidders and cash-use by the winning public bidder. Notice, however, that *Competition from Private Buyers* receives a large and highly significant coefficient also in Column (4) of Table 4, which controls for the credit-market spread, and in Column (5), which includes year-fixed effects. Thus, within-year variation in *Competition from Private Buyers* is strongly negatively associated with public bidder's propensity to pay for the target in stock, which further supports our interpretation of this variable.

Like *Competition from Private Buyers*, the dummy variable *Cash-only Seller* also receives a negative and significant coefficient in all Tobit regressions in tables 4 and 6. Moreover, as expected, *Cash-only Seller* is statistically insignificant for the conditional probability of a mixed offer in the multinomial probit estimation in Table 5. This evidence supports our conjecture that *Cash-only Seller* indeed captures a demand for all-cash payment, which may severely restrict the public bidder's choice of alternative payment methods.

3.2.3 Deal-, industry- and time characteristics

The *Deal characteristics* and *Industry/time period characteristics* are also significant. These include dummies for *Large Relative Deal Size* (indicating that the ratio of deal value to bidder total assets is in the top quartile) and *Public Target*. *Large Relative Deal Size* receives a highly significant and positive coefficient in all regressions in tables 4 and 5, while the impact of *Public target* is insignificant. However, in Table 5, *Public Target* is significant for mixed offers, reducing the conditional probability of a mixed payment.

As expected from Panel B of Figure 1, the Tobit regression in Table 4 and the multinomial probit estimation in Table 5 show that the fraction of stock is significantly lower in the post-bubble period and it is higher for high-tech bidders. Another interesting result is that *Stock* is higher for bids taking place during industry merger waves—although this effect disappears when adding year dummies. Finally, columns (6) and (7) of Table 4 show that all explanatory variables generate qualitatively similar coefficient estimates for high-tech and non-high-tech bidders. Thus, we drop this split going forward.

We next turn to tests of the bidder opportunism versus the rational payment design hypotheses using the baseline variables in Column (3) of Table 4 as controls. We begin the tests by adding proxies for the target's information about bidder value, and continue in Section 4 with a model for bidder mispricing based on an instrumentation of M/B.

3.3 The effect of greater target information about the bidder

Below, we first motivate the intuition behind our rational payment design hypothesis and then proceed to discuss the empirical test results.

3.3.1 Adverse selection and bidder incentive to pay in stock

Under the bidder opportunism hypothesis, stock-payments occur when bidder shares are overvalued by the target (adverse selection on the bidder side). The associated cross-sectional prediction—that it is more difficult to pay with overpriced shares the better the target's skill in valuing the bidder—is intuitive and needs no further motivation. On the other hand, rational payment design, which focuses on the effects of *target* adverse selection on the bidder's payment method choice, is much less discussed in the debate over bidder opportunism. We therefore add motivation for this hypothesis below.

Suppose two rational and risk-neutral firms have completed merger negotiations without deciding on the choice of payment method. The merger generates synergy gains which, for notational simplicity, we assume are bidder specific. Let b denote the with-synergy value of the bidder and t the reservation value of the target. The two firms know their own values b and t but only the probability distribution over the counter-party's value (two-sided information asymmetry). Moreover, during merger negotiations, the target reveals its estimate $\hat{b}$ of b to the bidder. The bidder makes the following mixed cash-stock offer that is acceptable to a target with reservation value of t^* or less: $c + z(\hat{b} + t^* - c) = t^*$, where c is the cash amount and z is the fraction of the equity in the merged firm.

Since the offer is accepted by all targets with a reservation price $t \leq t^*$ (adverse selection on the target side), the bidder expects to overpay by an amount equal to $t^* - E[t|a]$, financed by the synergies and where a indicates target acceptance. The conditional expected value of the bidder's residual claim on the merged firm is therefore

$$E[v|a] = (1 - z)(b + E[t|a] - c) = \frac{\hat{b}}{\hat{b} + t^* - c}(b + E[t|a] - c). \tag{3}$$

The partial derivative of $E[v|a]$ with respect to c is:

$$\frac{\partial E[v|a]}{\partial c} = \frac{\hat{b}}{(\hat{b} + t^* - c)^2}\left[(b - \hat{b}) - (t^* - E[t|a])\right]. \tag{4}$$

Note that $\partial E[v|a]/\partial c < 0$ if $t^* - E[t|a] > b - \hat{b}$. In other words, cash is a relatively costly method of payment when the expected overpayment cost exceeds the target's undervaluation of the bidder. As long as this inequality holds, the bidder prefers an all-stock offer. Intuitively, stock conditions the value of the deal payment on the realized value of the target type *ex post*, while cash precommits the bidder to a payment worth t^* for all target types.

Absent any response by the target to the bidder's choice of payment method, Eq. (3) implies either an all-stock offer (when $\partial E[v|a]/\partial c < 0$) or an all-cash offer (when $\partial E[v|a]/\partial c > 0$). However, precisely because cash may be a relatively costly form of payment, including cash in the deal payment may also reveal to the target that it undervalues the bidder shares. The equilibrium choice of (z, c) must therefore take into account the target's reaction to this information.

Let $c^* = c/t^* \in [0, 1]$ denote the fraction of the payment in cash. Eckbo, Giammarino, and Heinkel (1990) prove the existence of a (Bayesian) separating equilibrium, where the the signaling game is similar to the setup above. Since cash is a relatively costly payment method (recall the expected overpayment cost of $t^* - E[t|a]$), the bidder offers the *lowest* c^* required to reveal its value to the target. Our rational payment design hypothesis extends this theoretical result to bids in which targets differ in terms of their skill in valuing the bidder. Greater skill means a less diffuse prior distribution over possible bidder values and a smaller absolute valuation error $|b - \hat{b}|$, which lowers the minimum c^* required to signal b. Thus, the more informed the target is about the bidder, the greater the fraction of stock (and deal terms are fair to both parties in equilibrium).

In sum, the bidder opportunism and rational payment design hypotheses have opposite predictions. Under opportunism, a given stock payment is interpreted as driven by target overvaluation of the bidder shares with no correction by the target. Thus, greater target skill in valuating the bidder forces a reduction in the use of stock in the deal payment. Under rational payment design, the stock payment is driven by bidder concerns with target adverse selection. Thus, greater target skill increases the use of stock as payment. In the tests below, we quantify the target's skill in valuing the bidder using several empirical proxies, while we employ the above empirical baseline model to control for determinants of the payment method choice not related to issues of adverse selection.

3.3.2 Empirical test results

Our empirical proxies for the quality of the target's information about bidder pricing are as follows:

(1) *Industry Complementarity*—the degree to which the target and bidder input and output industries overlap.

This measure is based on the Input-Output industry matrix of the U.S. Bureau of Economic Analysis (BEA). Fan and Lang (2000) compute, for each BEA industry i, the percentage b_{ik} (v_{ki}) of its output (input) supplied to (purchased from) each intermediate BEA industry k. For each pair of industries i and j, they then calculate the simple correlation coefficient between b_{ik} and b_{jk} (v_{ki} and v_{kj}) across all k except i and j. We map the 4-digit SIC codes of the targets and bidders into the BEA industries and, for each target-bidder pair, calculate the average input and output correlation as our measure of complementarity. The measure averages 71% with a median of 86% (Table 2).

(2) *Geographic proximity and location*—the physical closeness and location of the two firms.

We use two dummy variables: *Local deal* indicates that the acquirer and target are located within 30 miles from each other. *Urban deal* indicates that the acquirer firm is located within 30 miles from the center of one of the ten largest metropolitan areas. These two variables are constructed using zip codes from SDC to calculate latitude (lat) and longitude (long) coordinates for each firm, based on the 1987 U.S. Census Gazetteer Files.[6] Following Cai, Tian, and Xia (2016), we compute the distance between acquirers and targets using the spherical law of cosines.

Our merging firms are on average approximately 1,000 miles (median 600 miles) apart. However, the distance between the bidder and the target is bimodal. A large number of bidder-target pairs are located in the same zip code area, while many acquirers and targets are located on opposite sides of the country (a distance of about 2,500 miles). For *Urban Deal*, the ten large metropolitan areas are Boston, Chicago, Dallas, Detroit, Houston, Los Angeles, New York City, Philadelphia, San Francisco, and Washington DC. As shown in Table 2, 17% of the sample bids have targets located within thirty miles of the acquirer, and 40% of the acquirers are located in, or close to, a large metropolitan area.[7]

(3) *Recent SEO and acquisition activity*—capturing the amount of valuation-related information disclosed publicly by the bidder prior to the merger negotiations.

Recent SEO is a dummy variable indicating that the bidder did a seasoned equity offering during the eighteen months preceding the bid (source: SDC Platinum Global New Issues Database).[8] Similarly,

[6]If the zip code is missing, we extract additional information from the firm address. For example, if city information is available, we use the coordinate of the city center.

[7]Kedia, Panchapagesan, and Usyal (2008) use a 60-miles cut-off in their study of acquirer returns. Our results are robust to using their cutoff distance.

[8]Schlingemann (2004) and Giuli (2013) provide evidence on SEOs preceding acquisitions.

Recent Acquirer indicates that the bidder announced a merger bid within the same prior eighteen-month period. Whatever the outcome of these earlier transactions, the information disclosure enhances the target's ability to value the bidder shares, increasing the difficulty of selling overpriced shares in the current merger transaction. For example, the market reaction to the information in the prior SEO may itself have reduced mispricing of the bidder shares. The *Recent SEO* dummy may also capture bidder fundamentals dictating a preference for financing with stock not already explained by our baseline capital structure controls. The average value of *Recent Acquirer* is 25%, while *Recent SEO* averages 26% (Table 2).

Table 7 shows the results of adding the information variables to our Tobit estimation of the fraction of stock (columns 1 and 2), and to the multinomial probit estimation of the choice between all-cash, all-stock and mixed offers (columns 3-6). The model controls for the baseline characteristics from Column (3) of Table 4. Moreover, since *Industry Complementarity* captures product relatedness, we also control for another potentially important aspect of product market characteristics: product market competition, measured using the Herfindahl-Hirschman Index (HHI). HHI is calculated by total assets of Compustat firms in the bidder's FF49 industry. For expositional simplicity, the table suppresses the baseline coefficients other than the novel *External pressure to pay in cash* (the remaining baseline coefficient estimates are available upon request).

Four of the five target information proxies receive statistically significant and positive coefficient estimates in the two models with Tobit estimation. First, greater values for *Industry Complementarity* increase the fraction of stock in the deal as predicted by our rational payment design hypothesis: the more informed the target is about the bidder through interrelated product markets, the more stock is used as payment.

Second, the coefficient on *Local Deal* is positive and highly significant. Thus, close geographic proximity between the two parties increases the use of bidder stock, also as predicted. The significance of geographic proximity possibly reflects a combination of greater physical plant information possessed by target managers, from interrelated local labor markets, and perhaps from having directly experienced the bidder's actions in the local community. The coefficient on *Urban Deal* is insignificant, however, possibly because it is somewhat subsumed in *Local Deal*. Third, *Recent SEO* and *Recent Acquirer* also receive positive and significant coefficients, suggesting that prior market transactions reducing the uncertainty about bidder valuation are associated with an increase in the use of stock.

