Are stock-financed takeovers opportunistic?*

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Abstract

We find that the probability of all-stock financed takeovers increases with measures of bidder overvaluation. However, when we instrument the bidder's pricing error using aggregate mutual fund flows, the reverse happens: greater overvaluation *reduces* the all-stock financing propensity. Since shocks to aggregate fund flows are exogenous to the payment method choice—while directly impacting bidder pricing errors—this evidence strongly rejects the notion that all-stock financed takeovers are "market driven". Bidders paying with stock tend to be small, non-dividend paying growth companies with low leverage, that recently made a seasoned equity offering. We also show that all-stock financing is more likely in high-tech industries, when the target and bidder operate in highly complementary industries are geographically close—factors that suggest the target is relatively informed about true bidder value. Overall, the evidence does not suggest a particular role for market mispricing in driving all-stock financed takeovers.

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"[The AOL TimeWarner deal] was done on terms that were insane...AOL stock was ridiculously overvalued...[AOL's CEO Steve Case] chose the moment, almost to the day, when his stock was most valuable and then used it as currency."
—Geoffrey Colvin, "Time Warner, Dont Blame Steve Case", February 3, 2003, *Fortune*.

1 Introduction

The dot.com bubble burst only two months after the January 2000 AOL TimeWarner merger agreement, causing a reduction of more than $100 million in the combined market value of AOL TimeWarner. This merger has become a poster child for the notion that bidder firms may succeed in converting overvalued shares into hard target assets before the overvaluation is corrected. We present new and powerful empirical tests of this "opportunistic bidder financing" hypothesis by studying the payment method choice in takeover bids. Understanding the likelihood of bidders getting away with selling overpriced shares is important not only for parties to merger negotiations but more generally for the debate over the efficiency of the market for corporate control. The larger concern is that opportunities for selling overpriced bidder shares may result in the most overvalued rather than the most efficient bidder winning the target—potentially distorting the important disciplinary role of the takeover market.

Classical economic theory rules out pure bets on the relative mispricing of the bidder and target shares (they are zero-sum games).[1] However, classical theory does not rule out that opportunities for selling overpriced shares may coexist alongside other (exogenous) sources of takeover gains. That is, zero-sum games may be played out if they are financed by expected synergies. This notion is embedded in many strategic takeover theories where rational bidder and target managers are asymmetrically informed about true stock values, in the literature on optimal auction bidding, as well as in recent theories where targets for various reasons tend to accept overpriced bidder stock (Shleifer and Vishny, 2003; Rhodes-Kropf and Viswanathan, 2004).[2]

The logical implication of this notion is that the initially high market-to-book ratio (M/B) of AOL may have reflected market anticipation of takeover synergies and growth options based on AOL

[1]Rational economic agents will not "agree to disagree" and execute a zero-sum stock swap at a positive price (Aumann, 1976; Milgrom and Stokey, 1982).

[2]Rhodes-Kropf and Viswanathan (2004) model synergistic takeovers where rational (Bayesian) target managers are more likely to accept payment in overpriced bidder shares when market valuations are generally high. Shleifer and Vishny (2003) model synergistic takeovers where target acceptance of overvalued shares is a consequence of agency problems and market inefficiency.

fundamentals as much as the type of market overvaluation that could have been recognized by AOL insiders *ex ante*. The empirical challenge, therefore, is to distinguish market mispricing from the value of anticipated takeover synergies and growth options in the data, given that both depend on unobservable (latent) factors and may affect market valuations in the same direction. The methods of estimating a benchmark model for the true bidder value, e.g. using the observed valuation ratios of comparable non-merging firms (Fu, Lin, and Officer, 2013), or inferring counterfactual bidder stand-alone values from failed bids (Savor, 2006), do not meet this challenge. What is needed is an instrument for changes in market pricing that is exogenous to the latent bidder fundamental characteristics driving the takeover decision.

We provide large-sample tests of the all-stock payment choice in takeovers based on such an instrument. Our instrument exploits recent evidence that large trades by mutual fund investors create economically and statistically significant price pressure in the form of temporary price changes of stocks held by the funds (Coval and Stafford, 2007). This evidence has been exploited in takeover settings that differ from ours. Edmans, Goldstein, and Jiang (2012), Khan, Kogan, and Serafeim (2012) and Phillips and Zhdanov (2013) all examine how mutual fund trade-induced price pressure affect the *ex ante* probability of a takeover. In contrast, we examine the determinants of the all-stock payment choice, conditional on a bid. Also, Hau and Lai (2013) study the effect of price pressure on corporate investment decisions. As shown by these studies as well as by our evidence below, the various trade-based instruments used in this literature are generally successful in identifying significant stock price effects in the data.

The use of mutual fund trade induced price pressure as an instrument is not without problems: there is evidence suggesting that trades by some active institutional investors is based on private information about acquiring firm fundamentals (Nain and Yao, 2013; Ben-David, Drake, and Roulstone, 2013). To reduce the impact of such information-based fund trades on our instrument, we follow Edmans, Goldstein, and Jiang (2012) and scale the current period's aggregate mutual fund flow with *last* period's fund portfolio weights. That is, our instrument assume that funds experiencing significant in- or outflows at the time of the takeover bid simply scale their portfolio investments up or down without changing their relative investment proportions in our bidder firms from the previous period. This scaling, which is factually correct for the passively managed funds in our data, substantially removes the possibility that the instrument is correlated with current-period private information about latent bidder characteristics. However, to be even more certain of this, we also exclude sector-specific funds from our instrument as these are more likely to trade on current-period valuable bidder information. Moreover, as pointed out by Edmans, Goldstein, and Jiang (2012) outflows from sector funds are likely to be correlated with industry fundamentals.

We begin our empirical analysis by developing a cross-sectional "baseline" probit model for the payment method choice. The baseline model captures equilibrium correlations between the use of all-stock (relative to payment methods involving cash) and observable firm- and macro characteristics in part suggested by the extant literature. This model shows that all-stock payers tend to be relatively small, non-dividend-paying growth companies with high R&D activity and low leverage. This is hardly surprising as these types of firms tend to have few pledgable assets necessary to raise cash by issuing debt to pay for the takeover. Moreover, we find that all-stock takeovers tend to cluster around industry-specific merger waves and in periods with high capital liquidity (low credit market spreads).[3] Our industry-based evidence expands extant findings that stock-mergers are positively correlated with economy-wide merger activity (Rhodes-Kropf, Robinson, and Viswanathan, 2005). Also, it shows that the earlier finding of Harford (2005) that stock-financing of partial-firm (divisional) acquisitions increases during industry merger waves also extends to merger bids.

We then add measures of bidder valuation errors to our baseline probit model which the extant literature suggests may be correlated with market mispricing. The first follows Rhodes-Kropf, Robinson, and Viswanathan (2005) who decompose a firm's M/B into a long-run valuation component, an industry sector valuation error, and a firm-specific error, all of which are included in our model. The second measure is the valuation discount used in Edmans, Goldstein, and Jiang (2012), which is constructed using a different industry valuation benchmark. The third measure is the aggregate sentiment index of Baker and Wurgler (2006). When including these candidate misvaluation measures *uninstrumented* into our baseline probit model, we find that the likelihood of all-stock as payment method is significantly related to the Rhodes-Kropf, Robinson, and Viswanathan (2005) pricing error only. Our instrumental variable tests are therefore focused primarily on their firm-specific valuation error.

[3]We follow Maksimovic, Phillips, and Yang (2012) and construct industry-specific merger waves for each of the 49 Fama-French industries (FF49) by each year calculating the aggregate dollar volume of mergers scaled by the total asset volume of all Compustat firms.

This brings us to the paper's main finding. Under the opportunistic financing hypothesis, the likelihood of bidders using all-stock as payment method (relative to payments involving cash) should be increasing in the instrumented firm-specific bidder valuation error. That is, at the margin, a positive exogenous shock to the bidder stock price should make it more likely that the bidder selects to pay for the target with all-stock. However, we find the opposite: fund flow shocks that cause bidder stock to be overpriced (positive instrumented pricing error) significantly *reduces* the probability of observing all-stock as payment method. This result, which survives a number of robustness checks, represents to our knowledge the strongest rejection in the literature of the hypothesis that the payment method in all-stock financed takeovers is driven by market overvaluation of bidder shares.[4]

To further assess the relevance of our opportunistic financing hypothesis, we also perform the more traditional analysis of bidder announcement-induced abnormal stock returns as well as a post-announcement (long-run) performance. If rational market participants are concerned with bidder adverse selection and overpricing, bidder announcement-period stock returns should be negative on average (Myers and Majluf, 1984). Moreover, if the pricing error measure is correlated with true market mispricing, the market reaction should be more negative the greater the *ex ante* pricing error. This cross-sectional prediction has been tested by Dong, Hisrshleifer, Richardson, and Teoh (2006) in the context of market timing arguments, and by Eckbo, Giammarino, and Heinkel (1990) in an equilibrium setting where the bidder's private information is fully revealed by the payment method choice. Moreover, we estimate the performance of long-short portfolios (long in correctly priced or undervalued bidders and short in overvalued bidders) over the three years following the merger announcement. If all-stock bidders are temporarily overpriced, risk-adjusted portfolio performance should be positive. Our regression results also fail to support these additional predictions of bidder overvaluation.

To better understand the rejection of the opportunistic financing hypothesis and the economic nature of the all-stock financing decision, we replace the industry fixed-effects in the baseline model with industry- and geographic location factors. This produces some additional interesting

[4]The robustness checks involve eliminating mixed cash-stock bids (so the choice is between all-stock and all-cash bids only), instrumenting other potential misvaluation variables, controlling for relative mispricing of bidders and targets, separating positive from negative pricing errors, and splitting up the instrument into one based on aggregate fund inflows and another based on aggregate fund outflows.

insights. We show that the likelihood of observing all-stock financed takeovers is greater in high-tech industries, when industry complementarity (the extent to which the industries of the bidder and target share the same inputs and outputs) is high, and when the bidder and target are geographically close. This evidence is important because none of these characteristics suggests a particular role for misvaluation. On the contrary, targets that are geographically close and operating in highly complementary industries are, if anything, more likely to be well informed about bidder fundamental value and thus less likely to naively accept overpriced bidder shares. When we instrument the firm-specific valuation error accounting for these additional industry variables, the main IV test result remains unchanged: the instrumented error again receives a statistically significant negative coefficient estimate, rejecting the opportunistic financing hypothesis.

Our rejection of the opportunistic financing hypothesis and our finding that industry characteristics and geographic location are important drivers of the payment method choice give credence to the classical notion that takeovers enhance economic efficiency. Thus, our results fit with the growing evidence that takeover synergies emanate from industry-specific productivity shocks (Mitchell and Mulherin, 1996; Boon and Mulherin, 2000; Maksimovic and Phillips, 2001; Harford, 2005), and that takeovers lead to productivity gains (Maksimovic and Phillips, 1998; Maksimovic, Phillips, and Prabhala, 2011; Maksimovic, Phillips, and Yang, 2012; Makaew, 2012) and promote efficiency along the supply chain (Hoberg and Phillips, 2010; Ahern and Harford, 2013).

We end the paper suggesting a potential capital structure channel for the significant effect of the instrument on the all-stock decision. Intuitively, shocks to bidder market values create deviations from capital structure targets, which in turn affect the payment method choice. In particular, positive (leverage-reducing) shocks reduce the incentive to issue stock to pay for the target. Consistent with this hypothesis, and with the evidence in Harford, Klasa, and Walcott (2009) and Uysal (2011), we find that the probability of all-stock payment increases with excess (book or market) leverage. We also find that the likelihood of all-stock financing decreases with excess cash holdings, suggesting that bidders take into account the level of cash holdings as well. While fully examining the payment method choice in a capital structure context goes beyond this paper, this evidence raises the possibility that exogenous shocks to the bidder's stock price indirectly affect the all-stock financing choice through their effect on the bidder's overall capital structure optimization.

The rest of the paper is organized as follows. Section 2 explains the data selection and sample characteristics, and provides estimates of our baseline model for the all-stock payment choice. Section 3 explains the estimation of bidder pricing errors, and presents the econometric methodology behind and empirical results of the IV tests for whether or not all-stock mergers are market driven. Section 4 describes the results of the event-studies and long-run performance estimation. Section 5 expands the baseline regression with new industry and location factors driving the payment method choice, while Section 6 examines how the all-stock decision correlate with deviations from capital structure targets. Section 7 concludes the paper.

2 A baseline model for the all-stock payment choice

2.1 Sample selection and fraction all-stock offers

Our merger sample is drawn from Thompson's Securities Data Corporation (SDC) database. The sample includes merger bids (successful and unsuccessful) from 1980-2008 where (1) both the bidder and the target are U.S. domiciled, (2) the bidder is publicly traded, (3) the SDC transaction type is "merger" (which eliminates asset acquisitions), and (4) SDC provides information on the consideration structure (method of payment). When we also exclude financial firms (SIC codes 6000-6999), as well as 15 cases without a primary SIC code in SDC, this selection produces 11,394 merger bids on SDC. Of these, the 6-digit acquirer CUSIP is missing for 3,192 bids. Matching the remaining 8,202 SDC records with CRSP and Compustat yields our final sample of 4,919 bidders with the required financial information. The total bid value of this sample is in excess of $2.3 trillion.

Using the SDC information on deal consideration structure, we classify each bid into three categories: all-stock, all-cash, and mixed cash-securities. Of the 4,919 merger bids, 31% are all-stock, 29% are all-cash, and 40% are mixed. The proportion of all-stock merger bids is slightly higher (35%) when measured as the dollar volume of all-stock bids to the total merger volume. About one quarter of the mixed offers consist of stock and cash only, while the remaining bids include some portion of debt, convertible securities, or other hybrid securities.[5]

[5] The average mixed stock-cash deal is split 50% stock and 50% cash. In mixed deals involving additional securities, the average stock and cash portions are each around 40%.

Table 1 reports the annual distribution of the number of bids and the fraction where the payment method is all-stock, all-cash, and mixed. The table shows the distribution for the sample and, for comparison purposes, for the larger SDC sample of 11,394 merger bids defined above. As shown, our sample payment method proportions are quite representative of the larger SDC sample where the proportions are 29% all-stock, 28% all-cash, and 42% mixed offers, respectively. Table 2 shows the distribution of merger bids and the fraction of all-stock bids across the FF49 industries, sorted in decreasing order of the fraction all-stock offers. The highest fraction is in the Coal industry where all-stock bids represents 60% of the total number of takeover bids. Various technology industries (e.g. Computer Software and Computers) also have a higher than average number of all-stock deals. Examples of industries with a low fraction all-stock deals are Consumer Goods, Apparel and Textiles, each having 16% all-stock offers.

Figure 1 plots the annual distribution of the number of bids and the percent all-stock bids in the sample. Panel A plots bid frequency, while Panel B plots total dollar volume of merger bids and the total value of all-stock bids as a fraction of the total merger volume. As shown in Panel A, the yearly number of merger bids increases gradually from 1985 to a peak of 400+ in 1998. The fraction all-stock bids follows a similar pattern, peaking in 1999 when nearly 50% of the deals were paid in all-stock. After the burst of the "internet bubble", the fraction all-stock bids declines through a low of 4% at the end of our sample period (in year 2008), paralleling the decline in overall merger activity.[6] In Panel B, the value-weighted fraction of all-stock bids varies substantially across the years, and exhibits less correlation with changes in deal volume. Total bid volumes peaks at $350+ billion annually in the years 1998-1999.