3.4 Further discussion and robustness checks

The above empirical results suggest that bidder opportunism, if it exists in the data, is of a second order at best. In Table 8, we examine the robustness of this conclusion to the use of five additional, industry-related proxies for the amount of information available to the target about bidder pricing. Since all industry-related proxies are bound to be correlated, we examine each one at a time, while maintaining the baseline controls throughout. In columns (1)-(5), we use the Tobit-estimation of the fraction of stock, while columns (6) and (7) report the multinomial probit regressions where, as before, the outcomes are all-stock, mixed cash-stock, and all cash (the baseline outcome).

In columns (1)-(4), the alternative industry measures are *Vertical Relatedness*, which is based on Fan and Lang (2000) and measures how much input/output of the bidder industry is bought from/sold to the target industry; *Same Primary SIC dummy* with a value of one if the primary 4-digit SIC industry is the same for the bidder and the target; and *Overlapping Industries/Bidder Industries* and *Overlapping Industries/Target Industries*, computed as the number of overlapping 4-digit SIC codes between the bidder and target scaled by the number of bidder (target) 4-digit codes, respectively. In Column (5), the information variable is *Acquirer-Target return Correlation*, measured as the daily stock return correlation between the bidder and target firms over trading days -290 through day -41, where day 0 is the first public bid announcement. Since this measure requires both firms to be publicly traded, the sample size is reduced to about one-third of the full sample.

The five alternative measures industry relatedness each receive a statistically significant positive coefficient estimate (at 5% or less). Thus, the positive impact of *Industry Complementarity* in Table 7 carries over to these other measures, which perhaps more directly reflect vertical and horizontal trade relationships. In other words, targets that may be more skilled at valuing the bidder due to vertical or horizontal product market relationships are also more likely to accept deal payment involving bidder stock. The final correlation measure is also positive and significant, confirming the finding of Boone, Lie, and Liu (2014) that greater pairwise return correlation tends to increase the probability of stock payment. Since the information in pairwise return correlations likely captures more than just industry factors (De Bodt, Eckbo, and Roll, 2016), greater comovements may assist the target in pricing the bidder shares.

The coefficient estimates for our information proxies are unlikely to be driven by target information alone. For example, Ahern (2012) reports that closer industry relationship between bidders and targets tends to enhance bidder bargaining power (measured as the bidder's share of total takeover synergies). Increased bargaining does not, however, alter the basic prediction of our bidder opportunism hypothesis. To see why, suppose that increased industry relatedness increases *both* bidder bargaining power and the target's skill in valuing the bidder shares. Moreover, suppose the bidder uses the incremental bargaining power to increase the stock portion of the payment. Again, since the target is better informed, the greater stock portion is less likely to be driven by bidder opportunism and more likely to reflect rational payment design. In other words, for bidder opportunism to prevail at a meaningful degree in the data, the marginal effect of the information proxies must again be negative.

Moreover, our analysis omits variables such as institutional cross-ownership and the use of common advisors, which may also reduce information asymmetry between bidder and targets and perhaps affect the payment method (Chen, Harford, and Li, 2007; Matvos and Ostrovsky, 2008; Harford, Jenter, and Li, 2011; Agrawal, Cooper, Lian, and Wang, 2013). Again, since a reduction in information asymmetry is antithetic to mispricing, the positive coefficient estimates for our information proxies continue to reject the notion that bidder opportunism is pervasive in the data.

We next turn to our alternative, IV tests of bidder opportunism, in which we instrument bidder market values with aggregate fund outflows in order to identify exogenous variation in potential market mispricing of the bidder firms in our sample.

4 The stock-payment choice conditional on a misvaluation model

In Section 3 above, we characterize the positive impact of M/B in our baseline model as evidence that high growth firms may prefer to pay for targets with stock due to cash constraints. In this section, we explore the alternative misvaluation interpretation. That is, following Shleifer and Vishny (2003), several papers suggest that acquirer M/B or related accounting valuation metrics may be used as proxies for bidder mispricing and opportunistic behavior. For example, Rhodes-Kropf, Robinson, and Viswanathan (2005) extract a firm-specific "valuation error" after industry-adjusting M/B, while Dong, Hirshleifer, Richardson, and Teoh (2006) model potential bidder mispricing relative to a residual income model.

The issue is whether the positive correlation between the fraction stock in the deal payment and M/B in our baseline model is evidence of bidder opportunism—bidders getting away with selling overpriced stock when market valuations are high—or latent (omitted) factors in the baseline model reflecting, e.g., future investment opportunities or cash flow uncertainties. We therefore use a two-stage IV approach, where the first stage constructs an instrument for M/B that identifies *exogenous* variation in the market's pricing of bidder stock (unrelated to the endogenous merger decision). In the second stage, we test whether the fraction of stock in the deal payment remains an increasing function of the instrumented M/B as predicted by bidder opportunism.

4.1 Time series of average market-to-book ratios

We begin by a simple description, in Panel A of Figure 3, of the time series of the average M/B for the population of Compustat firms and for our sample acquirers. It confirms that bidder M/B was extraordinarily high in 1998-1999, averaging as much as twelve over that period (and sixteen for bidders in the high-tech industry). Outside of this period, average bidder M/B fluctuates around four, much as the time-series behavior of M/B for the Compustat population over the entire sample period. Interestingly, Panel B shows that that *target* valuations are also high when bidder valuations are high, to the point where the average ratio of bidder to target M/B remains quite stable (around two) over the entire sample period—also for the 1998-1999 period.

As surveyed by Eckbo (2014), a number of rational takeover models exploit differences in M/B (or Tobin's Q) across bidders and targets in order to explain merger activity. For example, in Gort (1969) and Jovanovic and Rousseau (2002, 2008), "high buys low" in terms of market-to-book ratios: capital is reallocated from under-performing, low-Q targets to high-Q bidders with superior management skills and productive resources. While not a test, the aggregate time series in Panel B of Figure 3 is consistent with that prediction.[9]

Moreover, the stable ratio of bidder and target M/B evident in Panel B raises an important question: why would the high bidder market valuations in the late 1990s favor the bidder as Shleifer and Vishny (2003) seem to suggest (footnote 1 above)? If anything, there is some extant evidence to indicate the opposite: Moeller, Schlingemann, and Stulz (2005) study mergers in the 1998-1999 period and find large announcement-induced dollar-losses to bidders. Moreover, Fu, Lin, and Officer (2013) conclude more broadly that hypothetical bidder benefits from relative stock overvaluation measured prior to the

[9] Yang (2008) refines this prediction to one where firms with rising productivity buy assets of firms with falling productivity ("rising buys falling"). Rhodes-Kropf and Robinson (2008) and Levis (2011) use the idea that bidders search for targets with complementary assets. Rhodes-Kropf and Robinson (2008) predict that merging firms will have similar M/B ratios ("like buys like"), which receive some empirical support in their empirical analysis.

merger announcement largely disappear by the date of deal completion. A consistent interpretation of their evidence is that targets of bidders with exceptionally high M/B successfully "reverse-engineer" this information during the price-discovery process.

To further examine the impact of bidder M/B on the fraction of stock in the deal payment, we next turn to our IV tests of the bidder opportunism hypothesis. The central prediction is that exogenous increases in acquirer M/B make it easier for the bidder to fool the target into accepting deal terms based on bidder overvaluation.

4.2 Bidder price pressure from mutual fund outflows

Following Coval and Stafford (2007) and Edmans, Goldstein, and Jiang (2012), we use aggregate large mutual fund outflows from US equity funds holding bidder stock in our instrumentation of M/B. While funds are likely to invest their inflows strategically, using whatever underlying information they have about their portfolio companies, fund redemptions (outflows) occur under time pressure and so limit fund manager discretion. The more limited the fund manager's discretion when trading, the less likely the trade reflects information about our sample mergers and the more useful is the fund flow as an instrument for bidder stock price pressure.

The negative price pressure caused by aggregate fund outflows is significant.[10] Edmans, Goldstein, and Jiang (2012) exploit this evidence in a study of the likelihood that a Compustat industrial company becomes a target. We use a measure of price pressure similar to theirs, applied to bidder firms. Specifically, we instrument bidder M/B using price pressure from large aggregate fund outflows, and examine whether the exogenous variation in the (instrumented) M/B affects the fraction of the deal paid in stock.

Let F_{jt} denote the fund flow experienced by fund j in year t. This fund flow is identified using Thomson Reuters mutual fund holdings and CRSP mutual fund monthly net returns database, 1980-2014. F_{jt} is defined as the change in total fund assets (TA_j) from $t-1$ to t net of the realized fund return R_{jt}:

$$F_{jt} \equiv TA_{jt} - TA_{j,t-1}(1 + R_{jt}). \tag{5}$$

As Edmans, Goldstein, and Jiang (2012), we restrict the analysis to large outflows in order to minimize information-based fund trades. Thus, we set F_{jt} to zero for funds where $F_{jt}/TA_{j,t-1} > -5\%$.

[10] "[W]idespread forced selling by distressed mutual funds exerts significant downward price pressure on the individual stocks sold, well beyond any contemporaneous information effects" (Coval and Stafford, 2007, p.495).

Define bidder i's stock price pressure as

$$Price\ pressure_{it} \equiv \sum_{\tau=t-3}^{t} \frac{\sum_j (F_{j\tau} s_{ij,\tau-1})}{Volume_{i\tau}}, \tag{6}$$

where the merger announcement takes place in year $t+1$. $Volume_{it}$ is the contemporaneous trading volume, giving greater price pressure for relatively illiquid bidders, and $s_{ij,\tau-1}$ is the lagged portfolio weight of bidder i in fund j. In our context, to satisfy the exclusion restriction for the instrument, $Price\ pressure$ should affect the payment method choice only indirectly through its impact on the bidder stock price. While a direct correlation between the $Price\ pressure$ and the conditional choice of stock payment is highly unlikely for an instrument based on fund outflows, $Price\ pressure$ is further defined conservatively by using lagged portfolio weights ($s_{ij,\tau-1}$). Moreover, we eliminate sector-specific funds from the sample (using CRSP information on investment objectives).[11]

Models I and II in Table 9 report coefficient estimates from the IV regressions for the impact of acquirer misvaluation, measured by bidder M/B, on the percent stock payment. Model II includes dummies for bidder FF49 industry, while Model I does not. In the first stage estimation (columns 1 and 3), bidder M/B is regressed on $Price\ pressure$ and the controls from the baseline model (Column 3 of Table 4) and with all firm characteristics lagged one year. Two tests for the validity of $Price\ pressure$ as an instrument are reported at the bottom of the table. The Wald test statistic, which tests the exogeneity of the two-equation system, is significant at the 1% level, supporting our decision to control for endogeneity. The weak instrument test shows F-statistics that are also significant at the 1% level, confirming that $Price\ pressure$ is a statistically valid instrument for M/B.[12]

The second-stage coefficient estimates in columns (2) and (4) show that the instrumented M/B is statistically unrelated to the fraction of the deal paid in stock. This result, of course, stands in sharp contrast to the significantly positive impact of the uninstrumented M/B earlier. The IV estimation, which identifies the exogenous variation in M/B, suggests that the bidder's choice of stock-financing of the deal is unrelated to this variation.

[11] Khan, Kogan, and Serafeim (2012) and Ben-David, Drake, and Roulstone (2015) use, respectively, large fund inflow and short interest to indicate private information about potential bidder misvaluation. While these measures may also reflect investors' information about fundamental factors related to the payment method choice, our instrument is designed to minimize such information.

[12] We note that the instrument $Price\ pressure$ is likely superior to simply using lagged values of M/B to control for endogeneity. This is because market capitalization of growth opportunities (which include takeover synergies) and market pricing errors are likely to be persistent. See Roberts and Whited (2012) for a discussion of the use of lagged variables to control for endogeneity.

Models III and IV of Table 9 show that the conclusion based on models I and II is robust with respect to using the firm-specific valuation error developed by Rhodes-Kropf, Robinson, and Viswanathan (2005) rather than M/B as a measure of acquirer misvaluation. For a given sample acquirer, the variable *Valuation Error* is essentially an industry-adjusted valuation measure, $M/B - V/B$ (expressed in logs). Here, V is the fitted value from a cross-sectional regression in the year of the merger announcement, where the dependent variable is the market values of the acquirer's FF16 Compustat industry peers.[13] In both Model III and IV, the first-stage regression shows that the instrument is significant (and more significant than in Model I and II due to the wider range of factors). More importantly, the impact of the *Instrumented Valuation Error* in the second stage is statistically insignificant, again rejecting the hypothesis that the fraction stock in the deal payment is driven by exogenous variation in bidder valuation ratios.

5 Does the stock-payment choice convey information to the market?

In this section we examine whether the bidder's use of stock to pay for the target conveys information to the market. As explained below, evidence on short- and long-run abnormal stock returns following merger announcements adds to our understanding of the empirical relevance of the bidder opportunism hypothesis.

5.1 Empirical predictions

We examine three arguments, all of which assume that the bidder knows more than outside investors (and the target), about the true value of the bidder shares *ex ante*, against the null of no information asymmetry. The first uses as an analogy the Myers and Majluf (1984) model describing a seasoned equity offering for cash. That is, absent uncertainty about the true target value (one-sided information asymmetry), market concern with bidder adverse selection and overpricing predicts a negative reaction to the announcement of an all-stock offer.

Second, under our rational payment design hypothesis, bidders are also concerned with target mispricing (two-sided information asymmetry). As indicated in the introduction, this concern creates an

[13] As in Rhodes-Kropf, Robinson, and Viswanathan (2005), the explanatory variables are log book value of assets, leverage, and $ln(NI)D^+$ and $ln(NI)D^-$, where D^+ and D^- are binary indicators for the net income (NI) being positive or negative, respectively. See also Table 1 for variable definitions.

incentive for the bidder to pay with stock in order to minimize the expected cost of adverse selection on the target side of the deal. Furthermore, the payment method choice now also depends on the degree of target undervaluation of the bidder. Intuitively, the more the target undervalues the bidder, the more the bidder substitutes stock for cash in the total payment, leading to mixed cash-stock offers. As a result, in equilibrium, the fraction of cash in the deal payment signals bidder undervaluation and so the market reaction to the mixed offer is predicted to decrease in the fraction of stock (Eckbo, Giammarino, and Heinkel, 1990).

Third, the bidder opportunism hypothesis itself does not restrict bidder announcement-induced stock returns: it is consistent with, but not restricted to, a negative market reaction on average. Fundamentally, while the first two predictions assume that the merger announcements fully reveal bidder private information, bidder opportunism requires that some of the information asymmetry persists beyond the merger announcement. Moreover, private bidder information about overpricing that survives the merger negotiation process must be finite-lived in order for the concept of mispricing to be meaningful. Thus, bidder opportunism predicts that a long-short portfolio strategy—long in all-cash bidders and short in all-stock bidders—will exhibit positive abnormal stock return as the mispricing is corrected over time. In the analysis below, we approximate this time lag by a three-year post-announcement period.

5.2 Announcement-induced stock returns

Abnormal returns are estimated using the standard market model:

$$r_{it} = a + br_{mt} + e_{it}, \tag{7}$$

where r_{it} is bidder i's daily (CRSP) stock return in excess of the risk free (Treasury-bill) rate, and r_{mt} is the daily excess return on the value-weighted market portfolio. The market model parameters are estimated over day -291 through day -42 relative to the day of the first bid announcement (day 0) as reported by SDC, and we use the three-day window [-1, 1] to estimate announcement-period abnormal returns. We require at least 100 return observations in the model estimation period and return observations in all of the three days of the event window.

This estimation procedure produces 5,396 merger announcement returns, with a highly significant average three-day abnormal stock return of 1.0% (p-value < 0.000). Thus, the average takeover in our sample of public bidders is value-increasing for the acquirer. Both the magnitude and significance of this average abnormal announcement return is consistent with large-sample evidence on average bidder abnormal stock returns elsewhere in the literature (Betton, Eckbo, and Thorburn, 2008).

Table 10 shows the coefficient estimates in cross-sectional regressions with bidder announcement returns as a dependent variable. The fraction of stock payment (*Stock*), *Public Target*, and M/B are key variables of interest. From the extant literature, we know that average bidder abnormal returns tend to be negative when a relatively large, publicly traded bidder announces an all-stock bid for a public target (Betton, Eckbo, and Thorburn, 2008). Building on this finding, columns (3)-(6) of Table 10 control for the interaction between *Stock* and *Public target*. Moreover, the regression model includes the remaining baseline factors from Table 4 and the odd-numbered columns include industry dummies.

As shown in columns (1) and (2), *Stock* and *Public Target* both enter with statistically significant and negative coefficients. Moreover, as reported by Chang (1998) and Fuller, Netter, and Stegemoller (2002) as well, columns (3) to (6) show that the negative impact of *Stock* is limited to the subsample of public targets. In other words, the market reaction to merger announcements declines in the fraction of stock in the deal only when the target is public. While not a test, this evidence is consistent with our rational payment design hypothesis provided there is greater adverse selection on the target side when the target is private and therefore more opaque. That is, greater opaqueness increases the expected overvaluation cost of cash relative to stock and therefore reduces the negative signal embedded in *Stock* (Eckbo, Giammarino, and Heinkel, 1990)—possibly to the point where *Stock* becomes insignificant for private targets.

A negative effect of *Stock* in the sample of public targets is also consistent with bidder opportunism, provided the market reaction does not completely eliminate the information asymmetry. Under bidder opportunism, and assuming that measures of scaled market value such as M/B represent good proxies for bidder mispricing (Rhodes-Kropf, Robinson, and Viswanathan, 2005; Dong, Hirshleifer, Richardson, and Teoh, 2006), one would also expect M/B to receive a negative regression coefficient. However, this is not supported by Table 10 as the market reaction is statistically independent of M/B, whether as a stand-alone control variable or when interacted with *Stock*.

Notwithstanding the insignificance of M/B, under bidder opportunism it is possible that the market fails to correctly adjust for any residual mispricing at the time of the merger announcement. To examine this possibility, we next turn to a post-announcement, long-run abnormal return analysis.

5.3 Post-takeover abnormal performance

If bidder shares in stock-financed deals tend to be overpriced, and if the market fails to correct the pricing error upon the bid announcement, we should observe a subsequent reversal of the bidder stock price within a "reasonable time period". While there is no objective definition of such reasonable time period, it must be short enough for the notion of private information to be economically meaningful. We follow the convention of using a window of three calendar years. Thus, we form calendar-time portfolios of bidder firms sorted on M/B and then on payment method. In this experiment, a high (above median) M/B indicates high potential for overvaluation of bidder shares, and the test is whether all-stock financed deals under-perform all-cash deals within the sample of high M/B bidders.

Bidders enter the test portfolio in the month following the month of the initial bid announcement and is held for 36 months or until delisting, whichever comes first. Denote the monthly portfolio return as r_{pt}, and the portfolio excess return as $r^e_{pt} \equiv r_{pt} - r_{ft}$, where r_{ft} is the one-month Treasury bill rate. Our measure of abnormal portfolio performance is the constant term α in the following four-factor return-generating process containing the excess return on the CRSP value-weighted market portfolio (r^e_{mt}), the two Fama-French factors SMB_t and HML_t (Fama and French, 1993), and momentum UMD_t (Jegadeesh and Titman, 1993; Carhart, 1997):

$$r^e_{pt} = \alpha + \beta_1 r^e_{mt} + \beta_2 SMB_t + \beta_3 HML_t + \beta_4 UMD_t + \epsilon, \quad t = 1, ..., N, \tag{8}$$

where ϵ_t is the error term (assumed to be mean zero and orthogonal to the included risk factors) and the time index t runs from the first merger announcement in the sample (in 1980) to the last (in 2014), a total of 419 months in the analysis below.

Table 11 reports the portfolio factor loadings (β) and associated performance estimates (α) for equal-weighted portfolios in Panel A and for value-weighted portfolios in Panel B. The portfolios in columns (1)-(3) are restricted to bidder firms with above median M/B, while columns (4)-(6) for below-median M/B bidders. If opportunism drives bidders to use stock, all-stock bids should signal that bidders are overvalued, and so we expected the estimates of α to be negative and significant over the portfolio holding period. The evidence in Table 11 fails to support this prediction as the estimates of α are uniformly small and statistically insignificant, in particular for the "Long Cash Short Stock" portfolios in columns (3) and (6). Overall, these results again fail to support bidder opportunism.

6 Conclusion

In merger negotiations, the payment method decision is made close to deal closure, following an extensive period of information exchange, valuation estimation and bargaining. At that point, several factors may influence the fraction of bidder stock in the deal payment, ranging from bidder capital structure to external pressures to pay with cash. The main contribution of this paper is to develop and empirically test two competing but nested hypotheses for the incremental impact on the payment method choice of any residual information asymmetry that may still exist between the bidder and target firms when signing the deal.

The first hypothesis, bidder opportunism, holds that targets tend to accept payment in overvalued bidder shares. That is, notwithstanding the long price discovery process, targets are unable to unravel and rationally correct for the likelihood of adverse selection (opportunism) on the bidder side of the deal, creating an incentive for the bidder to pay in stock. The second hypothesis, rational payment design, focuses instead on rational bidder concern with adverse selection on the target side. This concern *also* creates an incentive to pay for the target in stock (cash is used only if the target undervalues the bidder). Testing these two fundamentally different motivations for the use of stock as deal payment is important: with bidder opportunism, the most overvalued rather than the most efficient bidder may win the competition for the target assets, potentially undermining the allocative efficiency of the market for corporate control.

Our main test exploits the simple and intuitive notion that, the more the target knows about the bidder, the more correctly it values the bidder shares. Specifically, the more correctly the target values the bidder shares, the *lower* is the predicted fraction of stock in the deal payment under bidder opportunism, and the *higher* is this fraction under rational payment design. The fraction stock is lower under bidder opportunism because the target is more likely to reverse-engineer the bidder pricing error and adjust the terms of trade to eliminate the putative gain from selling overpriced shares. The fraction is higher under rational payment design because the benefit of payment in stock over cash is greater with less target mispricing of the bidder. We also emphasize that, while testing these nested predictions requires empirical proxies for the target information about the bidder, the test has the advantage of being model-free: it does not require an explicit model specification of bidder pricing errors.

Our sample consists of 6,200 takeover bids by US public industrial firms, 1980-2014. Our empirical proxies for how much the target knows about the bidder capture industry relatedness and geographic location that is specific to the pairing of the two firms. Other proxies include recent public information events, such as seasoned equity offerings and acquisitions by the bidder. We find that public bidders systematically use *more* stock in the deal payment when the target knows more about the bidder, as measured by these information proxies. While inconsistent with opportunism constituting an important motivation for the use of stock to pay for the target, this evidence is as predicted when bidders are primarily concerned with adverse selection on the target side of the deal. This conclusion is also corroborated by tests for short- and long-run information effects of merger announcements, conditioning on the fraction of stock in the deal payment.