We perform our main analysis assuming bidders are primarily choosing between all-stock offers and offers involving some cash (all-cash bids and bids mixing cash and securities). As shown below, the main conclusion of this paper is robust with respect to changing the bidder's choice to all-stock versus all-cash (eliminating mixed bids from the analysis). However, modelling the decision as one between an all-stock offer and a bid involving some cash is conceptually attractive for two reasons. First, opportunistic bidders attempting to sell undervalued shares likely prefer not to mix cash in the deal in order to maximize the transfer from the target. Second, Eckbo, Giammarino, and Heinkel (1990) show that adding cash to the deal may lead to fully separating equilibria in

[6] The correlation between the annual number of merger bids and the fraction of all-stock bids is 52%.

which the payment method fully reveals the bidder type. In such equilibria, all-stock offers are preferred by the most overvalued bidders *ex ante*. We return to this possibility in the section on announcement returns below.

2.2 Sample characteristics

Table 3 reports sample characteristics, classified by all-stock bids and bids involving some or all cash. All variables are defined in Appendix 1. Of the sample bids, 83% are successful (classified in SDC as "completed"). The average deal size is 31% (median 13%) of the acquirer's size, and 28% of all targets are public. All-stock bids have a slightly higher completion rate and a larger relative size than bids involving cash.

Several of the bidder firm characteristics are significantly different across the two subsamples. All-stock acquirers are on average smaller (in total assets), and have higher M/B and R&D expenses (scaled by total assets), and lower asset tangibility and net leverage (defined as the ratio of total debt net of cash and total assets).[7] Moreover, a lower fraction of acquirers making all-stock bids are dividend payers. Table 3 further shows how all-stock deals differ from all-cash/mixed deals in terms of industry relatedness and geographic location. In particular, all-stock is used more often by bidders in the high-tech industry and in industries that are highly complementary with the target industry in terms of sharing inputs and outputs. Moreover, bidders are more likely to select all-stock as payment when the target is located within 30 miles range of the bidder (*Local Deal*). Later in the analysis, we use these industry and location factors, which are new to the literature, in a cross-sectional estimation of the payment method choice.

Finally, bidders using all-stock as consideration tend to operate in a different macroeconomic environment at the time of the transaction. To capture industry-wide conditions, we create a measure for industry merger waves that follows Maksimovic, Phillips, and Yang (2012). Specifically, for each FF49 49 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 value of industry merger-to-total assets in a given year, normalized by its mean and standard deviation over the sample period. As reported in Table 3, the frequency of all-stock bids is higher in industry merger

[7] The M/B ratio is from Compustat and is defined as (share price)*(number of shares outstanding)/(total assets - total liabilities).

waves. The second macro variable is the credit spread, reflecting economy-wide liquidity conditions. The credit spread is defined as the difference in yield between Moody's AAA seasoned corporate bonds and the three-month treasury bill. All-stock bids are more common in periods of lower credit spreads.

2.3 Baseline choice model estimation

We estimate a baseline probit model where the dependent variable takes the value of one when the consideration is all-stock and zero otherwise. The baseline model, reported in Table 4, includes bidder firm characteristics and the two macro variables capturing industry- and economy-wide business conditions.[8] All bidder characteristics are from the year prior to year of the merger announcement (defined in Appendix 1). Many of the explanatory variables produce significant coefficients that are consistent with the univariate results shown in Table 3. The likelihood of an all-stock bid is increasing in bidder's M/B ratio and R&D expenditure, and decreasing in an indicator for dividend payers, firm size (log of total assets) and net leverage. That is, small non-dividend paying firms with relatively high growth and R&D intensity, and low leverage are more likely to use their stock as acquisition currency.[9]

Columns 4 and 5 of Table 4 add the two macro variables $Industry\ Wave$ and $Credit\ Spread$, both of which produce highly significant coefficients. Consistent with the univariate results above, firms are more likely to use all-stock payment when the aggregate merger activity in the industry and market-wide liquidity is high. This complements the finding of Harford (2005) that merger activity is driven by industry factors. These inferences also hold when including industry fixed effects. The last column includes a dummy for public target and the bid premium offered for public targets, neither of which are significant and are therefore not included in the subsequent analysis.

The finding that the propensity to pay with stock is higher for small, R&D intensive, non-dividend paying high-growth firms with low leverage suggests that bidder financing constraints may play a role in the payment method decision. We explore this possibility towards the end of the paper (Section 6). We turn to effects of bidder valuation errors next.

[8]We do not include target firm characteristics in the baseline model since these are available only for the subsample of public targets (28%).

[9]The two remaining firm characteristics—operating efficiency and asset tangibility—both produce insignificant coefficients.

3 Effects of bidder valuation errors on the payment method choice

The opportunistic financing hypothesis holds that all-stock bidders exploit market valuation errors by selling overpriced shares. The baseline model in Table 4 shows that bidders are significantly more prone to pay with all-stock when M/B is high. As emphasized in the introduction, this positive correlation does not discriminate between neoclassical factors driving the all-stock decision (such as growth opportunities and agency costs) and opportunistic financing behavior. To achieve discrimination, we first transform M/B into a firm-specific valuation error using the technique in Rhodes-Kropf, Robinson, and Viswanathan (2005). We then instrument the firm-specific valuation error using shocks to aggregate fund flows, and re-estimate the probability of all-stock payment with the instrumented valuation error. Since aggregate fund flows are (likely) exogenous to the bidder's payment method decision, this IV test allows a relatively powerful examination of our opportunistic financing hypothesis. For robustness, we also examine the impact of instrumenting M/B itself, and we examine the impact of alternative measures of potential pricing errors, such as the the price discount developed by Edmans, Goldstein, and Jiang (2012) and the sentiment index of Baker and Wurgler (2006).

3.1 Estimating bidder valuation errors

3.1.1 Rhodes-Kropf, Robinson, and Viswanathan (2005) firm-specific errors

We follow Rhodes-Kropf, Robinson, and Viswanathan (2005) and decompose bidder i's market value at time t, M_{it} into a fundamental ("true") value at time t, denoted V_{it}, and a long-run (time invariant) fundamental value, V_i. This is done by first estimating, in year t when the bid is announced, the following cross-sectional regression, across the population of N Compustat firms in bidder i's Fama-French-16 industry (FF16):

$$M_{jt} = \alpha_t + \beta_t X_{jt} + e_{jt}, \quad j = 1, ..., N. \tag{1}$$

Here, M_{jt} is the equity market value of the bidder i's industry peer j, and the vector X_{jt} consists of the book value of equity, operating cash flow, and net leverage, all at time t.[10] Bidder i's

[10] In Rhodes-Kropf, Robinson, and Viswanathan (2005), the vector X consists of book value of total assets, net income, and leverage. Our variables differ slightly in order to maintain consistency with the variables used elsewhere

fundamental value is the fitted value $V_{it} \equiv \hat{\alpha}_t + \hat{\beta}_t X_{it}$. Moreover, the fundamental long-run value is $V_i \equiv \overline{\alpha_i} + \overline{\beta_i} X_{it}$, where $\overline{\alpha}$ and $\overline{\beta}$ are the time series averages of the annual estimated values of $\hat{\alpha}_t$ and $\hat{\beta}_t$, respectively, over the sample period (1980-2008).

The decomposition of M/B is as follows (where lower case denotes natural logarithm):

$$m_{it} - b_{it} = [m_{it} - v_{it}] + [v_{it} - v_i] + [v_i - b_{it}]. \tag{2}$$

The first square bracket on the right-hand-side of Eq. (2) is the *Firm-Specific Error*: the difference between the time t market value and fundamental value conditional on the industry j pricing rule. This term captures purely firm-specific deviations from fundamental value, because V_{it} captures deviations common to a sector at a point in time. The second square bracket is the *Time Series Sector Error*: the difference between the time t fundamental value and the fundamental value based on the long-run industry pricing rule. The third component is the *Long-Run Value to Book*: the difference between the fundamental value based on the long-run industry pricing rule and acquirer i's book value of equity in year t.

3.1.2 Two alternative proxies of bidder mispricing

For robustness, we also examine the price discount developed by Edmans, Goldstein, and Jiang (2012). In their context, the discount represents the difference between the observed market value and either the higher "full" value of the firm if managerial inefficiencies and agency costs were absent, or market mispricing. Following their lead, we estimate the full value using a subset of the most "successful" (highest-valued) industry peers, defined as firms in the top $(1-\alpha)$th percentile of market value in the FF16 industry of firm i in year t. By definition, the $\alpha\%$ of firms with valuations below the successful peers trade at a discount, and we follow Edmans, Goldstein, and Jiang (2012) and set $\alpha = 0.8$. The fundamental value V_{it} is now the fitted value from the quantile regression of regression equation (1). By construction, quantile regressions yield $(1-\alpha)\%$ positive residuals and $\alpha\%$ negative residuals. Successful firms are defined by a positive residual, $e_{it} > 0$. The rest of the firms trade at a discount. The *Edman's et. al's Discount* is then computed as $(V_{it} - M_{it})/V_{it}$.

We also apply the Baker and Wurgler (2006) sentiment index, obtained from Jeffrey Wurgler's

in our analysis.

web site.[11] This index is based on the first principal component of the following sentiment proxies: a value-weighted dividend premium, IPO volume, first-day IPO returns, closed-end fund discount, equity share of new securities issuances, and NYSE turnover.

3.2 Baseline model estimation without valuation error instrumentation

Table 5 shows the coefficient estimates in probit regressions for all-stock offers with the acquirer misvaluation measures added to our baseline model (replacing M/B). The data requirements reduces the sample size somewhat, to a total of 3,900 bids (which drops further to 3,445 observations when the sentiment score is added). In column 1, which excludes the baseline model factors, the decision to pay with stock is significantly and positively correlated with all three components of M/B estimated using Rhodes-Kropf, Robinson, and Viswanathan (2005).[12] As shown in columns 2 and 3, which also exclude the baseline model factors, adding the Edmans, Goldstein, and Jiang (2012) discount and the Baker and Wurgler (2006) sentiment index also produces significant slope coefficients.

However, when conditioning on the baseline model factors and industry fixed effects, several of the valuation error proxies lose much of their statistical significance. This is true for the Baker and Wurgler (2006) sentiment index, and for the *Long-Run Value to Book* factor, both of which become insignificant at conventional levels. The Edmans, Goldstein, and Jiang (2012) discount remains significant at the five percent level. Given these results, we go forward and instrument the two most significant measures of potential mispricing: M/B and *Firm-Specific Error*.

3.3 Baseline model estimation with valuation error instrumentation

3.3.1 The instrument

We use mutual fund price pressure as the instrumental variable. The price pressure of stock i in quarter t is defined as:

$$z_{it} \equiv \frac{\sum_j (F_{jt} s_{ij,t-1})}{TVOL_{it}}, \tag{3}$$

[11]We use the original index, where the data is orthogonalized to a set of macroeconomic conditions, downloaded from http://people.stern.nyu.edu/jwurgler.

[12]Rhodes-Kropf, Robinson, and Viswanathan (2005) find that the probability of merger activity increases with the firm-specific and time-series sector pricing errors, while it decreases with the long-run pricing error.

where F_{jt} is the net flow experienced by fund j in quarter t

$$F_{jt} \equiv TNA_{jt} - TNA_{j,t-1}(1 + R_{jt}), \tag{4}$$

and where TNA_{jt} is Total Net Assets and R_{jt} is the return for fund j from CRSP. As Edmans, Goldstein, and Jiang (2012), we focus on larger fund flows and set $F_{jt} = 0$ when $-5\% < F_{jt} < 5\%$. Note also that, while they use fund outflows only, we use both fund inflows and outflows. This is because bidder misvaluation relevant for the payment method choice may in principle be driven by both upward and downward price pressure.[13]

Moreover, the definition of $s_{ij,t-1}$, the share of stock i of fund j's total net assets at the end of the previous quarter, is given by:

$$s_{ij,t-1} \equiv \frac{Share_{ij,t-1} Price_{i,t-1}}{TNA_{j,t-1}}, \tag{5}$$

where $Share_{i,j,t-1}$ is the number of stock i shares held by fund j from Thompson, and $Price_{i,t-1}$ is the price of stock i. Finally, $TVOL_{it}$ is the total dollar trading volume of stock i in quarter t from CRSP.

The summation in (3) is over all non-sector specific funds, defined from the CRSP investment objectives. Sector funds are excluded because flows to mutual funds specializing in a specific industry might be correlated with industry shocks that also drive takeover activities and payment methods. Moreover, we aggregate z_{it} over the past four quarters to get the price pressure for each calendar year prior to the takeover.

Since the price pressure z_{it} is constructed using fund portfolio weights lagged one period ($s_{ij,t-1}$), it presumes that the fund flow F_{jt} is passively scaled up or down, preserving lagged weights. In other words, z_{it} measures mutual funds' hypothetical trades mechanically induced by flows by their own investors. While the assumption of constant weights from $t-1$ to t holds for passive funds, other funds likely change their weights in period t (Khan, Kogan, and Serafeim, 2012). By lagging the funds' weights in bidder i to period $t-1$, our instrument tends to neutralize the potentially confounding effect of informed fund trades in year t (the year of the merger bid). This enhances

[13] As it turns out, the bulk of the instrument's effect comes from fund inflows.

the quality of our instrument: it is unlikely to reflect latent bidder characteristics also driving the payment method choice. Under the opportunistic financing hypothesis the instrument affects the payment method choice *indirectly* through its (exogenous) effect on the bidder's stock price: shocks that increase bidder overvaluation should also increase the probability of observing all-stock as payment method.

3.3.2 Two-stage IV model

The baseline choice model estimated in Table 5 has the following form:

$$\begin{aligned} AllStock* &= \mu_0(m-v) + \mu_1 X + \xi \qquad (6) \\ AllStock &= 1 \text{ if } AllStock* > 0 \text{ and } 0 \text{ otherwise} \end{aligned}$$

where *AllStock∗* is the latent variable for the probability of an all-stock deal and *AllStock* is the dummy variable for *AllStock∗*. As before, $m - v$ is the firm-specific pricing error, and X is the vector of bidder characteristics. The problem is that unobservable bidder characteristics may affect both the pricing error and the payment method choice. The two-stage IV model addresses this problem by first instrumenting the pricing error using Z in (3) and, second, transforming the baseline choice model (6), as follows:

$$m - v = \gamma_1 X + \gamma_2 Z + \eta \qquad (7)$$

$$AllStock* = \mu_0(m-v) + \mu_1 X + \lambda\hat{\eta} + \xi', \qquad (8)$$

where $\hat{\eta}$ is the vector of fitted residuals from the first stage OLS regression (7). Here, $\hat{\eta}$ is an auxiliary regressor which "absorbs" the correlation between the error term and the $m - v$ regressor ($Cov(\eta, \xi)$), producing a well-behaved residual ξ' (Rivers and Vuong, 1988; Edmans, Goldstein, and Jiang, 2012).[14]

[14] To illustrate, let $\widehat{m-v}$ denote the fitted regression value in (7). Equation (8) can then be rewritten as

$$AllStock* = \mu_0(\widehat{m-v} + \hat{\eta}) + \mu_1 X + \lambda\hat{\eta} + \xi' = \mu_0(\widehat{m-v}) + \mu_1 X + (\mu_0 + \lambda)\hat{\eta} + \xi'.$$

With linear functions in both steps, it would have sufficed to replace $m - v$ with its fitted value in the second stage estimation. Since the probit regression is nonlinear, however, the proper procedure is to substitute in the first-stage fitted residual $\hat{\eta}$ in equation (8) (Rivers and Vuong, 1988). As a result, μ_0 is unbiased for the effect on the payment method of exogenous changes to the pricing error.