Furthermore, we provide a more traditional test of bidder opportunism, which exploits the cross-sectional variation in bidder market pricing in order to identify potential bidder mispricing. However, we innovate also here by instrumenting bidder market values using large aggregate outflows from mutual funds. The idea is that the large fund outflows, which are exogenous to the payment method choice, may influence this choice through the resulting pressure on the bidder's market value. Specifically, under bidder opportunism, the fraction of stock in the deal payment is predicted to be lower following an exogenous drop in the bidder M/B. We find instead that fraction of stock in the payment is statistically independent of the instrumented M/B.

While the above tests control for capital structure factors, we also discover and control for a surprisingly strong time-series correlation between the fraction of cash in the deal payment and the fraction of private bidder activity of the total takeover activity in the industry of the target firm. Since private (illiquid) bidders typically pay in cash, we interpret this correlation—which is strongly manifested also in our cross-sectional estimation—as indicating external competitive pressures on our public bidders to also pay in cash. This external pressure may also contribute to the strong time trend in the composition of the payment method over the sample period in general, and after the stock market crash in year 2000 in particular.

In sum, our empirical analysis suggests that the payment method choice is driven primarily by a combination of capital structure considerations, by external pressures to pay in cash, and by bidder concern with adverse selection on the target side of the deal (efficient payment design). While our tests cannot not rule out the possibility that some bidders succeed in selling overpriced shares in some deals, the test results do suggest that this possibility is statistically insignificant at the margin.

In terms of future research on the payment method choice, it is interesting to also add the potential for deal advisors, share-ownership concentration and governance factors to constrain bidders from attempting to sell overpriced shares to the target. Presumably, high-quality deal advisors help reduce information asymmetry, while cross-ownership by institutional owners may affect the incentive to transfer wealth from the target to the bidder through mispricing. Moreover, a stock-financed takeover creates a potentially concentrated group of target legacy shareholders in the merged firm. Rightly or wrongly, such shareholders may charge *ex post* that they received payment in overpriced bidder shares—possibly affecting bidder incentives *ex ante*.

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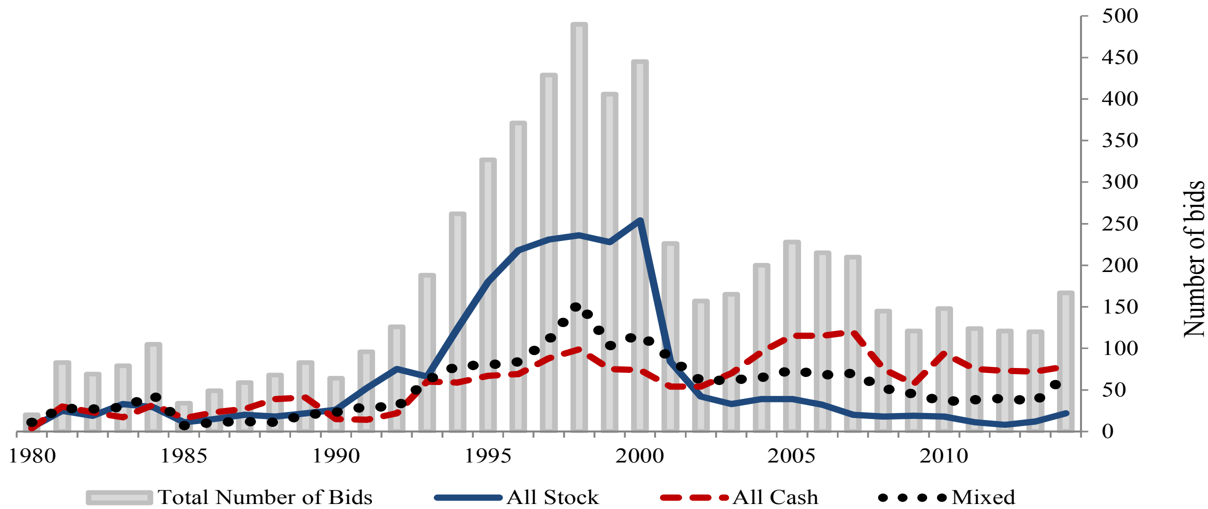
Figure 1
Number of takeover bids and their distribution across payment methods, 1980-2014

Panel A shows the annual number of bids and their distribution across payment methods (all-stock, all-cash, and mixed bids). Panel B shows the annual fraction of all-stock, all-cash, and mixed bids. The sample contains 6,200 merger bids for US targets by US non-financial public bidders, 1980-2014.

A: Annual total number of bids and the distribution across payment methods



B: Annual fraction of all-stock, all-cash and mixed bids

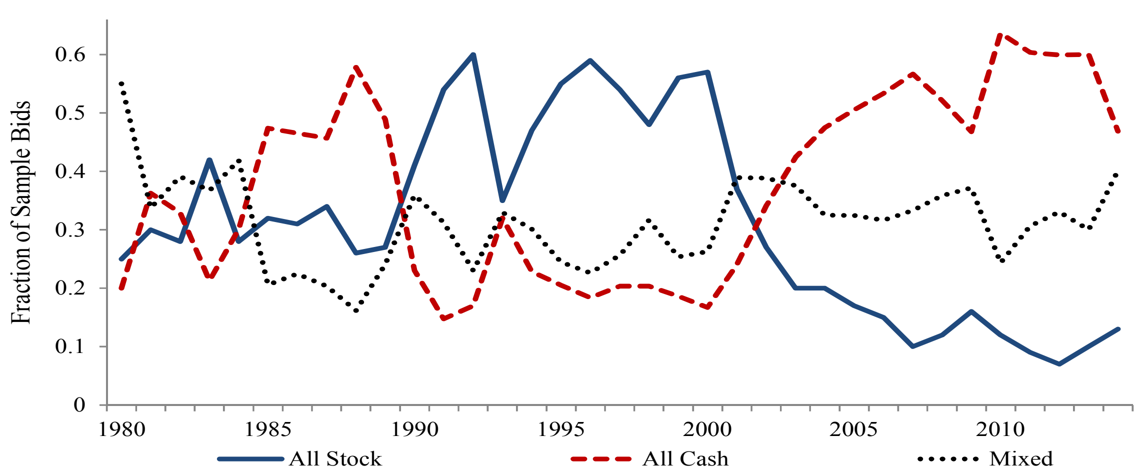
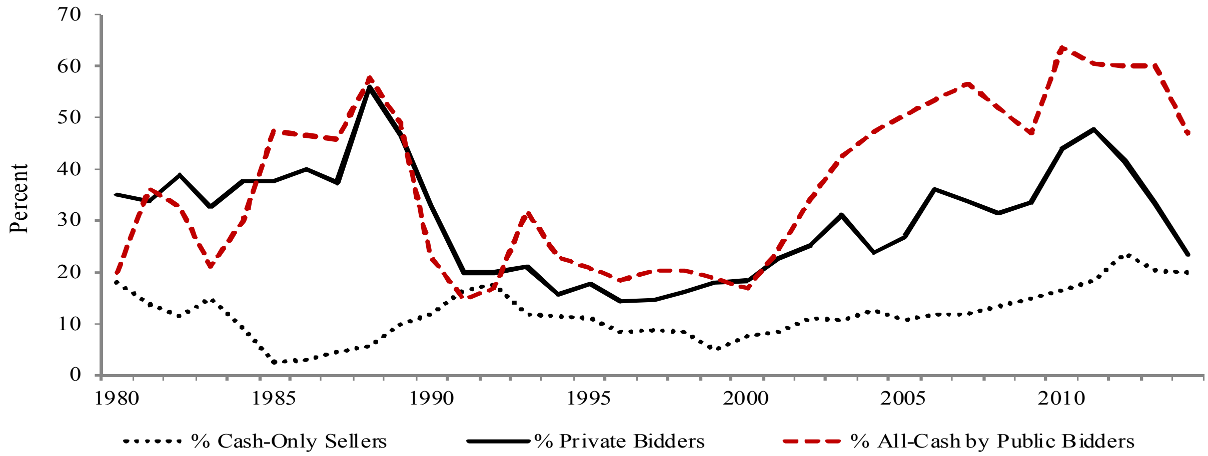


Figure 2
Bidder cash holdings and external pressure to pay with cash, 1980-2014

Panel A shows the annual average percent all-cash bids in N, and the percent private bidders and "cash only" sellers in an expanded sample of $N_e = 18,289$ takeover bids for US targets by US bidders. N_e is the sum of N_1=3,639 bids by financial public bidders, N_2=3,325 bids by nonfinancial public bidders with missing bidder characteristics in Table 2, N_3=5,125 bids by private bidders, and our N=6,200 nonfinancial public bidders. *% Private Bidders* is N_3/N_e. *% Cash-Only Sellers* is the fraction of subsidiary and financial sponsor targets in N_e. Panel B shows the annual average ratio of cash to total assets for Compustat firms and our sample of N=6,200 US nonfinancial public bidders, 1980-2014.

A: Percent all-cash bids by public bidders, and percent private bidders and cash-only sellers



B: Average ratio of cash to total assets for Compustat firms and our sample of public bidders

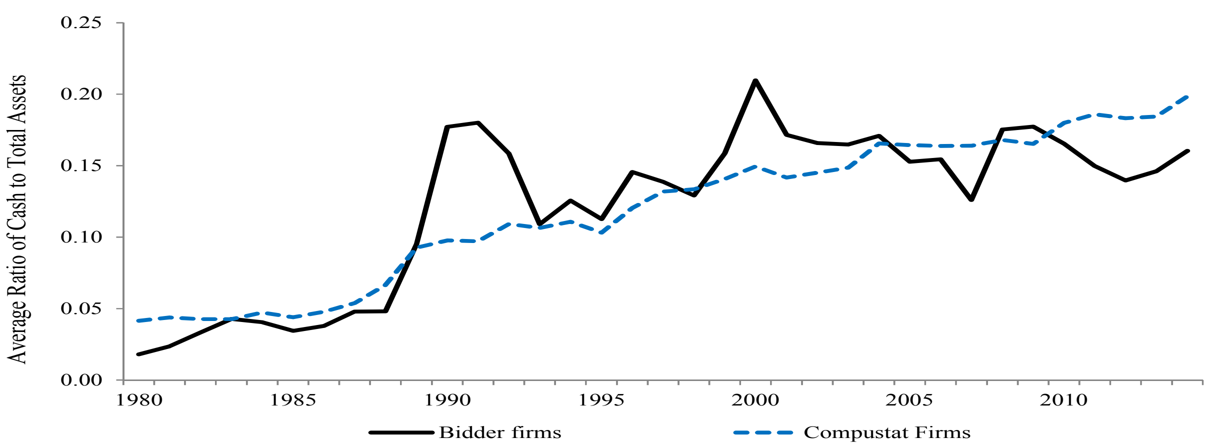
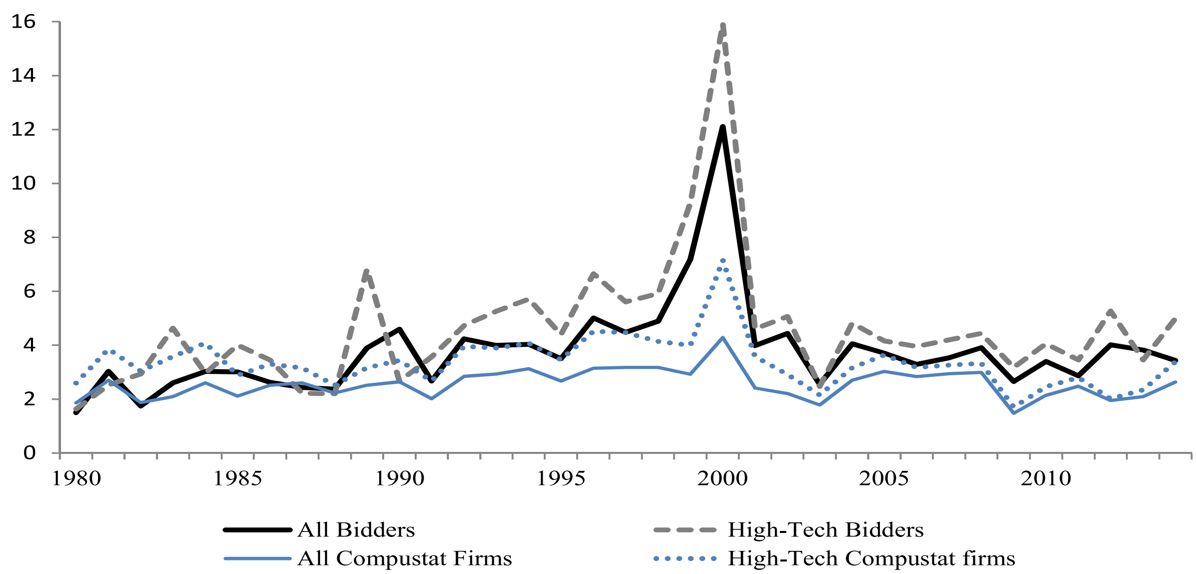


Figure 3
Average bidder M/B and ratio of bidder M/B to target M/B, 1980-2014

Panel A plots the annual average ratio of bidder market-to-book (M/B) for the Compustat population and our sample firms. Panel B plots the annual average ratio of bidder to target M/B and the fraction of deals in which Acquirer M/B > Target M/B. The sample contains 6,200 merger bids for US targets by US public bidders, 1980-2014.

A: Annual average bidder M/B



B: Annual average ratio of bidder to target M/B

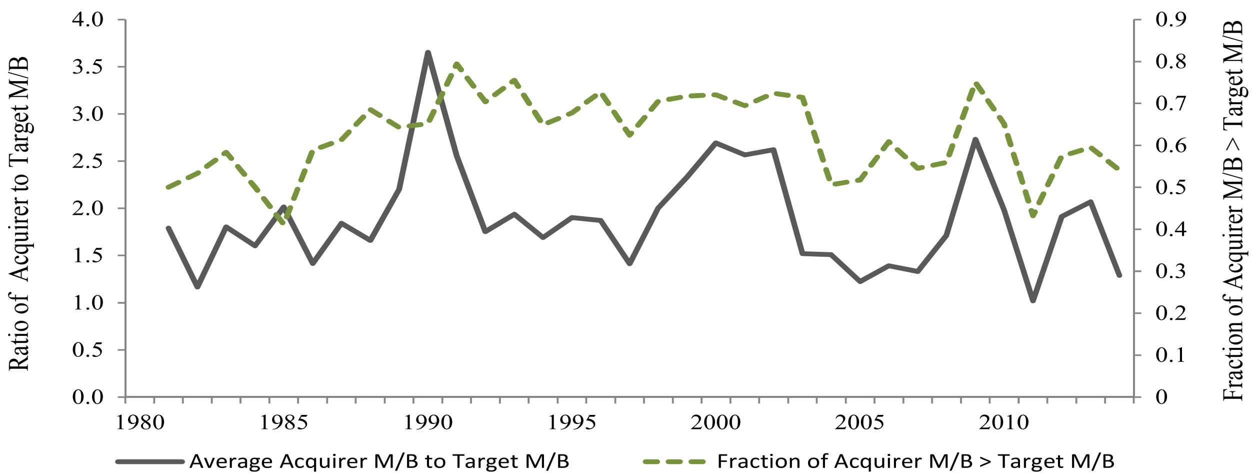


Table 1: **Variable Definitions**

Variable name	Source	Variable definition
A. Deal characteristics		
Stock	SDC	Fraction of stock in the total deal payment.
All-Stock	SDC	All-stock payment. Consideration structure = SHARES.
All-Cash	SDC	All-cash payment. Consideration structure = CASHO.
Mixed Offer	SDC	Consideration structure = HYBRID or OTHER.
Completed Deal	SDC	Deal Status = Completed.
Large Relative Deal Size	SDC	Dummy=1 if the ratio of deal value to bidder Total Assets is in the sample top quartile.
Public Target	SDC	Target public status = Public.
B. Bidder capital structure		
Size	Compustat	Natural log of Total Assets.
Leverage	Compustat	Total Debt/Total Assets.
Cash Holding	Compustat	Cash/Total Assets.
M/B	Compustat	Market-to-book equity ratio = (Year-end closing price x number of shares outstanding)/(Total Assets - Total Liabilities).
Dividend Dummy	Compustat	Dummy=1 if total dividends > 0.
R&D	Compustat	R&D Expense/Total Assets.
Asset Tangibility	Compustat	Properties, Plants and Equipment/Total Assets.
Operating Efficiency	Compustat	(Cost of Goods Sold + Selling, General and Administrative expense)/(Properties, Plants and Equipment + Total Current Assets - Cash - Total Current Liabilities).
Market Leverage	Compustat	Total Debt/ (Market Value of Equity + Total Debt).
Target Leverage	Authors' Calculation	The predicted value from the following cross-sectional (year-by-year) regression: Leverage = β_0 + β_1 (Size) + β_2 (Operating Efficiency) + β_3 (Market to Book Equity) + β_4 (R&D) + β_5 (Missing R&D Dummy) + β_6 Industry Dummies + e. Based on Harford, Klasa, and Walcott (2009).
Deviation from Target Leverage	Authors' Calculation	The fitted residual from the regression for Target Leverage.
Target Cash Holding	Authors' Calculation	The predicted value from the following cross-sectional (year-by-year) regression: Cash Holding = β_0 + β_1 (Size) + β_2 (Operating Efficiency)+ β_3 (Market to Book Equity) + β_4 (R&D) + β_5 (Missing R&D Dummy) + β_6 (Leverage) + β_7 Industry Dummies + e.
Deviation from Target Cash	Authors' Calculation	The fitted residual from the regression for Target Cash Holding.
C. External pressure to pay in cash		
Competition from Private Buyers	SDC	Fraction of all merger bids in the target's FF49 industry and year in which the bidder is private.
Cash-Only Seller	SDC	Dummy=1 if the target is owned by a financial sponsor or is a subsidiary.
HHI	Authors' calculation	Herfindahl Hirschman Index. $HHI = \sum_j^n X_j^2 / \sum_j^n X_j$, where X_j is the Total Assets of firm j, $j = 1, 2.., N$, and N is the number of Compustat firms in the bidder's FF49 industry and year.
D. Industry and time period characteristics		
Industry Wave	Authors' calculation	As Maksimovic, Phillips, and Yang (2013), the z-score of MTA, where MTA is the aggregate volume of mergers scaled by aggregate Total Assets of Compustat firms in the bidder's FF49 industry and year, normalized by its time-series mean and standard deviation.
High Tech Dummy	American Electronic Association	Dummy=1 if the bidder is in a high-tech industry, comprising 47 four-digit SIC codes in the two-digit industries 28, 35, 36, 38, 48, and 73.
Post Bubble	SDC	Dummy=1 if the deal is announced in the period 2001-2014.

Table 1 continued from previous page

Variable name	Source	Variable definition
Credit Spread	Federal Reserve website	Moody's yield on AAA seasoned corporate bonds - 3-month treasury bill (secondary market rate).
FF49	Ken French's website	The 49 industry classifications in Fama and French (1997).
E: Target's information about bidder value		
Industry Complementarity	Joseph Fan website	Based on Fan and Lang (2000), this proxy captures the extent to which the bidder and target industries share input from and output to the same industries.
Local Deal	Authors' calculation	Dummy=1 if the bidder and target are located within 30 miles. The distance is computed using the spherical law of cosines formula: Distance = arccos(sin(lat1).sin(lat2)+cos(lat1).cos(lat2).cos(long2-long1)), where R = Radius of the Earth = 3963 miles, (lat1,long1)= bidder coordinate (latitude,longtitude) in radians, and (lat2,long2)= target coordinate in radians. Firm location data are from the ZIP codes in SDC. Coordinates (lat,long) of all the zip codes are from 1987 U.S. Census Gazetteer Files.
Urban Acquirer	Authors' calculation	Dummy=1 if a firm is located within 30 miles from one of the ten largest metropolitan areas (New York City, Los Angeles, Chicago, Washington DC, San Francisco, Philadelphia, Boston, Detroit, Dallas, and Houston). Coordinates of the city centers are from www.world-gazetteer.com. See *Local Deal* for distance calculation.
Recent SEO	SDC	Dummy=1 if the bidder issued stock within 18 months prior to the bid.
Recent Acquirer	SDC	Dummy=1 if the bidder announced a merger bid within 18 months prior to the sample bid.
Vertical Relatedness	Joseph Fan website	Based on Fan and Lang (2000), the proxy captures how much input/output of the bidder industry is bought from/sold to the target industry.
Return Correlation	Authors' calculation	Daily stock return correlation between bidder and target; we use [t-290: t-41] as the estimation window, which covers 250 trading days before the 40-day run-up period, [t-40:t-1].
Same Primary SIC Dummy	SDC	Dummy=1 if the bidder primary 4-digit SIC is similar to target primary 4-digit SIC.
Overlapping Industries/Bidder Industries	SDC	Number of overlapping 4-digit SIC Codes between the bidder and target scaled by the number of bidder 4-digit SIC Codes.
Overlapping Industries/Target Industries	SDC	Number of overlapping 4-digit SIC Codes between the bidder and target scaled by the number of target 4-digit SIC Codes.
F. Bidder stock price pressure and valuation error		
Price pressure	Authors' calculation	Following Edmans, Goldstein, and Jiang (2012), mutual fund price pressure captures the aggregate price pressure on bidder stocks held by mutual funds experiencing large fund outflows, scaled by the stock's trading volume. The data are from Thomson Reuters mutual fund holdings database and CRSP mutual fund monthly net returns database. See section 4 for details.
Valuation Error	Authors' calculation	Based on the firm-specific valuation error in Rhodes-Kropf, Robinson, and Viswanathan (2005). Valuation Error = market value - fundamental value based on the sector pricing rule in year t. The latter is the fitted firm market value from the regression: market value = β_0 + β_1 (Book Value of Equity) + β_2 (positive component of Net Income) + β_3 (negative component of Net Income) + β_4 (Leverage) + e. The βs are estimated from all Compustat firms in the firm's Fama-French 16 industries in year t. All variables in the regression, except Leverage, are in natural log form.

Table 2
Sample characteristics

The table shows the mean and median values of key characteristics. The sample is 6,200 merger bids for US targets by US nonfinancial public bidders, 1980-2014. We require deal size ≥10 million, relative deal size ≥1% and nonmissing bidder characteristics. All variables are defined in Table 1. Columns (4)-(5) and (6)-(7) show the subsamples of all-stock and all-cash bids, respectively. The p-value in column (9) is the significance of a t-test for the difference in mean between all-stock and all-cash bids.