3.3.3 Results of the IV test

Table 6 presents the results of estimating regression equation (7)—the first-stage relation between mutual fund price pressure and the misvaluation measure. In columns 1-4, M/B is used as the misvaluation measure, while columns 5-8 uses the firm-specific valuation error (the difference between acquirer market value and the fundamental value based on the industry pricing rule from Rhodes-Kropf, Robinson, and Viswanathan (2005)).

The coefficients on mutual fund flows are positive and statistically significant at the 5% level for M/B and at the 1% level for *Firm-Specific Error*, indicating that firms with buying (selling) pressure tend to have higher (lower) valuation errors. In columns 2-4 and 6-8, we include additional controls for bidder characteristics, industry waves, credit spreads, and industry fixed effects from the baseline regressions in Table 4. The estimated coefficients on fund flows are robust to the inclusion of additional controls. Mutual fund flows have a strong impact on M/B and the firm-specific valuation error, and the impact is seemingly unaffected by the bidder and macro characteristics.

The coefficient estimates from the instrumental variable regressions (the second stage) are reported in Tables 7 and 8. Our main question is whether the higher (lower) acquirer valuation driven by pure price shocks lead to a higher (lower) probability of stock mergers. First, for comparison purposes, we estimate the non-instrumented regular probit regressions, reported in the first four columns. Effectively, this is analogous to analyzing the relation between the misvaluation measure and payment method under the assumption that the misvaluation is exogenous to any latent variables. We then run the regressions with instrumentation, reported in the last four columns. The system of equations determining misvaluation and payment method is estimated simultaneously using maximum likelihood estimators.

In columns 1 and 5, the misvaluation measure is the only explanatory variable. In the remaining columns, we include bidder firm characteristics and macro variables from the baseline model. The only difference is that the regressions use sales rank and market share instead of bidder firm size, following Edmans, Goldstein, and Jiang (2012). As discussed above, if funds actively buy and sell stocks in firms with certain latent characteristics, which are also associated with the choice of payment method, one may be concerned that mutual fund price pressure is not a valid instrument. Lagging the fund weights one period and including a large set of control variables, mitigate this concern.

The first four columns of Tables 7 and 8 show that the coefficients on the two misvaluation measures (M/B and *Firm-Specific Error*) are positive and statistically significant, consistent with Tables 4 and 5 above. This indicates that bidders with high market-to-book ratios and with valuations in excess of the sector-level pricing benchmark are associated with a higher likelihood of stock consideration. However, as discussed above, it is unclear whether these measures of misvaluation reflect pure price shocks or omitted variables such as future investment opportunities.

Therefore, we turn to the second-stage (IV) results, reported in the last four columns. Importantly, the coefficients on the instrumented misvaluation is now of the opposite sign (negative) and significant at the 1% level in both tables. In other words, with price pressure induced by mutual fund flows as an instrument, we find an inverse relationship between acquirer excess price and stock payment. The significant difference between the regular probit and the IV estimates suggests that the uninstrumented probit estimation suffers from endogeneity as discussed above. The signs for the control variables do not change, except for sales rank and market share.

The results of the IV estimation strongly contradicts the hypothesis that an exogenous increase in the bidder's valuation leads to a higher probability of stock mergers. We find the opposite effect. A potential explanation for the inverse relationship is that a drop in the stock price increases the firm's debt ratio (and vice versa). As shown in Section 6 below, when leverage is above the firm's target level, the bidder tends to offer stock, bringing the debt ratio back towards its target. As long as there are sufficient synergies in the transaction, paying with undervalued stock may still be value increasing for the acquirer.

Two sets of tests for the instrument validity are reported at the bottom of each table. First, we test the exogeneity of the equation system. The Wald statistics are large—in particular for the firm-specific error—and significant at the 1% level in all specifications. This rejects the null hypothesis that the pricing error is exogenous. The large Wald statistics together with the finding that the coefficient estimates with and without instrumentation have different signs support the need to control for endogeneity. The second test is a weak instrument test. The F-statistics of this test are highly significant in all specifications, rejecting the null hypothesis that the instrument is weak. This finding confirms that price pressure created by mutual fund flows is a good instrument for bidder M/B and firm-specific valuation errors.

3.4 Robustness

Table 9 shows results of the second stage of the IV test for specific subsamples of the data that may increase the power to identify true bidder opportunism. The first four models restrict the sample to all-stock versus all-cash bids, while the last four models are applied to deals where bidder M/B exceeds target M/B. Comparing all-stock to all-cash bids increases power because all-cash offers cannot reflect an incentive to sell overpriced shares (which may to some extent be present in mixed cash-stock offers). Restricting bidder bidder M/B to exceed target M/B increases power by increasing the likelihood in the data that the bidder is more overpriced than the target. In both experiments, the table shows both the uninstrumented and the instrumented regressions. Despite the sample reduction that these additional restrictions imply, the results are again statistically significant: in the instrumented regressions, the probability of using all-stock as payment method is again inversely related to the instrumented firm-specific pricing error.

In Table 10, we restrict the instrument to cover fund inflows (zeroing out fund outflows). This is because fund inflows make up a majority of fund flows in our sample. Moreover, only fund inflows directly create a potential for overvaluation. The table also conditions the IV test on the sign of the firm-specific pricing error. This allows us to test whether the instrumented error receives the positive sign predicted by the opportunistic financing hypothesis when the pricing error is positive.

The results in Table 10 are interesting. In the first two models (columns 1 and 2), we use fund inflows only but do not condition on the sign of the uninstrumented pricing error. The instrumented firm-specific pricing error again receives a negative and significant coefficient. The last four columns show first the uninstrumented effect of the positive valuation error (columns 3 and 4) and then the effect of instrumentation (columns 5 and 6). The probability of all-stock as payment method is strongly increasing in the uninstrumented positive pricing error, while it is statistically independent of the instrumented positive pricing error. These results further rejects the opportunistic financing hypothesis.[15]

[15]Table 9 and Table 10 show that the instruments pass endogeneity and weak instrument tests. Moreover, while we calculate robust standard errors to infer statistical significance, inferences based on clustered standard errors are identical This holds also for Tables 7 and 8.

4 Does the payment method convey private information?

4.1 Market reaction to merger announcements

Dong, Hisrshleifer, Richardson, and Teoh (2006) and others argue that, if bidders successfully time the market, opportunistic stock-sale announcements should induce abnormal stock returns that are lower (more negative), the higher the market valuation error of the acquirer stock. In this section, we examine how the method of payment affects the stock market reaction to the acquisition announcement. A similar prediction follows from rational signaling models where the bidder's private information about its true stock value is revealed by the choice of payment method (Fishman, 1989; Eckbo, Giammarino, and Heinkel, 1990). Under either set of arguments, a negative market reaction to the all-stock payment method is necessary to conclude that the all-stock choice conveys information to the market.

We test this hypothesis below. Abnormal returns are estimated using the standard market model as the return-generating process for bidder i in period t:

$$R_{it} = a + bR_{mt} + e_{it}. \tag{9}$$

We use CRSP's daily holding period returns (dividends included) for R_{it} and value-weighted market returns (dividends included) for R_m. The market model parameters are estimated over the window [-291; -42] and we use [-1; 1] as the event window. The event date is the announcement date from SDC. Our estimation procedure produces 4,442 merger announcement returns, with an average acquirer abnormal return of 0.9%.

The coefficient estimates from OLS regressions of the acquirer's announcement return is shown in Table 11. The method of payment is captured by an indicator for all-stock offers. The regressions introduce several interaction variables between all-stock bids and various valuation measures (M/B, *Firm-Specific Error* and *Edmans et al's Discount*), and they control for bidder characteristics and industry fixed effects.

Note first that the dummy for all-stock produces insignificant coefficients in all specifications, also when included on its own together with only industry fixed effects. While not shown here, the insignificance of the all-stock dummy is also confirmed when comparing the announcement returns between all-stock and all-cash/mixed offers with propensity score matching of the bidders.[16]

Table 11 also shows that the interaction variables between all-stock and the various valuation measures are all insignificant, as is the dummy for public target.[17] However, as reported earlier by Eckbo and Thorburn (2000) and Moeller, Schlingemann, and Stulz (2004), bidder announcement returns are negatively correlated with acquirer size. Moreover, bidder announcement returns are increasing in the bidder's net leverage, as if investors view acquisitions by financially constrained bidders more favorably.

These results fail to support the proposition that the all-stock payment method choice signals to the market that the bidder stock is overpriced. Alternatively, the insignificance of the all-stock dummy may mean that the bidder succeeds in "fooling the market" into believing the payment method is correctly priced. Under this misvaluation hypothesis, the market *must* realize that the bidder is overpriced at some point after the bid announcement—or the concept of "overvaluation" becomes meaningless. We test this prediction next.

4.2 Bidder post-merger abnormal performance

If the market fails to correct for bidder overvaluation at the bid announcement, then we should observe long-term reversal of the bidder's stock price over time. To examine this possibility, we form calendar-time portfolios of all-stock and all-cash bidders and hold these for up to three years. A bidder is in the month t portfolio if it has announced the acquisition between month $t-36$ and t. For each month, we compute the excess portfolio returns (in excess of the one-month Treasury bill rate) in calendar time. This monthly excess return is then regressed on a four-factor model consisting of the three Fama-French (FF) factors and momentum, and a second model where we also add the traded liquidity factor of Pastor and Stambaugh (2003).[18]

Table 12 reports the portfolio factor loadings and performance estimates (Alpha) using equal-weights in Panel A and value-weights in Panel B.[19] The first three columns present the results

[16]We match the treatment (all-stock) and control (all-cash/mixed) groups on Size, Operating Efficiency, M/B, Dividend Dummy, R&D, Leverage, and Asset Tangibility.

[17]An interaction variable between public target and all-stock bid also produces an insignificant coefficient.

[18]The three FF factors are the excess market portfolio return, the average return difference between small- and large-firm portfolios (SMB), and the average return difference between value- and growth-stock portfolios (HML). The momentum factor (UMD) is the average return difference between up- and down-portfolios over the prior year.

[19]The weights for individual stocks in the value-weighted portfolio is the ratio of the firm's market capitalization to the total market capitalization of the portfolio, measured at the end of the previous month.

for the FF three factors and momentum, while the last three columns show the results when the liquidity factor is added. The portfolios of all-stock payers have a negative loading on HML relative to the other portfolios. From the probit regressions above, we know that stock-payers tend to have relatively high M/B compared to other acquirers. All the value-weighted portfolios have lower loading on SMB than the equal-weighted portfolios, reflecting the greater influence of large acquirers when the portfolio is weighted by firm size.

Importantly, the alpha estimates (the estimates of portfolio abnormal returns) are insignificant for all portfolios and in all regression specifications. In conjunction with the insignificant announcement effect of the all-stock payment shown in the previous section, this finding rejects the joint hypothesis that bidders successfully "fool" the market into believing that the stocks used as payment for the targets are correctly priced when, according to the bidder's information, they are overpriced.

To explore the long-run valuation implications of stock-payment opportunism further, we form portfolios sorted on the firm-specific pricing errors. The first two portfolios in Table 13 are the top and bottom half, respectively, of mispriced firms offering all-stock consideration. The next two portfolios are the top and bottom half, respectively, of mispriced firms offering all-cash consideration. The last—and perhaps most interesting—portfolio is long the least mispriced firms (the bottom half) that offers all-cash consideration and short the most mispriced firms (the top half) that offers all-stock consideration. If overvalued firms opportunistically make stock bids, this portfolio should generate positive abnormal returns in the long run. However, as shown in the table, all portfolio alphas are insignificant from zero. This holds for both equal-weighted portfolios (Panel A) and value-weighted portfolios (Panel B). Again, there is little support for the notion that bidders pay with overvalued stock.

5 Expanding the baseline model: competition and geography

5.1 Industry relatedness and competition

Up to this point, we have used industry fixed effects to capture unique characteristics of the bidder's industry. In this section, we explore the impact of industry characteristics further, by developing measures for bidder and target industry complementarity and bidder industry concentration. About half of our sample deals involve bidder-target pairs that operate in different FF49 industries. Controlling for industry relatedness is potentially important as targets in related deals likely face lower uncertainty in terms of estimating the value of bidder shares used in the transaction, thus facilitating the use of stock. Moreover, the degree of industry competition may also affect the payment method: acquirers in relatively competitive industries tend to have less financial slack, which may raise the likelihood of using stock to pay for the target. To account for these possibilities, we repeat the IV-test using an expanded choice model.

We create two measures for industry relatedness by mapping all 4-digit SIC codes into the Input-Output industry matrix of the U.S. Bureau of Economic Analysis (BEA) and using the relatedness measures of Fan and Lang (2000).[20] *Vertical Relatedness* captures the fraction of input/output of the acquirer industry bought from/sold to the target industry. *Complementarity* captures the extent to which the acquirer industry and the target industry share the same input and output. We further compute two measures for the product market competition in the acquirer's FF49 industry in a given year. The first is the adjusted Herfindahl Hirschman Index (HHI), based on total assets.[21] The second measure is an indicator for industry leader, taking the value of one if the acquirer's total assets is in the top quintile in its FF49 industry.

The first three columns of Table 14 report the coefficient estimates from probit regressions for the all-stock choice, adding industry characteristics as explanatory variables in addition to *Firm-Specific Error*, and control variables from the baseline regressions in Table 4. The last three columns report the same choice model, but with the firm-specific valuation error instrumented with price pressure from mutual funds flow. The regressions include a dummy variable indicating that the acquirer is in the FF49 high-tech industry. The variables *Size*, *Dividend*, *R&D*, and *Leverage* are all replaced with the components (the fitted residuals) orthogonal to the industry variables because the original variables are highly correlated with, in particular, *Industry Leaders* and *High-Tech Dummy*.

The IV tests yield the same results as before, with a positive coefficient sign for *Firm-Specific*

[20]While not shown here, a third and simpler measure of relatedness, i.e. a dummy variable indicating that the bidder and target operate in the same industry, also produces similar statistical inferences.

[21]$HHI = \sum_j^n X_j^2 / \sum_j^n X_j$, where X_j is the total assets of firm j, $j = 1, 2.., n$, and n is the number of firms in the industry. We use total assets because the panel data on sales is relatively noisy. The HHI index ranges from 0 to 1. The U.S. Department of Justice defines an industry as concentrated if its HHI exceeds 0.18 and competitive if its HHI is below 0.10.

Error, which switches to a negative sign when the variable is instrumented with mutual funds flow. Again, the coefficients for misvaluation are highly significant in all specifications, as are the test statistics in the exogeneity and weak instrument tests, respectively. In other words, the addition of industry characteristics do not change the inferences with respect to the use of overvalued stock as payment method.

Turning to the industry characteristics themselves, the probability of an all-stock deal is higher when the acquirer and target industry share the same input/output (complementarity), and when the acquirer is in the high-tech industry. The indicator for industry leader, which is marginally significant in the simple probit regression, is positive and highly significant in the IV test. That is, firms that are major players in their respective industries are more likely to use stock as payment method. Adding the baseline bidder and macro control variables do not change any of the results.

Overall, bidder's are more likely to make all-stock bids in the high-tech industry and when the target and bidder industries share the same input and output. This is consistent with less information asymmetries and higher synergy gains being important determinants of the deal consideration. We next explore other links between the bidder and target that may reduce information asymmetries about the value of the acquirer shares.

5.2 Geographic proximity and location

In this section, we study the relevance of the bidder's and target's geographic location for the consideration choice. Target shareholders may have more information about the acquirer when the two firms are located relatively closely. It is further possible that acquirers located in small towns have a dominant position as an employer, and therefore are generally more well-known. If geographic proximity reduces information asymmetries, we should observe more all-stock payments in local deals.

We examine two measures of location: the distance between the acquirer and the target, and the distance between the acquirer and a large metropolitan area. For each firm, we use zip codes from SDC to calculate latitude (lat) and longitude (long) coordinates based on the 1987 U.S. Census Gazetteer Files. Following Cai and Tian (2012), we compute the distance between acquirers and targets using the spherical law of cosines formula:

$$Distance = arccos[sin(lat1).sin(lat2) + cos(lat1).cos(lat2).cos(long2 - long1)]R, \quad (10)$$

where R is the radius of earth (3,963 miles), (lat1,long1) are the acquirer coordinates, and (lat2,long2) are the target coordinates.

Merging firms are on average approximately 1,000 miles (median 600 miles) apart. However, the distance variable 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.[22] We define *Local Deal* as a takeover where the acquirer and the target are located within 30 miles from each other.[23] Following Cai and Tian (2012), we also construct an *Urban Deal* dummy, indicating that the acquirer firm is located within 30 miles from one of the ten largest metropolitan areas.[24] In our sample, 40% of the acquirers are located in, or close to, a large city.

The coefficient estimates from regular probit regressions for all-stock bids are reported in Table 15. As before, the dependent variable takes the value of one for all-stock transactions and zero otherwise. The acquirer or target zip code is missing in SDC for 45% of the sample (2,215 deals). We deal with this in two ways. First, we set *Local Deal* and *Urban Deal*, respectively, to zero for cases with missing zip codes (shown in columns 1-3 and 6-7). Next, we eliminate the deals with missing zip codes, reducing the sample size to 2,704 merger bids (shown in columns 4-5). As shown in the table, the probability of all-stock consideration is higher for local deals. The local deal dummy is robust to either way of dealing with missing zip codes and to the inclusion of industry-, bidder- and macro characteristics.

The measures industry complementarity and the high-tech dummy remain highly significant in all specifications. That is, geographic proximity and industry relatedness are both, and jointly, important predictors of all-stock mergers. This supports the notion that information asymmetries play a key role in the decision to pay with stock, where geographic proximity and industry links between the bidder and the target may help reduce such information gaps.

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[22]The distance between California and New York is around 2,500 miles.

[23]Kedia, Panchapagesan, and Usyal (2008) use a 100 kilometers (60 miles) cut-off in their study of acquirer returns.

[24]These are Boston, Chicago, Dallas, Detroit, Houston, Los Angeles, New York City, Philadelphia, San Francisco, and Washington DC. Coordinates of the city centers are obtained from www.world-gazetteer.com.

6 A capital structure channel for the pricing error effect?

The above analysis shows that the instrumented M/B and firm-specific valuation error negatively impacts the probability of using all-stock as payment. While this evidence rejects the opportunistic financing hypothesis, it does not suggest the economic channel for this result. One potential channel is the impact of exogenous price shocks on the bidder's optimal (target) leverage ratio. Recall from Table 4 that the likelihood of all-stock payment of the deal is decreasing in net leverage. One possible explanation for this result is that all-stock bidder firms tend to be under-leveraged at the time of the takeover bid and so prefer not to issue stock. Another possibility, however, is that optimal leverage ratios of all-stock bidders tend to be low in the cross-section.

To further explore this leverage effect, we examine below whether the all-stock payment choice also depends on bidder deviations from hypothetical leverage targets and target cash balances. Exogenous price shocks directly create deviations from leverage targets, and they may also affect the targets themselves (which depend on firm fundamentals). So, both current leverage and deviations from leverage targets are possibly endogenous to price shocks. For example, since positive exogenous price shocks lower the bidder's market leverage, bidders may choose to pay for the target in cash rather than in stock in order to help restore leverage back to a target. Since we use fund flows to instrument misvaluation errors, we cannot use the same instrument for target leverage deviations. Thus, we proceed by simply expanding the baseline model with deviations from cash and leverage targets. Moreover, we expand the capital structure analysis by adding indicators for current-period and lagged seasoned equity offerings (SEOs) by the bidder.

We follow Harford, Klasa, and Walcott (2009) and estimate for each year the deviation from the acquirer's target leverage as the fitted error term $\hat{e}$ from the OLS regression

$$Leverage_t = f(X_{t-1}) + e, \tag{11}$$

where X_{t-1} is a vector of lagged firm characteristics:

$$\begin{aligned} X_{t-1} \;=\; & \{Size_{t-1},\ Operating\ Efficiency_{t-1},\ M/B_{t-1},\ R\&D_{t-1},\ missing\ R\&D_{t-1}, \\ & Asset\ tangibility_{t-1},\ FF49\ industry\}, \end{aligned} \tag{12}$$

where $missing\ R\&D_{t-1}$ is a dummy indicating a missing value for R&D in Compustat. Similarly, we estimate the bidder's excess cash holdings as the fitted residual $\hat{g}$ from the OLS regression

$$Cash\ Holding_t = f(X_{t-1},\ Leverage_{t-1}) + g, \tag{13}$$

where *Cash Holding* is cash/total assets and X_{t-1} is the same vector of lagged firm characteristics.

Table 16 shows the time-series average of the coefficient estimates of the annual leverage and cash regressions, respectively. In column 1, bidder *Market Leverage* (scaled by the sum of debt and market value of equity) increases with size, operating efficiency, asset tangibility and the dummy for missing R&D, and decreases with M/B and R&D expenses. In column 2, *Book Leverage* (scaled by total assets) is decreasing in M/B and increasing in asset tangibility and the dummy for missing R&D. In the regression for *Cash* (column 3), all variables enter with the opposite sign as for *Market Leverage*. Moreover, cash holdings are decreasing in firm leverage.

Table 17 shows the coefficient estimates from probit regressions for the all-stock choice. The first four columns use market leverage, while the last four columns use book leverage. Whether using market or book leverage, the likelihood of an all-stock bid is decreasing in the acquirer firm's target leverage and increasing in the deviation from the target leverage. Moreover, as reported by Pinkowitz, Sturgess, and Williamson (2013) as well, bidders are more likely to use all-stock consideration when their cash balances are relatively high. Additionally, we find that the all-stock probability is significantly greater when cash balances are below their target. However, the table also shows that the significance of cash holdings and excess cash balances are sensitive to the inclusion of industry fixed effects. Thus, these variables likely reflect industry-specific cash-balance effects as some industries (e.g. R&D intensive) rely more on cash finance than others. Overall, the evidence suggests that bidders are more likely to choose all-stock when it helps adjust the capital structure towards a target.

We also add two binary variables indicating that the bidder made a SEO in, respectively, the year of, and the year before the merger bid. SEO data is from SDC's new issues data base. Both stock-issue dummies are significant, suggesting that firms issuing equity are also more likely to offer all-stock. To the extent that the firm has been vetted by investors in a previous equity offering, potential information asymmetries are reduced when offering the stock to target shareholders.

The regressions further include a binary variable indicating that the relative size of the target is in the top quartile. The cutoff point for the top quartile is deal values greater than 30% of the acquirer's total assets. The *Large Deal Dummy* receives a positive and highly significant coefficient in all specifications. That is, controlling for acquirer size, bidders are more likely to offer all-stock in relatively large deals. In columns 2 to 4 and 6 to 8, the regressions also control for the firm and macro characteristics from the baseline model, which produce similar coefficients as before.

In sum, bidders with relatively low target leverage and high target cash balances tend to use all-stock. Furthermore, bidders are more likely to offer stock when this reduces the deviation from the target leverage and cash holdings. Also, firms raising cash in an equity offering are more likely to use all-stock offers. These correlations are consistent with capital structure considerations being an important determinant of the payment method choice.

7 Conclusion

We present significant new empirical evidence relevant for the ongoing controversy over whether bidder shares in stock-financed mergers are overpriced. The extant literature is split on this issue, with some studies suggesting that investor misvaluation plays an important role in driving stock-financed mergers—especially during periods of high market valuations and merger waves—while others maintain the neoclassical view of merger activity where takeover synergies emanate from industry-specific productivity shocks. This debate is important because opportunities for selling overpriced bidder shares may result in the most overvalued rather than the most efficient bidder winning the target—distorting corporate resource allocation through the takeover market.

Our empirical analysis has three main parts. First, we build a baseline cross-sectional model describing the choice of all-stock financing by public acquirers. The estimated (equilibrium) correlations in this model describe how different market conditions and bidder firm characteristics line up in the cross-section of all-stock bids versus bids involving some cash payment and/or debt securities. This model shows that all-stock payment is more frequent among small, non-dividend paying growth (high M/B and R&D intensive) companies and among companies with relatively low leverage. These firms resemble companies which the capital structure literature often argues face greater cost of raising cash externally.

The regressions also show that the propensity to offer all-stock as payment increases during industry merger waves, M/B, and in commonly used measures of firm-specific market valuation errors. This evidence prompts the second part of our analysis: tests of the hypothesis that the choice of all-stock financing is market driven. Here we use shocks to mutual fund flows as an instrument to generate cross-sectional variation in bidder pricing errors which is exogenous to the bidder's payment method choice. Surprisingly, after instrumenting the bidder's firm-specific pricing error, we find that price shocks which increase bidder overvaluation significantly *lowers* the probability of observing all-stock payments. To our knowledge, this represents the first systematic rejection in the literature of the proposition that the all-stock payment choice is stock market driven.

In the third part of the paper, we expand the baseline model with industry- and location factors that have not been previously examined in the context of the payment method choice. Here, we find that bidder-target industry relatedness, as well as the geographic proximity of the target, also drive the payment method choice. A consistent interpretation is that bidders tend to self-select all-stock financing when targets are likely to be well informed about the true value of the bidder shares. Overall, the large-sample evidence presented in this paper does not suggest a particular role for market overpricing driving the bidder's payment method choice.

While we do not resolve the question of what drives the surprising negative effect of exogenous bidder pricing shocks on the all-stock payment decision, we suggest a possible capital structure channel: positive shocks that cause under-leverage relative to some target reduce the incentive to issue stock to pay for the investment in the target. Consistent with this suggestion, we show that the all-stock payment decision is correlated with deviations from both leverage and cash targets, and with prior seasoned equity offerings, as predicted.

Finally, an interesting but hitherto unexplored question is whether opportunistic sale of over-price shares gives rise to a costly *ex post* settling up between bidder managements and unhappy target shareholders who become large shareholders in the merged firm. Since all-stock deals are more likely when the target and bidder firms are of a similar firm size (shown here), target shareholders following all-stock deals often hold a sizeable block of shares in the merged company. Consequently, they may be in a position to impose significant personal costs on bidder management and directors who prefer to continue in their roles as top executives. For example, Steve Case, the CEO of AOL assumed the role as Chairman of AOL Time Warner in 2000 and subsequently retired from this role in 2003. Was Steve Case forced out by disgruntled former Time Warner shareholders considering the sale of AOL stocks as opportunistic? If so, at what personal costs to Mr. Case? The key to understanding the payment method decision in takeovers may require answers to this type of corporate governance questions as well.

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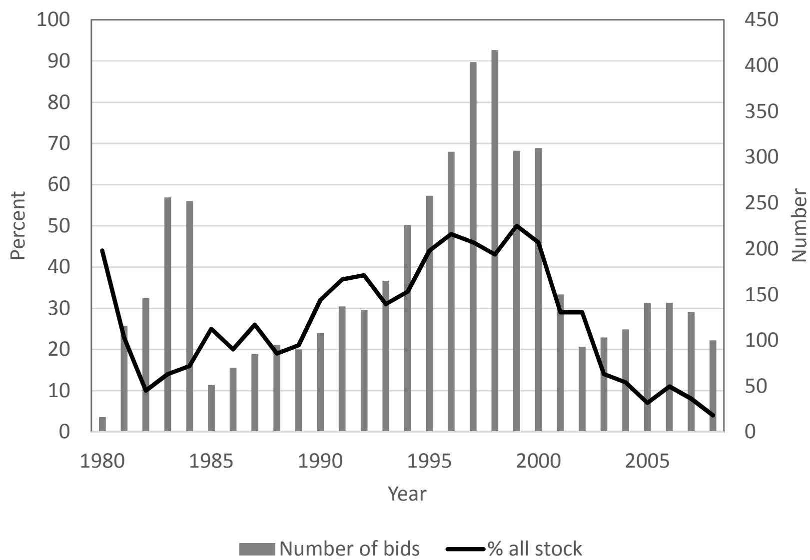
Figure 1
Distribution of Merger Bids and Fraction of All-Stock Merger Bids in the Sample

The figure plots the distribution of merger bids and the fraction of all-stock merger bids over the sample period. Panel A shows the frequency and Panel B the value of the merger bids. The sample is 4,919 merger bids from SDC in 1980-2008 that involve U.S targets and U.S. public acquirers with complete financial information, excluding bidders with SIC codes 6000-6999 (financial firms) and missing SIC-code.

Panel A: Number of bids and % all stock bids



Panel B: Total bid volume in $ billion and % all-stock bids in value

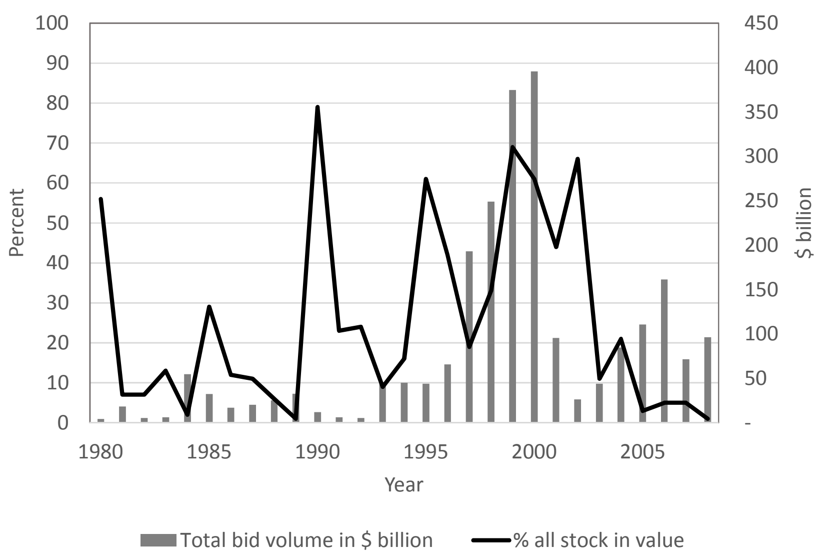


Table 1
Time-Series Breakdown of Methods of Payment

The table reports the number of mergers and methods of payment by year. The SDC sample includes 11,394 merger bids from 1980 to 2008 that involve (1) acquirers and targets incorporated in the U.S. and (2) public acquirers, excluding financial firms (SIC 6000-6999) and firms with unknown industry classification. Our sample is 4,919 mergers in the SDC sample with complete financial information. All variables are defined in Appendix 1.