	Full Sample (N=6,200)			All-Stock (N=2,284)		All-Cash (N= 2,042)		Difference	P-value of
	N	Mean	Median	Mean	Median	Mean	Median	in Mean	Difference
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Bidder capital structure:									
Total Assets (in $ million)	6,200	3,084	350	1,618	189	4,982	726	-3,365	<0.001
Leverage	6,200	0.205	0.162	0.169	0.100	0.217	0.190	-0.049	<0.001
Cash Holding	6,200	0.141	0.078	0.171	0.109	0.112	0.063	0.058	<0.001
M/B	6,200	4.627	2.829	6.390	3.831	3.360	2.525	3.031	<0.001
Dividend Dummy	6,200	0.392	0	0.311	0	0.482	0	-0.172	<0.001
R&D	6,200	0.049	0.007	0.068	0.028	0.034	0.008	0.035	<0.001
Asset Tangibility	6,200	0.417	0.311	0.359	0.267	0.440	0.344	-0.081	<0.001
Operating Efficiency	6,200	2.040	1.496	2.116	1.510	1.966	1.523	0.150	0.381
External pressure to pay in cash:									
Competition from Private Buyers	6,200	0.216	0.184	0.160	0.123	0.268	0.250	-0.108	<0.001
Cash-Only Seller	6,200	0.104	0	0.065	0	0.125	0	-0.061	<0.001
Industry HHI	6,053	0.072	0.053	0.076	0.057	0.071	0.054	0.005	0.004
Deal characteristics:									
Completed Deal	6,200	0.878	1	0.866	1	0.894	1	-0.028	0.005
Relative Deal Size	6,200	1.007	0.284	1.610	0.405	0.378	0.146	1.232	<0.001
Public Target	6,200	0.455	0	0.436	0	0.520	1	-0.084	<0.001
Industry and time period characteristics:									
Industry Wave	6,200	0.539	-0.029	0.797	0.113	0.259	-0.166	0.538	<0.001
Post Bubble	6,200	0.450	0	0.285	0	0.598	1	-0.313	<0.001
High-Tech	6,200	0.433	0	0.545	1	0.356	0	0.189	<0.001
Information asymmetry:									
Industry Complementarity	5,960	0.710	0.865	0.726	0.871	0.690	0.800	0.036	<0.001
Local Deal	5,343	0.168	0	0.213	0	0.115	0	0.098	<0.001
Urban Deal	6,071	0.397	0	0.401	0	0.382	0	0.019	0.202
Recent SEO	6,200	0.265	0	0.331	0	0.190	0	0.141	<0.001
Recent Acquirer	6,200	0.251	0	0.311	0	0.212	0	0.100	<0.001

Table 3
Industry distribution of sample bids and payment method

The table reports the frequency and total dollar volume (in $ thousand) of merger bids in the acquirer's FF49 industry, sorted by frequency. Columns (3)-(4) and (5)-(6) show the percent bids paid in all-stock and all-cash, respectively, while column (7) reports the average percent stock in mixed bids. The sample contains 6,200 merger bids for US targets by US nonfinancial public acquirers, 1980-2014.

FF Code	Industry	All Mergers		% All-Stock Mergers		% All-Cash Mergers		% Stock in Mixed Offers
		Frequency	$ Volume	by number	by volume	by number	by volume	
		(1)	(2)	(3)	(4)	(5)	(6)	(7)
36	Computer Software	1,151	473,551	49.3	44.7	23.7	27.1	60.4
37	Electronic Equipment	485	202,118	46.8	43.8	27.8	22.9	61.4
34	Business Services	372	95,298	40.6	31.7	25.3	23.2	55.1
30	Petroleum and Natural Gas	357	494,129	27.7	17.1	27.2	11.5	57.3
43	Retail	335	315,109	39.1	9.8	33.1	19.7	54.7
35	Computers	323	264,383	53.6	49.7	27.2	34.6	65.0
32	Communication	317	1,434,986	31.5	32.9	23.3	5.7	59.3
13	Pharmaceutical Products	263	812,888	33.5	38.5	43.0	17.0	62.2
42	Wholesale	234	90,861	36.3	34.9	35.0	25.9	59.2
12	Medical Equipment	218	125,531	39.0	17.2	37.2	26.4	62.2
21	Machinery	201	91,823	33.8	30.6	46.8	34.7	56.8
38	Measuring and Control Equipment	178	95,233	29.2	16.9	43.8	60.4	63.9
11	Healthcare	175	63,035	38.3	16.8	27.4	22.1	53.9
7	Entertainment	104	95,219	35.6	14.3	33.7	64.0	47.0
2	Food Products	100	98,959	23.0	8.6	44.0	50.8	49.5
14	Chemicals	94	104,799	21.3	3.0	40.4	46.1	54.9
22	Electrical Equipment	93	21,939	33.3	23.2	44.1	52.5	33.8
17	Construction Materials	91	22,402	18.7	45.0	47.3	24.4	56.4
19	Steel Works	85	38,544	14.1	6.7	56.5	44.5	48.1
39	Business Supplies	82	82,382	19.5	17.9	47.6	22.9	44.3
9	Consumer Goods	80	91,586	18.8	63.3	53.8	20.6	48.6
44	Restaraunts, Hotels, and Motels	80	13,025	53.8	47.3	26.3	28.2	52.4
41	Transportation	79	31,549	24.1	40.1	32.9	31.9	59.2
33	Personal Services	77	18,899	33.8	28.5	36.4	39.1	70.8
10	Apparel	69	18,805	17.4	8.1	44.9	44.6	34.3
49	Other	68	56,211	32.4	44.5	23.5	40.4	57.6
23	Automobiles and Trucks	62	18,510	12.9	5.3	58.1	65.7	44.5
8	Printing and Publishing	49	17,175	8.2	10.9	71.4	47.2	49.7
18	Construction	48	3,729	25.0	36.4	43.8	40.2	31.2
24	Aircraft	47	51,211	8.5	26.8	66.0	53.4	43.5
15	Rubber and Plastic Products	46	8,555	15.2	29.7	43.5	36.9	58.1
6	Recreation	31	7,401	25.8	61.3	35.5	19.3	57.0
16	Textiles	29	6,142	24.1	24.4	41.4	21.8	61.1
31	Utilities	28	39,949	25.0	4.0	17.9	29.9	52.5
20	Fabricated Products	26	2,805	34.6	14.2	34.6	62.0	39.2
1	Agriculture	22	3,906	40.9	7.4	31.8	50.0	58.9
27	Precious Metals	19	5,184	52.6	58.2	21.1	10.9	76.0
4	Beer and Liquor	15	24,485	6.7	0.0	26.7	5.3	51.4
28	Non-Metallic and Industrial Metal Mining	13	58,990	30.8	11.8	15.4	1.8	47.8
3	Candy and Soda	12	4,503	0.0	0.0	33.3	44.4	39.0
26	Defense	11	11,797	27.3	76.6	54.5	19.2	46.2
40	Shipping Containers	11	8,125	18.2	1.5	36.4	30.1	51.3
25	Shipbuilding and Railroad Equipment	8	3,884	0.0	0.0	50.0	27.3	71.1
29	Coal	8	5,101	25.0	10.5	50.0	73.9	46.9
5	Tobacco Products	4	28,592	0.0	0.0	50.0	11.3	26.6
	Total	6,200	5,563,305	36.8	30.3	32.9	20.8	57.3

Table 4
Baseline tobit model for the fraction of stock in takeover bids

The table reports the coefficient estimates from tobit regressions for the fraction of stock (vs. cash) in the deal payment. The sample is split into *High-Tech* and *Non-Tech* bidders in columns (6) and (7), respectively. The explanatory variables are controls for bidder capital structure and external pressure to pay in cash, as well as deal, industry and time period characteristics. Firm-level variables are lagged by one year. All variables are defined in Table 1. Industry dummies indicate the bidder's FF49 industry. A constant term is included but not reported. The sample contains 6,200 merger bids for US targets by US nonfinancial public acquirers, 1980-2014. t-statistics are in parenthesis, using robust standard errors. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% level, respectively.

Sample:	All firms					High-Tech	Non-Tech
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Bidder capital structure:							
Size	-0.17	-0.173	-0.1	-0.168	-0.085	-0.117	-0.087
	(12.83)***	(12.74)***	(7.34)***	(12.39)***	(6.15)***	(5.70)***	(4.66)***
Leverage	-0.054	-0.1	-0.051	-0.076	0.033	0.081	-0.055
	(0.48)	(0.86)	(0.45)	(0.66)	(0.30)	(0.46)	(0.38)
Cash Holding	-0.063	-0.235	0.085	-0.216	0.051	-0.123	0.452
	(0.40)	(1.49)	(0.55)	(1.37)	(0.33)	(0.61)	(1.84)*
M/B	0.03	0.025	0.024	0.024	0.018	0.03	0.011
	(8.03)***	(6.82)***	(6.79)***	(6.65)***	(5.06)***	(6.12)***	(2.02)**
Dividend Dummy	-0.116	0.015	-0.057	0.02	-0.064	-0.063	-0.038
	(2.38)**	(0.29)	(1.17)	(0.41)	(1.34)	(0.77)	(0.61)
R&D	1.823	2.19	2.127	2.056	2.016	1.958	3.733
	(5.91)***	(6.40)***	(6.31)***	(5.96)***	(6.13)***	(5.12)***	(4.44)***
Asset Tangibility	-0.089	-0.286	-0.293	-0.291	-0.295	-0.306	-0.29
	(1.34)	(3.64)***	(3.83)***	(3.71)***	(3.95)***	(2.15)**	(3.18)***
Operating Efficiency	0.004	0.003	0.004	0.003	0.003	0.007	-0.004
	(0.90)	(0.72)	(1.04)	(0.71)	(0.84)	(1.30)	(0.64)
External pressure to pay in cash:							
Competition from Private Buyers	-2.209	-2.281	-1.609	-2.223	-0.938	-2.184	-1.261
	(15.14)***	(15.39)***	(11.03)***	(15.05)***	(6.05)***	(7.80)***	(7.52)***
Cash-only sellers	-0.388	-0.333	-0.305	-0.33	-0.275	-0.454	-0.228
	(5.03)***	(4.38)***	(4.10)***	(4.35)***	(3.81)***	(3.64)***	(2.49)**
Deal characteristics:							
Large Relative Deal Size	0.452	0.437	0.500	0.438	0.526	0.488	0.487
	(8.25)***	(8.03)***	(9.36)***	(8.07)***	(9.99)***	(5.74)***	(7.15)***
Public Target	0.008	0.027	-0.034	0.023	-0.048	-0.098	0.043
	(0.16)	(0.55)	(0.69)	(0.47)	(0.99)	(1.31)	(0.67)
Industry and time period characteristics:							
Industry Wave	0.115	0.103	0.096	0.082	0.008	0.130	0.063
	(7.05)***	(6.36)***	(6.13)***	(4.85)***	(0.41)	(5.45)***	(2.98)***
Post Bubble			-0.738			-0.99	-0.563
			(14.69)***			(12.00)***	(8.58)***
Credit Spread				-0.074			
				(3.99)***			
High-Tech Dummy			0.298	0.248	0.277		
			(4.18)***	(3.41)***	(3.98)***		
Year Dummies	No	No	No	No	Yes	No	No
Industry Dummies	No	Yes	Yes	Yes	Yes	Yes	Yes
Pseudo R-squared	0.10	0.12	0.14	0.12	0.16	0.18	0.11
N	5,841	5,841	5,841	5,841	5,841	2,601	3,240

Table 5
Baseline multinomial model for the all-stock, mixed, and all-cash payment choice

The table reports the coefficient estimates from multinomial probit regressions for the choice of payment method in takeover bids. The outcomes are all-stock (odd-numbered columns), mixed (even-numbered columns), and all-cash (base outcome) offers. The explanatory variables are controls for bidder capital structure and external pressure to pay in cash, as well as deal, industry and time period characteristics. All variables are defined in Table 1. Firm-level variables are lagged by one year. Industry dummies indicate the bidder's FF49 industry. A constant term is included but not reported. The sample contains 6,200 merger bids for US targets by US nonfinancial public acquirers, 1980-2014. Z-statistics are in parenthesis, using robust standard errors. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% level, respectively.