Year	All Deals		% All-stock		% All-cash		% Mixed	
	SDC	Sample	SDC	Sample	SDC	Sample	SDC	Sample
1980	27	16	37	44	19	25	44	31
1981	265	116	19	23	56	47	25	29
1982	415	146	9	10	72	75	19	14
1983	738	256	12	14	74	76	14	11
1984	783	252	13	16	67	67	20	17
1985	130	51	23	25	38	35	39	39
1986	157	70	17	20	45	46	38	34
1987	149	85	26	26	37	35	38	39
1988	156	95	17	19	49	47	34	34
1989	204	90	25	21	25	14	50	64
1990	222	108	30	32	14	15	55	53
1991	270	137	38	37	10	11	52	52
1992	273	133	37	38	8	11	55	52
1993	304	165	35	31	18	22	47	47
1994	378	226	40	34	19	17	41	50
1995	496	258	44	44	18	17	39	39
1996	505	306	47	48	13	13	40	39
1997	652	404	45	46	15	15	39	39
1998	778	417	40	43	17	16	44	41
1999	612	307	44	50	16	15	40	36
2000	671	310	48	46	12	16	40	38
2001	436	150	36	29	14	18	51	53
2002	293	93	34	29	16	27	50	44
2003	329	103	28	14	18	35	55	51
2004	372	112	22	12	19	38	59	50
2005	462	141	17	7	24	45	59	48
2006	489	141	13	11	21	39	66	50
2007	463	131	16	8	22	48	62	44
2008	365	100	12	4	21	35	66	61
Total	11,394	4,919	29	31	28	29	42	40

Table 2
Industry Distribution of Acquirers

The table reports the total dollar volume of merger bids (in $ thousand) and the fraction of all-stock bids by the acquirer's industry. The sample is 4,919 merger bids from SDC in 1980-2008 that involve U.S targets and U.S. public acquirers with complete financial information, excluding bidders with SIC codes 6000-6999 (financial firms) and missing SIC-code. The % All-Stock Mergers is the fraction of all mergers paid in stock by number and volume, respectively. All variables are defined in Appendix 1. The rows are ordered by frequency based on % All-Stock Mergers.

	All Mergers		% All-Stock Mergers	
	Frequency	$ Volume	by number	by volume
Coal	5	549	60	99
Computer Software	704	220,040	48	56
Computers	198	67,964	44	43
Precious Metals	21	4,163	43	68
Electronic Equipment	324	107,411	42	50
Construction	63	4,073	38	59
Business Services	296	36,793	38	40
Retail	288	117,839	36	16
Medical Equipment	153	29,188	35	47
Pharmaceutical Products	154	317,865	34	73
Agriculture	21	3,899	33	2
Defense	3	497	33	10
Other	218	65,615	32	15
Measuring and Control Equipment	144	26,377	31	22
Personal Services	91	8,091	30	39
Health care	135	19,321	28	12
Transportation	68	18,003	28	8
Entertainment	74	52,884	27	5
Machinery	161	25,730	27	43
Electrical Equipment	100	7,429	27	31
Fabricated Products	27	1,877	26	15
Petroleum and Natural Gas	247	255,058	26	23
Communication	204	583,758	25	32
Restaurants, Hotels, Motels	63	5,995	24	6
Wholesale	244	25,915	23	15
Rubber and Plastic Products	40	5,448	20	18
Consumer Goods	75	16,228	16	10
Apparel	56	7,358	16	14
Textiles	31	6,875	16	11
Steel Works Etc	91	33,005	16	4
Automobiles and Trucks	66	21,212	15	5
Food Products	99	42,909	14	3
Business Supplies	73	47,164	14	36
Chemicals	80	32,479	13	2
Construction Materials	100	7,819	13	34
Aircraft	39	34,377	13	40
Beer and Liquor	17	18,538	12	0
Recreation	37	7,559	8	0
Utilities	15	8,485	7	0
Shipping Containers	17	1,801	6	2
Printing and Publishing	57	12,686	4	0
Candy and Soda	4	1,041	0	0
Tobacco Products	1	19,275	0	0
Shipbuilding, Railroad Equipment	9	1,103	0	0
Non-Metallic and Industrial Metal Mining	6	11,998	0	0
Total	4,919	2,343,693	31	35

Table 3
Descriptive Sample Statistics

The sample is 4,919 merger bids from SDC in the period 1980-2008 that involve U.S targets and U.S. public acquirers with complete financial information, excluding bidders with SIC codes 6000-6999 (financial firms) and missing SIC-code. All variables are defined in Appendix 1. The p-value shows the significance from a t-test of the difference in mean.

	Full Sample (N=4,919)			All-stock payment (N= 1,529)		All-cash/mixed payment (N=3,390)		Difference in Mean	p-value
	N	Mean	Median	Mean	Median	Mean	Median		
Deal characteristics:									
Completed Deal	4,919	0.826	1	0.854	1	0.813	1	0.041	<0.001
Relative Size	3,759	0.307	0.126	0.395	0.148	0.259	0.119	0.136	<0.001
Public Target	4,919	0.276	0	0.27	0	0.278	0	-0.008	0.544
Bidder characteristics:									
Total Assets (in $ million)	4,919	3,218	376	2,452	282	3,564	436	-1,112	<0.001
Operating Efficiency	4,919	2.369	1.641	2.35	1.711	2.367	1.626	-0.017	0.9297
Market-to-Book Equity	4,919	3.066	1.991	3.85	2.466	2.72	1.849	1.13	<0.001
Dividend Dummy	4,919	0.441	0	0.312	0	0.499	0	-0.187	<0.001
Net Leverage	4,919	0.169	0.178	0.09	0.079	0.203	0.215	-0.113	<0.001
R&D	4,919	0.044	0	0.065	0.018	0.034	0	0.031	<0.001
Asset Tangibility	4,919	0.429	0.343	0.378	0.292	0.453	0.379	-0.075	<0.001
Industry characteristics:									
Vertical Relatedness	4,711	0.052	0.01	0.041	0.015	0.058	0.008	-0.017	0.0049
Complementarity	4,571	0.62	0.614	0.665	0.735	0.6	0.547	0.065	<0.001
High-Tech Dummy	4,919	0.359	0	0.5	1	0.296	0	0.204	<0.001
HHI	4,919	0.077	0.056	0.075	0.055	0.077	0.056	-0.002	0.3233
Top 20% Industry Leaders	4,919	0.447	0	0.458	0	0.442	0	0.017	0.2725
Geographic location:									
Local Deal	2,710	0.155	0	0.189	0	0.139	0	0.05	<0.001
Urban Deal	4,221	0.401	0	0.377	0	0.413	0	-0.036	0.0263
Macro characteristics:									
Industry Wave	4,790	0.47	-0.097	0.664	0.106	0.383	-0.137	0.281	<0.001
Credit Spread	4,919	2.692	2.41	2.569	2.36	2.748	2.41	-0.179	<0.001

Table 4
Baseline Regressions for the Probability of All-Stock Payment

The table reports the coefficient estimates from probit regressions for the probability of an all-stock merger bid (vs. an all-cash/mixed bid). The explanatory variables are bidder firm characteristics, an industry wave indicator, Moody's credit spread, and deal characteristics. Firm-specific variables are lagged by one year. Also estimated, but not reported, is a constant term. The sample is 4,919 merger bids for U.S. targets by U.S. public acquirers in 1980-2009. All variables are defined in Appendix 1. Z-statistics are in paranthesis, using robust standard errors. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% level, respectively.

Bidder characteristics:						
Size	-0.014	-0.017	-0.005	-0.021	-0.025	-0.028
	(1.50)	(1.73)*	(0.46)	(2.21)**	(2.50)**	(2.71)***
Operating Efficiency	-0.003	-0.004	-0.005	-0.004	-0.004	-0.004
	(1.05)	(1.15)	(1.59)	(1.15)	(1.34)	(1.18)
Market to Book Equity	0.021	0.019	0.014	0.021	0.02	0.02
	(4.85)***	(4.50)***	(3.13)***	(4.92)***	(4.55)***	(4.62)***
Dividend Dummy	-0.338	-0.231	-0.206	-0.344	-0.234	-0.23
	(7.82)***	(5.10)***	(4.23)***	(7.82)***	(5.10)***	(5.03)***
Net Leverage	-0.558	-0.465	-0.606	-0.579	-0.483	-0.462
	(6.65)***	(5.37)***	(6.58)***	(6.73)***	(5.42)***	(5.20)***
R&D	1.258	0.995	0.979	1.139	0.86	0.846
	(4.73)***	(3.34)***	(3.12)***	(4.15)***	(2.81)***	(2.77)***
Asset Tangibility	-0.091	-0.074	-0.085	-0.066	-0.042	-0.047
	(1.39)	(0.94)	(1.01)	(1.00)	(0.52)	(0.59)
Macro characteristics:						
Industry Wave				0.076	0.078	0.076
				(5.17)***	(5.14)***	(4.99)***
Credit Spread				-0.083	-0.078	-0.076
				(4.58)***	(4.18)***	(4.11)***
Deal characteristics:						
Public Target Dummy						-0.01
						(0.23)
Public Target Dummy x Target Premium						0.06
						(1.11)
Industry Fixed Effects		Yes	Yes		Yes	Yes
Year Fixed Effects			Yes			
Pseudo R-squared	0.06	0.08	0.16	0.07	0.09	0.08
N	4919	4899	4899	4786	4766	4766

Table 5
Stock-Market Valuation and the Payment Method Choice

The table reports the coefficient estimates from probit regressions for the probability of an all-stock merger bid (vs. an all-cash/mixed bid). The explanatory variables are the components of market-to-book equity, investor sentiment, and control variables from the baseline model in Table 4. The three components of market-to-book equity (*Firm-Specific Error, Time-Series Sector Error,* and *Long-Run Value to Book*) are based on Rhodes-Kropf, Robinson, and Viswanathan (2005). *Edmans et.al's Discount* is based on Edmans, Goldstein, and Jiang (2012). *Sentiment* is the aggregate investor sentiment index from Baker and Wurgler (2006). The firm-specific variables are lagged by one year. Also estimated, but not reported, is a constant term. The sample is 3,900 merger bids for U.S. targets by U.S. public acquirers in 1980-2008. All variables are defined in Appendix 1. Z-statistics are in parentheses, using robust standard errors. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% level, respectively.

Valuation measures:						
Firm-Specific Error	0.155	0.144	0.17	0.148	0.155	0.158
	(5.93)***	(5.28)***	(5.90)***	(5.01)***	(4.97)***	(4.94)***
Time-Series Sector Error	0.524	0.521	0.384	0.295	0.332	0.296
	(6.58)***	(6.53)***	(4.54)***	(3.44)***	(3.82)***	(3.30)***
Long-Run Value to Book	0.78	0.784	0.781	0.25	0.235	0.115
	(9.09)***	(9.07)***	(8.56)***	(2.31)**	(2.07)**	(0.76)
Edmans et. al's Discount		-0.045	-0.089	-0.111	-0.118	-0.135
		(1.65)*	(2.25)**	(2.45)**	(2.15)**	(2.33)**
Sentiment			0.195	0.097	0.066	0.063
			(3.68)***	(1.71)*	(1.10)	(1.02)
Bidder characteristics:						
Size				-0.019	-0.023	-0.031
				(1.44)	(1.66)*	(2.02)**
Operating Efficiency				-0.001	-0.002	-0.002
				(0.39)	(0.41)	(0.61)
Dividend Dummy				-0.307	-0.33	-0.235
				(5.95)***	(6.28)***	(4.28)***
Net Leverage				-0.735	-0.797	-0.767
				(7.39)***	(7.79)***	(7.03)***
R&D				0.624	0.508	0.619
				(1.98)**	(1.58)	(1.68)*
Asset Tangibility				-0.077	-0.048	-0.038
				(0.99)	(0.61)	(0.39)
Macro characteristics:						
Industry Wave					0.034	0.036
					(1.92)*	(1.96)*
Credit Spread					-0.15	-0.137
					(6.20)***	(5.51)***
Industry Fixed Effects						Yes
Pseudo R^2	0.03	0.03	0.03	0.07	0.09	0.10
N	3900	3900	3540	3540	3445	3420

Table 6
Determinants of Market-to-Book Equity and Firm-Specific Error (IV Stage 1)

The table reports the coefficient estimates from the first-stage IV regressions for *M/B* and *Firm-Specific Error*. The explanatory variables are *Mutual Fund Flow* (price pressure from mutual fund flows), *Sales Rank, Market Share*, and other control variables from the baseline model in Table 4. *Firm-Specific Error* of market-to-book equity is based on Rhodes-Kropf, Robinson, and Viswanathan (2005). All firm characteristics are lagged by one year. Also estimated, but not reported, is a constant term. The sample is 3,900 merger bids for U.S. targets by U.S. public acquirers in 1980-2008. All variables are defined in Appendix 1. The t-statistics are in parentheses, using robust standard errors. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% level, respectively.