Model:	I		II		III	
Outcome:	All-Stock	Mixed	All-Stock	Mixed	All-Stock	Mixed
	(1)	(2)	(3)	(4)	(5)	(6)
Bidder capital structure:						
Size	-0.215	-0.117	-0.227	-0.131	-0.143	-0.108
	(13.70)***	(7.60)***	(13.67)***	(8.05)***	(8.06)***	(6.29)***
Leverage	-0.019	0.567	-0.09	0.373	-0.067	0.355
	(0.13)	(3.98)***	(0.57)	(2.54)**	(0.41)	(2.43)**
Cash Holding	-0.061	0.301	-0.294	0.073	0.147	0.188
	(0.31)	(1.52)	(1.47)	(0.36)	(0.72)	(0.90)
M/B	0.034	0.001	0.029	-0.001	0.028	-0.002
	(6.15)***	(0.25)	(5.26)***	(0.15)	(5.27)***	(0.36)
Dividend Dummy	-0.087	-0.042	0.08	0.028	-0.025	-0.01
	(1.48)	(0.72)	(1.28)	(0.45)	(0.39)	(0.16)
R&D	2.553	1.265	3.38	2.49	3.176	2.206
	(6.12)***	(2.93)***	(6.43)***	(4.65)***	(6.21)***	(4.23)***
Asset Tangibility	-0.086	0.273	-0.31	-0.046	-0.338	-0.064
	(0.98)	(3.30)***	(2.87)***	(0.45)	(3.08)***	(0.63)
Operating Efficiency	0.005	0.005	0.005	0.005	0.006	0.005
	(1.16)	(0.98)	(0.99)	(0.99)	(1.19)	(1.10)
External pressure to pay in cash:						
Competition from Private Buyers	-2.545	-0.741	-2.747	-0.776	-2.001	-0.695
	(14.30)***	(4.68)***	(14.68)***	(4.71)***	(10.52)***	(4.08)***
Cash-Only Seller	-0.454	-0.155	-0.405	-0.111	-0.377	-0.099
	(4.74)***	(1.79)*	(4.11)***	(1.25)	(3.78)***	(1.12)
Deal characteristics:						
Large Relative Deal Size	0.633	0.813	0.638	0.779	0.73	0.801
	(9.30)***	(11.78)***	(9.16)***	(11.06)***	(10.10)***	(11.21)***
Public Target	-0.064	-0.357	-0.036	-0.332	-0.094	-0.352
	(1.05)	(5.95)***	(0.59)	(5.42)***	(1.50)	(5.74)***
Industry and time period characteristics:						
Industry Wave	0.147	0.119	0.136	0.111	0.138	0.101
	(6.98)***	(5.60)***	(6.33)***	(5.16)***	(6.58)***	(4.88)***
Post Bubble					-0.968	-0.184
					(15.23)***	(3.08)***
High-Tech Dummy					0.388	0.138
					(4.13)***	(1.54)
Industry Dummies	No	No	Yes	Yes	Yes	Yes
Log Likelihood	-6,028		-5,862		-5,717	
N	6,200		6,200		6,200	

Table 6
Baseline tobit model for the fraction of stock with leverage and cash decomposition

The table reports the coefficient estimates from tobit regressions for the fraction of stock (vs. cash) in the deal payment. Market and book leverage are decomposed into *Target Leverage* and *Deviation from Target Leverage*, based on Harford, Klasa, and Walcott (2009). *Cash Holding* is decomposed into *Target Cash Holding* and *Deviation from Target Cash*. See Table 1 for variable definitions. The remaining explanatory variables are controls for bidder capital structure and external pressure to pay in cash, as well as deal, industry and time period characteristics from Table 4. Firm-level variables are lagged by one year. Industry dummies indicate the bidder's FF49 industry. A constant term is included but not reported. The sample contains 6,200 merger bids for US targets by US nonfinancial public acquirers, 1980-2014. t-statistics are in parenthesis, using robust standard errors. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% level, respectively.

	Market leverage			Book leverage		
	(1)	(2)	(3)	(4)	(5)	(6)
Bidder capital structure:						
Deviation from Target Leverage	0.842	1.554	0.806	0.203	0.503	0.048
	(2.96)***	(5.46)***	(2.81)***	(0.89)	(2.19)**	(0.21)
Deviation from Target Cash	-0.02	-0.036	-0.075	-0.143	-0.177	-0.197
	(0.10)	(0.18)	(0.39)	(0.69)	(0.87)	(0.98)
Target Leverage	-0.563	-1.135	-0.421	-0.11	-0.398	0.001
	(2.95)***	(5.76)***	(2.08)**	(0.71)	(2.46)**	(0.01)
Target Cash Holding	-4.234	-7.675	-3.34	-3.585	-6.575	-1.983
	(7.72)***	(11.51)***	(4.41)***	(6.88)***	(10.05)***	(2.67)***
Size	-0.19	-0.218	-0.132	-0.205	-0.241	-0.137
	(12.94)***	(14.29)***	(8.02)***	(13.71)***	(15.04)***	(7.85)***
M/B	0.032	0.026	0.025	0.033	0.028	0.025
	(7.30)***	(6.05)***	(5.93)***	(7.41)***	(6.35)***	(5.95)***
Dividend Dummy	-0.218	-0.08	-0.105	-0.209	-0.073	-0.103
	(3.95)***	(1.45)	(1.93)*	(3.69)***	(1.28)	(1.83)*
R&D	3.268	4.242	3.154	3.231	4.288	2.977
	(8.36)***	(10.23)***	(7.66)***	(7.92)***	(9.87)***	(6.91)***
Asset Tangibility	-0.248	-0.7	-0.483	-0.236	-0.692	-0.454
	(3.23)***	(7.63)***	(5.26)***	(2.95)***	(7.23)***	(4.77)***
Operating Efficiency	0.004	0.004	0.004	0.004	0.003	0.004
	(0.93)	(0.83)	(1.02)	(0.78)	(0.57)	(0.86)
External pressure to pay in cash:						
Competition from Private Buyers	-2.2	-2.113	-1.674	-2.305	-2.257	-1.743
	(13.85)***	(13.24)***	(10.53)***	(14.20)***	(13.77)***	(10.70)***
Cash Only Sellers	-0.39	-0.318	-0.307	-0.435	-0.365	-0.351
	(4.63)***	(3.87)***	(3.78)***	(5.03)***	(4.32)***	(4.21)***
Deal characteristics:						
Large Relative Deal Size	0.529	0.537	0.576	0.553	0.556	0.596
	(8.77)***	(9.04)***	(9.79)***	(8.78)***	(8.97)***	(9.71)***
Public Target	-0.012	-0.02	-0.05	-0.065	-0.071	-0.095
	(0.23)	(0.38)	(0.94)	(1.17)	(1.30)	(1.78)*
Industry and time period characteristics:						
Industry Wave	0.115	0.096	0.088	0.123	0.108	0.095
	(6.33)***	(5.38)***	(5.05)***	(6.65)***	(5.91)***	(5.32)***
Post Bubble			-0.646			-0.721
			(10.28)***			(11.21)***
High-Tech Dummy			0.302			0.293
			(3.89)***			(3.66)***
Industry Dummies	No	Yes	Yes	No	Yes	Yes
Pseudo R-squared	0.10	0.13	0.14	0.10	0.13	0.14
N	5,070	5,070	5,070	5,316	5,316	5,316

Table 7
Regressions for information asymmetry and payment method choice

The table reports the coefficient estimates from tobit regressions for the fraction of stock in takeover bids (columns (1)-(2)) and multinomial probit regressions for the choice of payment method, where the outcomes are all-stock, mixed, and all-cash (baseline) bids (columns (3)-(6)). The explanatory variables are measures for information asymmetry about bidder valuation based on bidder and target industry complementary (*Industry Complementarity*), geography (*Local Deal*, *Urban Deal*), and recent transactions (*Recent CEO*, *Recent Acquirer*), as well as measures for external pressures to pay in cash. All variables are defined in Table 1. The regressions also include controls for bidder capital structure, deal, industry, and time period characteristics from Table 4. Firm-level variables are lagged by one year. A constant term is included but not reported. The sample contains 6,200 merger bids for US targets by US nonfinancial public acquirers, 1980-2014. Columns (1)-(2) show t-statistics in parenthesis, while columns (3)-(6) show Z-statistics, all using robust standard errors. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% level, respectively.

Regression model	Tobit		Multinomial probit			
			I		II	
			All-Stock	Mixed	All-Stock	Mixed
	(1)	(2)	(3)	(4)	(5)	(6)
Information asymmetry:						
Industry Complementarity	0.31	0.231	0.302	0.226	0.235	0.2
	(3.88)***	(3.27)***	(3.63)***	(2.68)***	(2.52)**	(2.23)**
Local Deal	0.595	0.459	0.617	0.392	0.595	0.361
	(8.44)***	(7.33)***	(8.34)***	(5.17)***	(7.17)***	(4.44)***
Urban Deal	-0.004	0.007	0.008	0.075	0.054	0.115
	(0.08)	(0.15)	(0.15)	(1.35)	(0.87)	(1.92)*
Recent SEO	0.583	0.273	0.624	0.375	0.3	0.189
	(9.50)***	(4.94)***	(9.81)***	(5.72)***	(4.07)***	(2.62)***
Recent Acquirer	0.46	0.298	0.454	0.044	0.368	0.189
	(7.64)***	(5.35)***	(7.31)***	(0.67)	(5.14)***	(2.63)***
External pressure to pay in cash:						
Competition from Private Buyers		-1.432			-1.839	-0.609
		(9.36)***			(8.91)***	(3.34)***
Cash-only seller		-0.371			-0.511	-0.111
		(4.40)***			(4.39)***	(1.12)
Industry HHI	1.604	-0.63	1.651	-0.172	-0.793	-1.225
	(3.86)***	(1.52)	(3.98)***	(0.37)	(1.49)	(2.25)**
Bidder capital structure	No	Yes	No	No	Yes	Yes
Deal characteristics	No	Yes	No	No	Yes	Yes
Industry and time-period	No	Yes	No	No	Yes	Yes
Pseudo R-squared/Log Likelihood	0.02	0.14	-5,482		-4,651	
N	4,872	4,764	5,128		5,014	

Table 8
Alternative measures for information asymmetry and payment method choice

The table reports the coefficient estimates from tobit regressions for the fraction of stock in takeover bids (columns (1)-(5)) and multinomial probit regressions for the choice of payment method, where the outcomes are all-stock, mixed, and all-cash (baseline) bids (columns (6)-(7)). The explanatory variables are measures for information asymmetry about bidder valuation based on bidder and target industry relatedness (*Vertical Relatedness, Acquirer-Target Return Correlation, Same Primary SIC Dummy, Overlapping Industries/Acquirer Industries*, and*Overlapping Industries/Target Industries*). All variables are defined in Table 1. The regressions also control for the information asymmetry measures from Table 7 as well as measures for external pressures to pay in cash, bidder capital structure, deal, industry, and time period characteristics from Table 4. Firm-level variables are lagged by one year. A constant term is included but not reported. The sample contains 6,200 merger bids for US targets by US nonfinancial public acquirers, 1980-2014. Columns (1)-(5) show t-statistics in parenthesis, while columns (6)-(7) show Z-statistics, all using robust standard errors. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% level, respectively.