Dependent variable:	Market to Book				Firm-Specific Error			
Instrument:								
Mutual Fund Flow	0.011	0.008	0.008	0.008	0.003	0.018	0.018	0.017
	(3.40)***	(2.25)**	(2.19)**	(2.35)**	(7.49)***	(4.17)***	(4.02)***	(4.00)***
Bidder characteristics:								
Sales Rank		0.933	0.913	0.736		0.662	0.653	0.64
		(3.05)***	(2.96)***	(2.28)**		(12.25)***	(11.91)***	(11.49)***
Market Share		3.26	3.591	3.701		1.502	1.617	1.635
		(1.98)**	(2.18)**	(1.69)*		(3.51)***	(3.71)***	(3.37)***
Operating Efficiency		0.002	0.002	-0.001		0	-0.001	-0.001
		(0.09)	(0.08)	(0.02)		(0.03)	(0.23)	(0.22)
Dividend Dummy		-0.171	-0.156	-0.037		-0.019	-0.013	-0.009
		(0.92)	(0.82)	(0.18)		(0.61)	(0.41)	(0.27)
Net Leverage		-0.385	-0.407	-0.204		0.224	0.203	0.285
		(0.97)	(0.99)	(0.50)		(3.02)***	(2.68)***	(3.77)***
R&D		7.768	8.03	7.154		1.853	1.878	1.747
		(3.91)***	(3.93)***	(2.99)***		(6.74)***	(6.72)***	(5.43)***
Asset Tangibility		-0.838	-0.809	-0.229		-0.096	-0.087	-0.014
		(2.95)***	(2.77)***	(0.56)		(2.00)**	(1.80)*	(0.21)
Macro characteristics:								
Industry Wave			-0.115	-0.145			-0.019	-0.021
			(1.89)*	(2.26)**			(1.75)*	(1.85)*
Credit Spread			-0.030	-0.000			-0.015	-0.014
			(0.42)	(0.52)			(1.21)	(1.15)
Industry Fixed Effects				Yes				Yes
R^2	0.00	0.04	0.04	0.06	0.01	0.10	0.10	0.13
N	4919	4027	3922	3902	3900	3900	3803	3784

Table 7
Instrumenting Market-to-Book Equity in the All-Stock Choice (IV Stage 2)

The table reports the coefficient estimates from probit regressions for the choice of all-stock merger bids vs. all-cash/mixed bids. The explanatory variables are *M/B, Sales Rank, Market Share*, and other control variables from the baseline model in Table 4. In the first four columns, the estimates are from regular probit regressions. In the last four columns, *M/B* is instrumented by price pressure from mutual fund flows. Firm characteristics are lagged by one year. Also estimated, but not reported, is a constant term. The sample is 4,919 merger bids for U.S. targets by U.S. public acquirers in 1980-2008. All variables are defined in Appendix 1. Z-statistics are in parentheses, using robust standard errors. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively

	Uninstrumented Regressions				Instrumented Regressions			
Valuation measures:								
Market-to-Book	0.03	0.022	0.022	0.021	-0.166	-0.175	-0.177	-0.177
	(6.87)***	(4.87)***	(5.02)***	(4.73)***	(7.10)***	(7.77)***	(8.02)***	(8.17)***
Bidder characteristics:								
Sales Rank		-0.225	-0.208	-0.256		0.095	0.102	0.046
		(3.14)***	(2.86)***	(3.41)***		(1.12)	(1.23)	(0.53)
Market Share		-1.434	-1.68	-1.256		0.12	0.107	0.363
		(1.86)*	(2.19)**	(1.49)		(0.22)	(0.18)	(0.57)
Operating Efficiency		-0.003	-0.002	-0.003		-0.001	-0.001	-0.002
		(0.88)	(0.77)	(1.05)		(0.18)	(0.14)	(0.32)
Dividend Dummy		-0.277	-0.298	-0.215		-0.143	-0.145	-0.093
		(5.83)***	(6.15)***	(4.26)***		(2.44)**	(2.33)**	(1.73)*
Net Leverage		-0.548	-0.568	-0.517		-0.308	-0.314	-0.263
		(6.31)***	(6.33)***	(5.55)***		(2.62)***	(2.55)**	(2.22)**
R&D		1.038	0.944	0.791		1.868	1.871	1.661
		(3.85)***	(3.41)***	(2.52)**		(5.15)***	(5.00)***	(3.75)***
Asset Tangibility		-0.093	-0.048	0.057		-0.197	-0.173	-0.022
		(1.35)	(0.69)	(0.67)		(3.39)***	(2.91)***	(0.26)
Macro characteristics:								
Industry Wave			0.076	0.069			0.009	0.002
			(4.73)***	(4.17)***			(0.47)	(0.08)
Credit Spread			-0.057	-0.054			-0.031	-0.032
			(2.91)***	(2.68)***			(1.60)	(1.72)*
Industry Fixed Effects				Yes				Yes
Exogeneity tests :								
Wald Statistic					17.36	10.75	10.71	11.86
p-value					<0.001	<0.001	<0.001	<0.001
Weak Instrument tests :								
F Statistic					22.01	8.3	9.1	9.1
p-value					<0.001	0.004	0.002	0.002
N	4919	4027	3922	3902	4919	4027	3922	3902

Table 8
Instrumenting Firm-Specific Error in the All-Stock Choice (IV Stage 2)

The table reports the coefficient estimates from probit regressions for the choice of all-stock merger bids vs. all-cash/mixed bids. The explanatory variables are *Firm-Specific Error, Sales Rank, Market Share*, and other control variables from the baseline model in Table 4. *Firm-Specific Error* is based on the Rhodes-Kropf, Robinson, and Viswanathan (2005) decomposition of M/B. In the first four columns, the estimates are from regular probit regressions. In the last four columns, *Firm-Specific Error* is instrumented by price pressure from mutual fund flows, estimated in Table 6. Firm characteristics are lagged by one year. Also estimated, but not reported, is a constant term. The sample is 3,900 merger bids for U.S. targets by U.S. public acquirers in 1980-2008. All variables are defined in Appendix 1. Z-statistics are in parentheses, using robust standard errors. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% level, respectively.

	Uninstrumented Regressions				Instrumented Regressions			
Valuation measures:								
Firm-specific Error	0.129	0.158	0.166	0.171	-0.824	-0.924	-0.944	-0.966
	(5.29)***	(5.95)***	(6.09)***	(6.16)***	(9.99)***	(7.90)***	(8.33)***	(8.80)***
Bidder characteristics:								
Sales Rank		-0.292	-0.28	-0.333		0.537	0.553	0.53
		(3.88)***	(3.65)***	(4.18)***		(4.38)***	(4.66)***	(4.38)***
Market Share		-1.5	-1.787	-1.366		0.889	0.927	1.451
		(1.91)*	(2.27)**	(1.58)		(1.30)	(1.32)	(1.91)*
Operating Efficiency		-0.001	-0.001	-0.002		-0.001	-0.002	-0.002
		(0.35)	(0.32)	(0.53)		(0.18)	(0.40)	(0.47)
Dividend Dummy		-0.282	-0.302	-0.222		-0.159	-0.157	-0.112
		(5.80)***	(6.10)***	(4.31)***		(2.98)***	(2.80)***	(2.21)**
Net Leverage		-0.779	-0.816	-0.772		-0.189	-0.209	-0.091
		(8.31)***	(8.49)***	(7.62)***		(1.28)	(1.38)	(0.60)
R&D		0.72	0.578	0.512		2.227	2.202	2.067
		(2.53)**	(1.99)**	(1.56)		(7.45)***	(7.08)***	(5.86)***
Asset Tangibility		-0.06	-0.02	0.079		-0.132	-0.103	0.022
		(0.82)	(0.27)	(0.87)		(2.14)**	(1.66)*	(0.26)
Macro characteristics:								
Industry Wave			0.076	0.073			0.018	0.013
			(4.68)***	(4.30)***			(0.99)	(0.70)
Credit Spread			-0.059	-0.053			-0.047	-0.043
			(2.93)***	(2.59)***			(2.76)***	(2.53)**
Industry Fixed Effects				Yes				Yes
Exogeneity tests :								
Wald Statistic					41.55	19.27	19.73	20.78
p-value					<0.001	<0.001	<0.001	<0.001
Weak Instrument tests:								
F-Statistic					48.35	14.73	10.783	11.223
p-value					<0.001	<0.001	<0.001	<0.001
N	3900	3900	3803	3784	3900	3900	3803	3803

Table 9
IV tests for subsamples of all-stock and all-cash bids, and bidder M/B > target M/B

The table reports the coefficient estimates from probit regressions for the choice of all-stock merger bids vs. all-cash/mixed bids. In the first for column, the sample is restricted to all-stock and all-cash bids, excluding the mixed offers (N=2,191). In the last four columns, the sample is restricted to merger bids where acquirer M/B is greater than target M/B (N=677). The explanatory variables are *Firm-specific Error, Sales Rank, Market Share*, and control variables from the baseline model in Table 4. *Firm-Specific Error* is computed following Rhodes-Kropf, Robinson, and Viswanathan (2005). In columns 3-4 and 7-8, *Firm-specific Error* is instrumented by price pressure from mutual fund flows. Firm characteristics are lagged by one year. Also estimated, but not reported, is a constant term. The sample is merger bids for U.S. targets by U.S. public acquirers in 1980-2008. All variables are defined in Appendix 1. Z-statistics are in parentheses, using robust standard errors. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively

Sample:	All-stock and All-cash bids				Bidder M/B > Target M/B			
Misvaluation:	Uninstrumented		Instrumented		Uninstrumented		Instrumented	
Valuation measures:								
Firm-specific Error	0.109	0.136	-1.090	-1.105	0.115	0.155	-1.437	-1.608
	(3.01)***	(3.43)***	(11.65)***	(12.08)***	(1.58)	(1.78)*	(13.92)***	(13.14)***
Bidder characteristics:								
Sales Rank	-0.821	-0.818	0.413	0.355	-0.189	-0.392	0.685	0.8
	(7.92)***	(7.20)***	(2.26)**	(2.08)**	(0.96)	(1.73)*	(3.58)***	(3.54)***
Market Share	-2.158	-2.978	1.205	1.793	-2.028	-2.659	2.972	6.188
	(2.11)**	(2.47)**	(1.58)	(1.97)**	(1.20)	(1.21)	(2.71)***	(3.84)***
Operating Efficiency	-0.004	-0.008	0.008	0.005	0.013	0.006	0.006	0.017
	(0.77)	(1.41)	(1.28)	(0.71)	(1.27)	(0.49)	(0.41)	(1.16)
Dividend Dummy	-0.421	-0.349	-0.19	-0.163	-0.168	-0.015	-0.113	-0.056
	(6.80)***	(5.07)***	(2.52)**	(2.32)**	(1.45)	(0.11)	(1.15)	(0.53)
Net Leverage	-0.957	-1.021	-0.3	-0.245	-0.876	-0.897	0.367	0.204
	(6.94)***	(6.79)***	(1.66)*	(1.28)	(3.45)***	(3.01)***	(1.24)	(0.63)
R&D	0.707	0.936	1.816	1.669	2.202	2.293	2.648	2.708
	(1.54)	(1.65)*	(4.91)***	(3.72)***	(2.60)***	(2.22)**	(3.20)***	(2.74)***
Asset Tangibility	-0.013	0.053	-0.049	0.166	0.218	0.209	-0.002	0.049
	(0.13)	(0.41)	(0.61)	(1.53)	(1.37)	(0.88)	(0.02)	(0.29)
Macro characteristics:								
Industry Wave		0.094		0.009		0.048		-0.005
		(3.62)***		(0.35)		(1.10)		(0.14)
Credit Spread		-0.033		-0.034		-0.082		-0.09
		(1.08)		(1.52)		(1.49)		(2.07)**
Industry Fixed Effects		Yes		Yes		Yes		Yes
Exogeneity Tests :								
Wald Statistic			17.28	20.49			3.08	3.35
p-value			<0.001	<0.001			<0.001	<0.001
Weak Instrument Tests :								
F Statistic			7.05	6.39			0.08	0.60
p-value			0.010	0.010			0.776	0.440
N	2191	2129	2191	2129	677	623	677	623

Table 10
IV tests using net inflows, and conditioning on the sign of the valuation error

The table reports the coefficient estimates from probit regressions for the choice of all-stock merger bids vs. all-cash/mixed bids. In columns 1-2, *Firm-specific Error* is instrumented with mutual fund net inflows. In columns 5-6, *Firm-specific Error* is instrumented with net inflows when positive and with net outflows when negative. *Positive Error* is a dummy indicating that *Firm-Specific Error* ≥ 0. The explanatory variables are *Firm-specific Error, Sales Rank, Market Share*, and control variables from the baseline model in Table 4. Firm characteristics are lagged by one year. *Firm-Specific Error* is computed following Rhodes-Kropf, Robinson, and Viswanathan (2005). Also estimated, but not reported, is a constant term. The sample is 3,900 merger bids for U.S. targets by U.S. public acquirers in 1980-2008. All variables are defined in Appendix 1. Z-statistics are in parentheses, using robust standard errors. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively

Instrument:	Net Inflows		Uninstrumented		Net in- and outflows	
Valuation measures:						
Firm-specific Error	-0.924	-0.967				
	(7.91)***	(8.81)***				
Firm-specific Error			0.168	0.160	-4.605	-5.919
* Positive Error			(3.75)***	(3.49)***	(1.34)	(1.46)
Firm-specific Error			0.064	0.115	-6.205	-5.013
* (1-Positive Error)			(1.00)	(1.57)	(1.07)	(0.95)
Positive Error			0.075	0.073	9.805	9.627
			(1.14)	(1.05)	(1.10)	(1.20)
Bidder characteristics:						
Sales Rank	0.538	0.530	-0.288	-0.336	-0.060	-0.322
	(4.39)***	(4.38)***	(3.76)***	(4.15)***	(0.08)	(0.43)
Market Share	0.890	1.452	-1.581	-1.412	-5.213	-2.129
	(1.30)	(1.91)*	(1.99)**	(1.63)	(0.81)	(0.42)
Operating Efficiency	-0.001	-0.002	-0.001	-0.002	0.007	0.008
	(0.18)	(0.47)	(0.32)	(0.50)	(0.58)	(0.55)
Dividend Dummy	-0.159	-0.112	-0.282	-0.223	-0.361	-0.322
	(2.98)***	(2.20)**	(5.79)***	(4.33)***	(2.19)**	(1.94)*
Net Leverage	-0.188	-0.091	-0.779	-0.769	0.320	0.684
	(1.27)	(0.60)	(8.32)***	(7.58)***	(0.39)	(0.69)
R&D	2.228	2.067	0.713	0.516	5.032	5.740
	(7.45)***	(5.86)***	(2.50)**	(1.58)	(1.75)*	(1.71)*
Asset Tangibility	-0.132	0.022	-0.055	0.080	-0.084	0.205
	(2.14)**	(0.26)	(0.76)	(0.88)	(0.29)	(0.71)
Macro characteristics:						
Industry Wave		0.013		0.072		-0.023
		(0.70)		(4.27)***		(0.28)
Credit Spread		-0.043		-0.053		-0.108
		(2.53)**		(2.56)**		(1.18)
Industry Fixed Effects		Yes		Yes		Yes
Exogeneity Tests :						
Wald Statistic	19.29	20.78			15.54	16.56
p-value	<0.001	<0.001			<0.001	<0.001
Weak Instrument Tests :						
F Statistic	14.82	11.24			9.81;5.69;6.35[a]	7.10;6.60;6.59[a]
p-value	<0.001	<0.001			<0.001	<0.001
N	3900	3784	3900	3784	3900	3784

[a] There are three reported F-statistics, one for each of three instruments: (1) Mutual fund flow if Mutual fund flow > 0 and 0 otherwise. (2) Mutual fund flow if Mutual fund flow < 0 and 0 otherwise. (3) Positive mutual fund flow dummy = 1 if Mutual fund flow > 0 and 0 otherwise.

Table 11
Determinants of Acquirer Announcement Returns

The table reports coefficient estimates from OLS regressions for the acquirer announcement abnormal returns in event days [-1,1], estimated from a standard market model. The explanatory variables are *All-Stock Dummy*, valuation measures, and their interactions, *Public Target* dummy, and other control variables from the baseline model in Table 4. Firm characteristics are lagged by one year. Also estimated, but not reported, is a constant term. The sample is 4,442 merger bids for U.S. targets by U.S. public acquirers in 1980-2008. All variables are defined in Appendix 1. The t-statistics are in parentheses, using robust standard errors. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% level, respectively.

Payment method and valuation measures:								
All Stock Dummy	0.22	0.679	0.266	0.809	0.364	0.706	0.232	0.756
	(0.57)	(1.29)	(0.53)	(1.59)	(0.88)	(1.32)	(0.46)	(1.47)
Market to Book Equity		0.059				0.054		
		(1.10)				(1.01)		
All Stock x Market to Book		-0.047				-0.056		
		(0.56)				(0.68)		
Firm-Specific Error			-0.056				-0.118	
			(0.16)				(0.34)	
All Stock x Firm-Specific Error			0.299				0.222	
			(0.44)				(0.33)	
Edmans et al's Discount				1.837				1.845
				(1.68)*				(1.68)*
All Stock x Discount				-2.769				-2.779
				(1.43)				(1.44)
Deal characteristics:								
Public Target		-0.492	-0.601	-0.57		-0.476	-0.598	-0.556
		(1.40)	(1.39)	(1.32)		(1.33)	(1.36)	(1.27)
Bidder characteristics:								
Size		-0.703	-0.76	-0.662		-0.678	-0.743	-0.654
		(6.14)***	(6.15)***	(5.04)***		(5.99)***	(5.74)***	(4.80)***
Operating Efficiency		-0.002	-0.026	-0.025		-0.007	-0.034	-0.032
		(0.06)	(0.74)	(0.71)		(0.21)	(0.95)	(0.88)
Dividend Dummy		0.663	0.924	0.915		0.646	0.934	0.904
		(1.71)*	(2.23)**	(2.20)**		(1.52)	(2.16)**	(2.08)**
Net Leverage		3.825	3.298	3.225		3.719	3.055	3.068
		(2.88)***	(3.11)***	(3.13)***		(2.64)***	(2.61)***	(2.67)***
R&D		-0.278	-1.154	-0.475		1.241	0.019	0.522
		(0.10)	(0.41)	(0.17)		(0.40)	(0.01)	(0.17)
Asset Tangibility		-0.449	-0.456	-0.353		-0.916	-0.432	-0.378
		(0.84)	(0.88)	(0.68)		(1.17)	(0.62)	(0.56)
Macro characteristics:								
Industry Wave		-0.132	-0.311	-0.326		-0.122	-0.314	-0.32
		(0.87)	(2.13)**	(2.20)**		(0.79)	(2.09)**	(2.10)**
Credit Spread		0.109	0.083	0.112		0.145	0.116	0.155
		(0.82)	(0.52)	(0.69)		(1.06)	(0.72)	(0.94)
Industry Fixed Effects					Yes	Yes	Yes	Yes
R^2	0	0.03	0.03	0.04	0.02	0.04	0.04	0.05
N	4442	4324	3426	3426	4442	4324	3426	3426

Table 12
Acquirer Post-Merger Portfolio Returns

The table reports the coefficient estimates from calendar time portfolio regressions. The dependent variable is the monthly returns on portfolios of all acquirers, all-stock acquirers, and all-cash acquirers, respectively. An acquirer will be in month t portfolio if it has announced the acquisition between month t-36 and t. The explanatory variables are the Fama-French three factors, momentum, and the traded liquidity factor from Pastor and Stambaugh (2003). Rm is excess return on the market. SMB is the average return on small- minus large-stock portfolios. HML is the average return on value- minus growth portfolios. UMD is the average return on up minus down portfolios. The monthly returns on acquirer portfolios are equal-weighted in Panel A and value-weighted in panel B. All variables are defined in Appendix 1. t-statistics are in parentheses and standard errors are robust. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% level, respectively.

	All	All-Stock	All-Cash	All	All-Stock	All-Cash
Panel A: Equal-weighted returns						
Alpha	-0.062	-0.233	0.003	-0.126	-0.373	-0.015
	(0.55)	(1.07)	(0.03)	(1.10)	(1.86)*	(0.13)
Risk Factors:						
Rm	1.06	1.145	0.993	1.068	1.12	0.99
	(42.32)***	(23.65)***	(38.42)***	(42.18)***	(25.31)***	(37.85)***
SMB	0.811	0.938	0.576	0.823	0.944	0.58
	(20.89)***	(12.50)***	(14.39)***	(21.23)***	(13.94)***	(14.48)***
HML	-0.099	-0.292	0.072	-0.09	-0.316	0.069
	(2.52)**	(3.83)***	(1.76)*	(2.28)**	(4.55)***	(1.68)*
UMD	-0.239	-0.425	-0.172	-0.234	-0.432	-0.174
	(8.07)***	(7.41)***	(5.59)***	(7.88)***	(8.31)***	(5.65)***
Liquidity				0.077	0.110	0.039
				(2.64)***	(2.17)**	(1.31)
R^2	0.90	0.76	0.86	0.90	0.80	0.87
N	383	381	382	371	371	370
Panel B: Value-weighted returns						
Alpha	0.036	-0.036	0.18	0.014	-0.13	0.186
	(0.47)	(0.28)	(1.57)	(0.19)	(1.01)	(1.58)
Risk Factors:						
Rm	1.001	1.002	0.96	1.02	1.027	0.973
	(57.51)***	(35.12)***	(37.58)***	(60.06)***	(36.06)***	(37.49)***
SMB	-0.082	-0.114	-0.112	-0.068	-0.087	-0.106
	(3.03)***	(2.58)**	(2.82)***	(2.63)***	(2.00)**	(2.67)***
HML	-0.226	-0.416	-0.217	-0.202	-0.386	-0.200
	(8.25)***	(9.27)***	(5.40)***	(7.60)***	(8.66)***	(4.92)***
UMD	-0.073	-0.145	-0.157	-0.058	-0.126	-0.146
	(3.55)***	(4.28)***	(5.16)***	(2.93)***	(3.77)***	(4.78)***
Liquidity				0.027	0.058	-0.007
				(1.37)	(1.78)*	(0.23)
R^2	0.92	0.82	0.83	0.93	0.83	0.83
N	383	381	382	371	371	370

Table 13
Acquirer Post-Merger Portfolio Returns Sorted by Firm-Specific Error

The table reports the coefficient estimates from calendar time portfolio regressions. The dependent variable is the monthly returns on portfolios of acquirers sorted by payment method and firm-specific pricing error (top vs. bottom half). An acquirer will be in month t portfolio if it has announced the acquisition between month t-36 and t. The explanatory variables are the Fama-French three factors and momentum. Rm is excess return on the market. SMB is the average return on small- minus large-stock portfolios. HML is the average return on value minus growth portfolios. UMD is the average return on up minus down portfolios. The monthly returns on acquirer portfolios are equal-weighted in Panel A and value-weighted in panel B. All variables are defined in Appendix 1. t-statistics are in parentheses and standard errors are robust. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% level, respectively.

	All-Stock bids		All-Cash bids		Long All-Cash and Low
	High Pricing Error	Low Pricing Error	High Pricing Error	Low Pricing Error	Pricing Error; Short All-Stock and High Pricing Error
Panel A: Equal-weighted returns					
Alpha	-0.187	-0.436	-0.074	0.148	0.328
	(0.76)	(1.16)	(0.54)	(0.78)	(1.11)
Risk Factors:					
Rm	1.139	1.087	0.979	1.089	-0.084
	(20.79)***	(12.82)***	(32.04)***	(25.72)***	(1.27)
SMB	0.793	1.189	0.558	0.658	-0.182
	(9.35)***	(9.15)***	(11.78)***	(10.11)***	(1.79)*
HML	-0.422	-0.023	-0.062	0.238	0.624
	(4.90)***	(0.17)	(1.28)	(3.55)***	(5.98)***
UMD	-0.457	-0.294	-0.303	0.055	0.476
	(7.04)***	(2.89)***	(8.34)***	(1.07)	(6.01)***
R^2	0.71	0.51	0.83	0.73	0.17
N	381	376	382	373	373
Panel B: Value-weighted returns					
Alpha	-0.184	-0.202	0.224	0.022	0.192
	(1.19)	(0.71)	(1.64)	(0.11)	(0.76)
Risk Factors:					
Rm	1.03	1.132	0.954	1.108	0.062
	(29.77)***	(17.63)***	(31.32)***	(23.72)***	(1.09)
SMB	-0.109	0.182	-0.126	0.048	0.118
	(2.03)**	(1.85)*	(2.66)***	(0.67)	(1.36)
HML	-0.514	0.203	-0.307	0.043	0.527
	(9.43)***	(2.01)**	(6.40)***	(0.58)	(5.88)***
UMD	-0.179	0.102	-0.216	0.168	0.311
	(4.37)***	(1.33)	(5.96)***	(3.00)***	(4.59)***
R^2	0.77	0.49	0.78	0.64	0.09
N	381	376	382	373	373

Table 14
Instrumenting Firm-Specific Error Controlling for Industry Characteristics

The table reports the coefficient estimates from probit regressions for the choice of all-stock merger bids vs. all-cash/mixed bids. The explanatory variables are *Firm-specific Error*, industry characteristics, *Sales Rank, Market Share*, and other control variables from the baseline model in Table 4. In the first three columns, the estimates are from regular probit regressions. In the last three columns, *Firm-specific Error* is instrumented by price pressure from mutual fund flows. Firm characteristics are lagged by one year. Also estimated, but not reported, is a constant term. The sample is 3,629 merger bids for U.S. targets by U.S. public acquirers in 1980-2008. All variables are defined in Appendix 1. Z-statistics are in parentheses, using robust standard errors. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively

	Uninstrumented Regressions			Instrumented Regressions		
Valuation measures:						
Firm-specific Error	0.122	0.158	0.162	-0.975	-1.018	-1.034
	(4.71)***	(5.75)***	(5.75)***	(12.77)***	(11.17)***	(11.66)***
Industry characteristics:						
Vertical Relatedness	-0.843	-0.721	-0.614	-0.245	0.047	-0.073
	(1.83)*	(1.45)	(1.21)	(0.71)	(0.13)	(0.20)
Complementarity	0.203	0.196	0.19	0.163	0.144	0.146
	(2.92)***	(2.71)***	(2.59)***	(2.80)***	(2.40)**	(2.43)**
High-Tech Dummy	0.43	0.455	0.439	0.317	0.287	0.29
	(9.68)***	(9.25)***	(8.74)***	(6.05)***	(4.49)***	(4.68)***
HHI	-0.139	-0.319	-0.191	-0.203	-0.208	0.081
	(0.45)	(0.98)	(0.48)	(0.67)	(0.67)	(0.25)
Top 20% Industry Leaders	-0.069	-0.091	-0.108	0.339	0.352	0.371
	(1.55)	(1.96)*	(2.29)**	(6.99)***	(6.56)***	(6.68)***
Bidder characteristics:						
Sales Rank		-0.466	-0.444		0.466	0.464
		(5.38)***	(5.00)***		(3.72)***	(3.82)***
Market Share		-2.101	-2.264		0.616	0.594
		(2.31)**	(2.53)**		(0.90)	(0.87)
Operating Efficiency		-0.001	-0.001		-0.001	-0.003
		(0.37)	(0.23)		(0.33)	(0.60)
Dividend Dummy		-0.303	-0.327		-0.136	-0.134
		(5.86)***	(6.22)***		(2.42)**	(2.26)**
Net Leverage		-0.793	-0.832		-0.082	-0.107
		(7.90)***	(8.06)***		(0.57)	(0.72)
R&D		0.225	0.166		2.083	2.065
		(0.74)	(0.54)		(5.96)***	(5.76)***
Asset Tangibility		0.013	0.044		-0.092	-0.054
		(0.16)	(0.53)		(1.36)	(0.79)
Macro characteristics:						
Industry Wave			0.071			0.005
			(4.18)***			(0.31)
Credit Spread			-0.049			-0.038
			(2.35)**			(2.29)**
Exogeneity Tests :						
Wald Statistic				32.5	21.7	21.47
p-value				<0.001	<0.001	<0.001
Weak Instrument Tests :						
F Statistic				19.03	10.31	9.4
p-value				<0.001	<0.001	<0.001
N	3629	3629	3536	3629	3629	3536

Table 15
Geographic Location, Industry Relatedness and the All-Stock Choice

This table reports the coefficient estimates from probit regressions for the choice of all-stock merger bids vs. all-cash/mixed bids. The explanatory variables are *Local Deal, Urban Deal*, industry characteristics, and control variables from the baseline model. *Local Deal* indicates that the acquirer and target are located within 30 miles. *Urban Deal* indicates that the acquirer is located within 30 miles from one of the ten largest metropolitan areas. If the target or acquirer zip code is missing in SDC, *Local Deal* is set to zero (columns 1-3 and 7-8) or the observation is eliminated (columns 4-6). *Vertical Relatedness* and *Complementarity* are based on Fan and Lang (2000). *High-tech Dummy* indicates that the acquirer is in a high-tech industry according to American Electronic Association. *HHI* is the Herfindahl Hirschman Index. *Top 20% Industry Leaders* indicates that the acquirer's total assets are in the largest quintile in its FF49 industry. In columns 7-8, *Size, Dividend, R&D*, and *Leverage* are replaced with the components orthogonal to industry variables (the predicted residuals). Also estimated, but not reported, is a constant term. The sample is 4,919 merger bids for U.S. targets by U.S. public acquirers in 1980-2008. All variables are defined in Appendix 1. Z-statistics are in parentheses, using robust standard errors. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% level, respectively.

Rule for Missing Zip Code:	Local Dummy=0			Observation is Excluded			Local Dummy=0	
Geographic Location:								
Local Deal	0.275	0.194	0.176	0.22	0.162	0.147	0.191	0.195
	(4.23)***	(2.81)***	(2.54)**	(3.25)***	(2.30)**	(2.05)**	(2.80)***	(2.74)***
Urban Deal	-0.044	-0.022	-0.027	-0.085	-0.044	-0.033	-0.001	0.021
	(1.12)	(0.53)	(0.65)	(1.66)*	(0.83)	(0.60)	(0.03)	(0.48)
Industry characteristics:								
Vertical Relatedness							-0.471	-0.232
							(1.15)	(0.52)
Complementarity							0.228	0.19
							(3.67)***	(2.89)***
High-Tech Dummy							0.521	0.497
							(12.83)***	(10.89)***
HHI							-0.309	0.016
							(1.11)	(0.04)
Top 20% Industry Leaders							-0.003	-0.035
							(0.07)	(0.85)
Bidder Characteristics:								
Size		-0.021	-0.024		-0.047	-0.052		-0.073
		(2.17)**	(2.42)**		(3.55)***	(3.77)***		(5.38)***
Operating Efficiency		-0.004	-0.004		0	-0.002		-0.003
		(1.12)	(1.30)		(0.04)	(0.37)		(1.00)
Market to Book Equity		0.021	0.02		0.026	0.026		0.019
		(4.93)***	(4.56)***		(4.43)***	(4.55)***		(4.29)***
Dividend Dummy		-0.339	-0.231		-0.234	-0.162		-0.319
		(7.70)***	(5.03)***		(3.98)***	(2.65)***		(6.73)***
Net Leverage		-0.577	-0.483		-0.473	-0.397		-0.496
		(6.73)***	(5.44)***		(4.30)***	(3.40)***		(5.52)***
R&D		1.096	0.828		0.945	0.804		0.465
		(3.99)***	(2.70)***		(2.70)***	(2.03)**		(1.57)
Asset Tangibility		-0.07	-0.042		0.054	0.085		-0.03
		(1.06)	(0.52)		(0.62)	(0.79)		(0.41)
Macro Characteristics:								
Industry Wave		0.075	0.077		0.077	0.078		0.074
		(5.13)***	(5.11)***		(3.99)***	(3.90)***		(4.87)***
Credit Spread		-0.084	-0.078		-0.055	-0.043		-0.079
		(4.63)***	(4.21)***		(2.35)**	(1.77)*		(4.19)***
Industry Fixed Effects			Yes			Yes		
Pseudo R^2	0	0.07	0.09	0	0.06	0.08	0.04	0.08
N	4919	4786	4766	2704	2629	2605	4567	4441

Table 16
Estimation of Target Leverage and Target Cash

This table summarizes the results from the estimation of target leverage and target cash. The coefficients are the time-series averages of the annual leverage and cash regressions. N is the average number of observations in the annual regressions. The dependent variable is market leverage, book leverage, and cash ratios, respectively. Explanatory variables are firm characteristics lagged by one year. All variables are defined in Appendix 1. Numbers in the parentheses are the t-statistics from the tests whether the time-series average is equal to zero. The *, **, and *** indicate statistical significance at the at the 10%, 5%, and 1% level.