Regression model	Tobit					Multinomial probit	
						All-Stock	Mixed
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Information asymmetry:							
Vertical Relateness	1.058					1.272	1.648
	(2.78)***					(2.40)**	(3.30)***
Same Primary SIC Dummy		0.152					
		(3.13)***					
Overlapping Industries/Acquirer Industries			0.174				
			(2.40)**				
Overlapping Industries/Target Industries				0.131			
				(2.26)**			
Acquirer-Target Return Correlation					1.595		
					(6.09)***		
Local Deal	0.46	0.455	0.454	0.456	0.533	0.592	0.357
	(7.33)***	(7.25)***	(7.22)***	(7.26)***	(4.50)***	(7.15)***	(4.39)***
Urban Deal	0.006	0.012	0.009	0.008	-0.064	0.053	0.113
	(0.12)	(0.25)	(0.20)	(0.18)	(0.73)	(0.85)	(1.87)*
Recent SEO	0.27	0.267	0.263	0.271	0.469	0.296	0.18
	(4.89)***	(4.85)***	(4.76)***	(4.90)***	(4.34)***	(4.02)***	(2.49)**
Recent Acquirer	0.282	0.281	0.284	0.282	0.383	0.354	0.202
	(5.06)***	(5.05)***	(5.09)***	(5.07)***	(3.78)***	(4.96)***	(2.80)***
External pressure to pay in cash:							
Competition from Private Buyers	-1.417	-1.437	-1.46	-1.448	-1.725	-1.826	-0.57
	(9.22)***	(9.39)***	(9.54)***	(9.45)***	(6.13)***	(8.82)***	(3.09)***
Cash-only seller	-0.373	-0.371	-0.374	-0.372	0.294	-0.514	-0.109
	(4.42)***	(38.03)***	(38.03)***	(38.03)***	(0.73)	(4.42)***	(1.10)
Industry HHI	-0.634	-0.606	-0.627	-0.651	-1.281	-0.778	-1.188
	(1.53)	(1.46)	(1.51)	(1.57)	(1.51)	(1.47)	(2.18)**
Other controls:							
Bidder capital structure	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Deal characteristics	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry and time-period	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Pseudo R-squared/Log Likelihood	0.14	0.14	0.14	0.14	0.12	-4,650	
N	4,764	4,764	4,764	4,764	2,078	5,014	

Table 9
Instrumentation of acquirer misvaluation using mutual fund outflows

The table reports coefficient estimates from instrumental variable (IV) regressions for acquirer misvaluation, measured by M/B (models I and II) and firm-specific valuation error (models III and IV). The even columns show the second-stage IV tobit regressions for the percent stock payment. The explanatory variables are *Price pressure* (bidder stock price pressure from mutual fund outflows) and instrumented misvaluation from the first-stage estimation. The regressions control for the baseline model (column 3 of Table 4). All variables are defined in Table 1. The regressions are estimated using maximum likelihood. Firm-level variables are lagged by one year. Industry dummies, which are included in models II and IV, indicate the bidder's FF49 industry. A constant term is included but not reported. The sample contains 6,200 merger bids for US targets by US nonfinancial public acquirers, 1980-2014. t-statistics are in parenthesis, using robust standard errors. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% level, respectively.

Model	I		II		III		IV	
Dependent Variable:	M/B	Percent Stock	M/B	Percent Stock	Valuation Error	Percent Stock	Valuation Error	Percent Stock
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Instrumentation of Misvaluation:								
Instrumented M/B		0.164		0.154				
		(0.49)		(0.48)				
Instrumented Valuation Error						0.327		0.33
						(0.80)		(0.23)
Price pressure	-5.77		-5.897		-6.959		-6.02	
	(2.52)***		(2.56)***		(5.28)***		(4.59)***	
External pressure to pay in cash:								
Competition from Private Buyers	-0.51	-1.459	-0.507	-1.543	-0.104	-1.55	-0.152	-1.599
	(2.95)***	(6.38)***	(2.86)***	(6.82)***	(1.58)	(9.98)***	(2.28)**	(6.52)***
Cash-Only Seller	-0.253	-0.433	-0.215	-0.368	-0.182	-0.367	-0.158	-0.321
	(2.67)***	(3.62)***	(2.27)**	(3.40)***	(5.04)***	(3.36)***	(4.43)***	(1.34)
Other controls:								
Bidder capital structure	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Deal characteristics	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry and time-period	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry Dummies	No	No	Yes	Yes	No	No	Yes	Yes
Exogeneity tests :								
Wald Statistic	4.27		3.61		15.59		10.96	
p-value	0.000		0.000		0.000		0.000	
Weak Instrument tests :								
F Statistic	6.33		6.56		27.8		20.79	
p-value	0.0119		0.0105		0		0	
N	5,097		5,097		5,377		5,377	

Table 10
Determinants of acquirer announcement CAR

The table reports coefficient estimates from OLS regressions for the acquirer three-day announcement return. The explanatory variables are *Fraction Stock*, *M/B*, and a *Public Target* dummy, as well as controls for external pressure to pay in cash, bidder capital structure, and deal, industry and time period characteristics from Table 4. All variables are defined in Table 1. Firm characteristics are lagged by one year. Industry dummies indicate the bidder's FF49 industry. The sample contains 6,200 merger bids for US targets by US public bidders, 1980-2014. The t-statistics are in parentheses, using robust standard errors. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% level, respectively.

	(1)	(2)	(3)	(4)	(5)	(6)
Payment method and bidder valuation measures:						
Fraction Stock	-0.02	-0.02	0.009	0.009	0.008	0.008
	(3.75)***	(3.90)***	(1.39)	(1.52)	(1.03)	(1.14)
M/B x Fraction Stock	0	0			0	0
	(0.68)	(0.66)			(0.48)	(0.48)
M/B	0	0			0	0
	(0.98)	(1.04)			(0.97)	(1.04)
Payment method and deal characteristics:						
Public Target x Fraction Stock			-0.056	-0.055	-0.056	-0.055
			(7.88)***	(7.82)***	(7.81)***	(7.77)***
Public Target	-0.037	-0.037	-0.006	-0.007	-0.006	-0.007
	(9.84)***	(10.11)***	(1.20)	(1.34)	(1.22)	(1.37)
Large Relative Deal Size	0.01	0.01	0.01	0.01	0.01	0.01
	(1.67)*	(1.57)	(1.73)*	(1.63)	(1.76)*	(1.67)*
External pressure to pay in cash:						
Competition from Private Buyers	0	-0.004	0	-0.002	0	-0.003
	(0.03)	(0.24)	(0.01)	(0.15)	(0.03)	(0.18)
Cash Only Sellers	0.005	0.005	0.01	0.009	0.01	0.009
	(0.62)	(0.54)	(1.13)	(1.03)	(1.10)	(1.00)
Other controls						
Bidder capital structure	Yes	Yes	Yes	Yes	Yes	Yes
Industry and time-period	Yes	Yes	Yes	Yes	Yes	Yes
Industry Dummies	No	Yes	No	Yes	No	Yes
R-squared	0.05	0.06	0.06	0.07	0.06	0.07
N	5,396	5,396	5,396	5,396	5,396	5,396

Table 11
Acquirer long-run (36 months) returns by payment method and M/B

The table reports the coefficient estimates from calendar time portfolio regressions. The dependent variable is the monthly return on portfolios of acquirers sorted by payment method (*All-Stock* versus *All-Cash*) and above versus below median M/B. Columns (3) and (6) contain portfolios that are long all-cash acquirers and short all-stock acquirers. An acquirer enters the portfolio in the month following a bid announcement and is held for 36 months or until delisting, whichever comes first. The explanatory variables are the Fama and French (1993) three factors (R_m, *SMB*, and *HML*) and the Carhart (1997) momentum (*UMD*). R_m is the excess return on the market. The monthly returns on bidder portfolios are equal-weighted in Panel A and value-weighted in panel B. The sample contains 6,200 merger bids for US targets by US public bidders, 1980-2014. t-statistics are in parentheses and standard errors are robust. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% level, respectively.

Acquirer valuation:	High M/B			Low M/B		
Payment method:	All Stock (1)	All Cash (2)	Long Cash Short Stock (3)	All Stock (4)	All Cash (5)	Long Cash Short Stock (6)
A: Equal-weighted returns						
α	-0.003	-0.003	0.001	-0.001	0.002	0.003
	(1.81)*	(1.66)*	(0.27)	(0.62)	(1.40)	(1.48)
Risk Factors:						
r_m^e	1.209	1.035	-0.15	1.111	0.986	-0.125
	(26.56)***	(23.98)***	(2.62)***	(27.21)***	(33.89)***	(2.79)***
SMB	0.745	0.559	-0.213	0.934	0.626	-0.308
	(11.60)***	(9.14)***	(2.62)***	(16.03)***	(15.07)***	(4.82)***
HML	-0.629	-0.138	0.457	-0.222	0.377	0.6
	(9.10)***	(2.10)**	(5.24)***	(3.57)***	(8.51)***	(8.80)***
UMD	-0.336	-0.285	0.09	-0.414	-0.206	0.208
	(7.92)***	(6.98)***	(1.67)*	(10.83)***	(7.54)***	(4.95)***
R-squared	0.8	0.73	0.16	0.81	0.81	0.33
N (months)	411	405	405	419	418	418
B: Value-weighted returns						
α	-0.002	0.001	0.003	-0.001	0	0.001
	(1.36)	(0.47)	(1.52)	(0.68)	(0.20)	(0.65)
Risk Factors:						
r_m^e	1.091	0.984	-0.102	1.064	0.989	-0.075
	(25.28)***	(27.38)***	(2.04)**	(28.08)***	(30.35)***	(1.61)
SMB	-0.098	-0.117	-0.035	0.19	0.059	-0.129
	(1.61)	(2.29)**	(0.50)	(3.52)***	(1.27)	(1.93)*
HML	-0.665	-0.405	0.239	-0.241	0.208	0.449
	(10.13)***	(7.40)***	(3.15)***	(4.17)***	(4.20)***	(6.30)***
UMD	-0.038	-0.115	-0.059	-0.087	-0.078	0.004
	(0.94)	(3.39)***	(1.25)	(2.44)**	(2.56)**	(0.10)
R-squared	0.73	0.74	0.06	0.74	0.72	0.16
N (months)	411	405	405	419	418	418

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