	Market Leverage	Book Leverage	Cash
Bidder Characteristics:			
Size	0.0077	-0.0015	-0.0117
	(12.71)***	(1.05)	(15.48)***
Operating Efficiency	0.0018	0.0003	-0.0002
	(4.14)***	(0.73)	(1.31)
Market to Book Equity	-0.0062	-0.0028	0.0009
	(19.65)***	(6.41)***	(7.7)***
R&D	-0.2129	0.0276	0.1976
	(10.39)***	(1.02)	(9.36)***
Missing R&D Dummy	0.0462	0.0413	-0.0045
	(16.04)***	(9.94)***	(2.84)***
Asset Tangibility	0.0782	0.1066	-0.0408
	(15.59)***	(18.20)***	(11.31)***
Leverage			-0.06
			(11.2)***
Industry Fixed Effects	Yes	Yes	Yes
N	4103	4142	4076

Table 17
Decomposition of Leverage and Cash, SEOs, and the All-Stock Choice

The table reports the coefficient estimates from probit regressions for the choice of all-stock vs. all-cash/mixed bids. The explanatory variables are capital structure characteristics, *Large Deal Dummy*, and control variables from the baseline model in Table 4. In the first four columns, *Leverage* is market leverage. In the last four columns, *Leverage* is book leverage. *Deviation from Target Leverage* is based on Harford, Klasa, and Walcott (2009) and the estimated coefficients are shown in Table 16. *Stock Issue Dummy* indicates that the acquirer does an SEO in year of (t), or the year prior to ($t-1$), the merger. *Large Deal Dummy* indicates that the ratio of deal value to acquirer total assets is in the top quartile. Firm characteristics are lagged by one year. Also estimated, but not reported, is a constant term. The sample is 4,708 merger bids for U.S. targets by U.S. public acquirers in 1980-2008. All variables are defined in Appendix 1. Z-statistics are in parentheses, using robust standard errors. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% level, respectively.

	Market Leverage				Book Leverage			
Capital structure characteristics:								
Leverage	-1.326	-1.32	-1.497	-1.621	-0.563	-0.685	-0.793	-0.887
	(9.34)***	(8.97)***	(9.78)***	(10.09)***	(3.90)***	(4.36)***	(4.71)***	(5.00)***
Deviation from Target Leverage	1.191	1.133	1.404	1.48	0.43	0.472	0.637	0.748
	(5.44)***	(5.17)***	(6.20)***	(6.33)***	(1.89)*	(1.97)**	(2.38)**	(2.74)***
Cash Holding	2.568	0.859	0.459	-0.831	3.51	1.701	1.422	0.007
	(8.24)***	(1.98)**	(1.02)	(1.51)	(11.82)***	(3.98)***	(3.20)***	(0.01)
Excess Cash	-2.079	-0.497	-0.137	1.143	-2.825	-1.163	-0.914	0.502
	(6.04)***	(1.12)	(0.30)	(2.06)**	(8.52)***	(2.67)***	(2.02)**	(0.92)
Stock Issue Dummy$_t$		0.138	0.122	0.093		0.153	0.145	0.122
		(2.30)**	(2.00)**	(1.50)		(2.58)***	(2.39)**	(1.98)**
Stock Issue Dummy$_{t-1}$		0.314	0.309	0.274		0.331	0.327	0.289
		(5.10)***	(4.95)***	(4.32)***		(5.43)***	(5.31)***	(4.62)***
Deal characteristics:								
Large Deal Dummy		0.306	0.264	0.285		0.288	0.251	0.268
		(6.12)***	(5.13)***	(5.44)***		(5.78)***	(4.90)***	(5.14)***
Bidder characteristics:								
Size		-0.009	-0.02	-0.031		-0.003	-0.012	-0.026
		(0.94)	(1.86)*	(2.78)***		(0.28)	(1.12)	(2.33)**
Operating Efficiency		-0.002	-0.002	-0.004		-0.002	-0.003	-0.004
		(0.59)	(0.72)	(1.03)		(0.77)	(0.95)	(1.17)
Market to Book Equity		0.017	0.018	0.017		0.022	0.023	0.023
		(3.86)***	(4.03)***	(3.80)***		(4.87)***	(5.04)***	(4.95)***
Dividend Dummy		-0.264	-0.281	-0.205		-0.261	-0.277	-0.208
		(5.63)***	(5.88)***	(4.22)***		(5.62)***	(5.88)***	(4.33)***
R&D		0.774	0.777	1.015		0.852	0.857	1.027
		(2.49)**	(2.39)**	(2.84)***		(2.68)***	(2.58)***	(2.84)***
Asset Tangibility		-0.039	-0.023	-0.091		-0.01	0.01	-0.058
		(0.56)	(0.33)	(1.02)		(0.15)	(0.14)	(0.66)
Macro characteristics:								
Industry Wave			0.068	0.073			0.066	0.073
			(4.41)***	(4.59)***			(4.35)***	(4.64)***
Credit Spread			-0.079	-0.075			-0.06	-0.056
			(4.12)***	(3.78)***			(3.17)***	(2.87)***
Industry Fixed Effects				Yes				Yes
Pseudo R^2	0.07	0.09	0.1	0.12	0.05	0.07	0.08	0.1
N	4699	4699	4572	4552	4708	4708	4581	4561

Appendix 1: Variable Definitions

Variable name	Source	Variable definition
A. Deal characteristics		
All-Stock Bid	SDC	Consideration structure is SHARES
All-Cash Bid	SDC	Consideration structure is CASHO
Mixed Offer	SDC	Consideration structure is HYBRID or OTHER
Completed Deal	SDC	Deal Status in SDC is equal to "Completed"
Public Target	SDC	Target Public Status is "Public"
Target Premium	SDC	Offered price in percent of target stock price four weeks prior to deal announcement
B. Bidder characteristics		
Size	Compustat	Natural Log of Total Assets
Operating Efficiency	Compustat	(Cost of Goods Sold + Expense)/Net Operating Assets, Net Operating Assets=Properties, Plants and Equipment + Total Current Assets - Cash -Total Current Liabilities
Dividend Dummy	Compustat	A dummy taking the value of 1 if total dividends are greater than 0
R&D	Compustat	R&D Expense/Total Assets
Asset Tangibility	Compustat	Properties, Plants and Equipment/ Total Assets
C. Firm valuation		
Market to Book Equity	Compustat	(Closing Price x Number of Shares Outstanding)/ (Total Assets - Total Liabilities)
Firm-specific Error	Authors' Calculation	Based on Rhodes Kropf, Robinson, and Visvanathan (2005), Firm-specific Error=Market Value - Fundamental Value Based on Sector Pricing Rule in year t; Fundamental Value Based on Industry Pricing Rule in year t is the fitted firm market value from the regression: Market value = β_0 + β_1 (Book Value) + β_2 (Operating Cash Flow) + β_3 (Net Leverage) + e where β's are estimated from all Compustat firms in the same FF16 industries in year t.
Time-Series Sector Error	Authors' Calculation	Based on Rhodes-Kropf, Robinson, and Viswanathan (2005), Time-Series Sector Error = Fundamental Value Based on Sector Pricing Rule in year t - Fundamental Value Based on Long-Run Sector Pricing Rule; Fundamental Value Based on Long-Run Industry Pricing Rule is the firm market value from the following equation: Market value = average β_0 + average β_1 (Book Value) + average β_2 (Operating Cash Flow) + average β_3 (Net Leverage) where average β's are the long-run averages of β's across all years.
Long-Run Value to Book	Authors' Calculation	Based on Rhodes-Kropf, Robinson, and Viswanathan (2005), Long-Run Value to Book = Fundamental Value Based on Long-Run Industry Pricing Rule - Book Value
Edmans et. al's Discount	Authors' Calculation	Based on Edmans, Goldstein, and Jiang (2012), Potential Value is the fitted firm market value from the quantile regression: Market Value = β_0 + β_1 (Book Value) + β_2 (Operating Cash Flow) + β_3 (Net Leverage) + e. We choose (1-α) equal to 0.20. The discount is defined as (Potential Value - Market Value)/Potential Value.

Appendix 1 continued from previous page

Variable name	Source	Variable definition
D. Macro and market timing variables		
Industry Wave	Authors' Calculation	Based on Maksimovic, Phillips, and Yang (2012), we calculate the aggregate volume of mergers scaled by aggregate total assets of Compustat firms in each FF49 industry each year. Then, we calculate the mean and standard deviation of merger-to-total assets across all years. Industry Wave is defined as the z-score ((Aggregate Mergers-to-Total Assets in year t - Long-Run Mean)/Standard Deviation).
Credit Spread	Federal Reserve's Website	Moody's yield on AAA seasoned corporate bonds - 3-month treasury bill (secondary market rate)
Sentiment	Jeffrey Wurgler's Website	Sentiment index in Baker and Wurgler (2006) based on first principal component of six sentiment proxies where each of the proxies has first been orthogonalized with respect to macroeconomic conditions
Mutual Fund Flow	Authors' Calculation	Based on Edmans, Goldstein, and Jiang (2012), we compute mutual fund price pressure from Thomson Reuters mutual fund holdings database. Mutual fund price pressure is defined as the product of total flows experienced by each fund and shares of each stock as a proportion of fund's total assets.
E: Industry characteristics		
Vertical Relatedness	Joseph Fan's Website	Based on Fan and Lang (2000), the variable captures how much input/output of acquirer industry is bought and sold to target industry.
Complementarity	Joseph Fan's Website	Based on Fan and Lang (2000), the variable captures how much acquirer industry and target industry share the same input/output.
High Tech Dummy	American Electronic Association	A dummy taking the value of 1 if the firm's 4-digit SIC is in High-Tech industry according to America Electronic Association
Top 20% Industry Leaders	Authors' Calculation	A dummy taking the value of 1 if the firm is among Compustat's 20% largest firms (based on Total Assets) in its FF49 Industry
HHI	Authors' Calculation	Herfindahl Hirschman Index calculated by total assets of Compustat firms for each FF49 Industry
Industry Fixed Effects	Kenneth French's Website	Industry dummies defined by FF49 industries
F: Geographic location		
Local Deal (30 miles)	Authors' Calculation	A dummy taking the value of 1 if the acquirer and target are located within 30 miles from each other, The data on firm location are from the ZIP codes in SDC. The distance between acquirers and targets is computed using the spherical law of cosines formula: Distance = arccos(sin(lat1).sin(lat2)+cos(lat1).cos(lat2).cos(long2-long1)).R where R = Radius of the Earth = 3963 miles (lat1,long1)= coordinate (latitude,longtitude) of the acquirer in radians (lat2,long2)= coordinate of the target in radians, Coordinates (lat,long) of all the zip codes are from 1987 U.S. Census Gazetteer Files.
Urban Acquirer	Authors' Calculation	A dummy taking the value of 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.
G. Capital structure variables		

Appendix 1 continued from previous page

Variable name	Source	Variable definition
Net Leverage	Compustat	(Total Debts- Cash)/Total Assets
Book Leverage	Compustat	Total Debts/Total Assets
Market Leverage	Compustat	Total Debts/ (Market Value of Equity + Total Debts), Market Value of Equity = Closing Price x Number of Shares Outstanding
Deviation from Target Leverage	Authors' Calculation	Based on Harford, Klasa, and Walcott (2009), Deviation from Target Leverage is the fitted residuals from the following cross-sectional (year-by-year) regression: Leverage = $\beta_0 + \beta_1$ (Size) + β_2 (Operating Efficiency)+ β_3 (Market to Book Equity) + β_4 (R&D) + β_5 (Missing R&D Dummy) + Industry Fixed Effects + e. All explanatory variables are lagged by one year.
Cash Holding	Compustat	Cash/Total Assets
Excess Cash	Authors' Calculation	Excess Cash is the fitted residuals from the following cross-sectional (year-by-year) regression: Cash Holding = $\beta_0 + \beta_1$ (Size) + β_2 (Operating Efficiency)+ β_3 (Market to Book Equity) + β_4 (R&D) + β_5 (Missing R&D Dummy) + β_6 (Leverage) + Industry Fixed Effects + e. All explanatory variables are lagged by one year.
Large Deal Dummy	SDC	A dummy taking the value of 1 if Relative Size (Deal Value/Total Assets) is in the top quartile
Stock Issue Dummy	SDC	A dummy taking the value of 1 if the acquirer issues stock in the year of merger (t) or the prior year ($t-1$)
H. Bidder returns and risk factors		
Announcement Return	Authors' Calculation	Abnormal returns are estimated from a standard market model: Ri = a + b Rm +e. We use CRSPs daily holding period returns (dividends included) for Ri. Following Betton, Eckbo, and Thorburn (2008), we use [-291: -42] as the estimation window, [-41; -2] as the exclusion period due to run-ups, and [-1; 1] as the event window. Event date is the announcement date on SDC.
Calendar Time Portfolio Return	Authors' Calculation	Monthly returns on portfolios of acquirers, pure-stock acquirers, and pure-cash acquirers An acquirer will be in month t portfolio if it has announced the acquisition between month t-36 and t.
Alpha	Authors' Calculation	Jensen's alpha calculated from regressing Calendar Time Portfolio returns on Fama-French 3 factors and Fama-French 3 factors with Liquidity
Rm	CRSP	Excess return on the market = the value-weight return on all NYSE, AMEX, and NASDAQ stocks (from CRSP) minus the one-month Treasury bill rate
SMB	CRSP	SMB (Small Minus Big) is the return on the small portfolios minus the average return on big portfolios
HML	CRSP	HML(High Minus Low) is the return on the value portfolios minus the average return on growth portfolios
UMD	CRSP	Momentum (UMD) is the return on the up portfolios minus the average return on down portfolios
Liquidity	CRSP	Pastor and Stambaugh (2003)'s traded liquidity factor