Use of Reference Point Theory to Explain the Price Paid for Private Targets

Abstract

We investigate whether reference points influence the price paid for private targets. Contrary to prior literature, we consider reference points of both target and bidder firms. Because market valuations of private targets are not available, we use comparable public firms and actual deals to derive an implied reference point for private targets. We find that when private firms have an implied valuation that is further from their implied reference points, they require a higher premium. In addition we find that the price paid for private targets is influenced by the bidder's own reference point. We also show that the degree to which the target reference point influences the price paid for private targets is time-varying and affected by the prevailing economy. Private targets rely less heavily on their implied reference point to negotiate their takeover price when economic conditions are strong.

I. INTRODUCTION AND MOTIVATION

Lee and Malmendier (2011) observe behavior (such as EBay bidding) of online bidders and conclude that bidder behavior is inconsistent with rational expectations, since bidders are willing to pay more for the items in an auction setting than the fixed price required by the seller. The propensity to overbid is not limited to an individual setting. Giliberto and Varaiya (1989) point out that bidders of failed banks overpay during FDIC bids and the overpayment is higher under conditions of more intense competition. The overbidding results in the winner's curse and a high premium, whereby the bidder suffers as a result of the bidding because it paid too much for the target.

Much research has been conducted on the payment of premiums for public targets in mergers. Uncertainty surrounding the true value of the public target (see Miller 1977) can cause wide variation in premiums paid among targets. Roll (1986) uses the hubris hypothesis to explain why premiums paid for public targets may be excessive. Managers who are subject to hubris overestimate synergies, and therefore pay too much for the target. Varaiya (1988) analyzes the winner's curse in corporate takeovers, concluding that the amount paid for public targets is substantially higher than their market value. Sirower (1997) focuses his explanation of overpayment on unfamiliarity and bidder's lack of knowledge about the public target. Baker, Pan, and Wurgler (2012) suggest that the public target's reference point (based on its

peak stock price over the last year) is a major determinant of the premium that bidders pay for targets when acquiring public firms.

By comparison, there is very little research that explains the premium paid for private targets. Officer (2007) and De Granco, Gavious, Jin and Richardson (2007) find lower premiums for private firms compared to public companies, while Ang and Kohers (2001) show that the premiums paid for private targets are higher than those paid for public firms. Ang and Kohers explain the difference in premium by a "timing option" that private firms create due to their strong bargaining power.

In this study, we extend the notion of a reference point used by Baker, Pan, and Wurgler (2012) to explain the variation in premiums paid for private firms. The target's reference point should have a direct effect on the premium for both public and private firms. Although private firms do not have an explicit public value, they are aware of their implied value. Managers of private firms can keep track of their potential market valuation (in the event that the firms might be sold or converted to public ownership) by comparison to publicly traded firms in the same line of business. Therefore, private firms have a reference point just like public firms do.

Target shareholders may be more willing to accept a bid when the price paid for their firm is close to their reference point (either explicit or implied). Therefore, the takeover price (and premium) required by the target must be higher when its prevailing stock price is relatively low compared to its reference point. To the extent that private targets rely on publicly-traded comparable firms to derive an implied market valuation, the premium received by private targets should be influenced by the implied reference point of the respective comparable firms.

As our second contribution, we build on the reference point theory to consider the perspective of the public bidder, which has its own reference point. We develop the concept of bidder reference point and study its impact on the premium paid for private targets.

We find that, similar to public targets, the reference point of private firms is a significant determinant of the premium paid in M&A transactions. In addition, when the deal is financed with stock, the relationship extends to the bidder reference point. Controlling for the possibility that the premium and

method of payment are determined simultaneously yields the same results: the target's reference point has a strong positive influence on the premium paid for private firms, independent of the method of payment, while the bidder's reference point has a negative influence on the premium paid.

Further, we also find that the influence of the target reference point of the acquisition premium varies over time, diminishing in importance during periods of good economic conditions. In contrast, we do not find that the influence of the bidder reference point on the premium varies with economic conditions.

We proceed as follows. In section II, we present our hypotheses; in section III, we describe the methodology and data; section IV follows with the results; and in section V, we conclude our findings.

II. HYPOTHESES DEVELOPMENT

Impact of Target Reference Point on Private Target Premiums

Bates (2005) and Officer (2007) point out that although the sale of private firms has become an important source of restructuring and liquidity for corporations and that two thirds of acquisitions involve private firms, little is known about the premium paid for these firms. Further, the scant existing research reports inconsistent findings. Using multiples, Officer (2007) shows that private firms sell at a discount between 15-30% and that more than two thirds of the sample is acquired with multiples that are lower than those calculated for comparable public firms. He explains the results by pointing to the liquidity constraint of private firms. Unlike public firms, private firms do not have many choices for raising cash, and this constraint leads them to accept lower premiums. Similarly, lower premiums for private targets are found by DeFranco, Gavious, Jin and Richardson (2007). In contrast, Ang and Kohers (2001) find higher premiums for private firms compared to public firms and explain the higher premium paid for private targets by pointing to the higher bargaining power of the private firms. Because these firms have higher ownership concentration and lower agency conflicts, the owners have more control over decisions about selling the firm, which may allow them to demand a higher premium. Ang and Kohers (2001)

explain how the private firm can reject offers that are considered to "undervalue its true worth" (page 735), until the firm is satisfied with the premium offered.

Recently, Cooney, Moeller, and Stegemoller (2009) examine the influence of behavioral biases and target uncertainty valuation on the acquirer announcement returns in a small sample of acquisitions of private targets. Their sample include 68 acquisitions over the period 1996-2005 with available information on private firm valuations from previously withdrawn IPO registrations with the SEC. They provide evidence consistent with a stronger influence of target valuation uncertainty and weaker influence of behavioral biases (prospect theory).

We focus on why the premium paid for private targets varies among private targets. We suggest that the reference point theory that was applied to public targets by Baker, Pan, and Wurgler (2012) can be adapted to explain the premiums and the degree of under/overpayment paid for private targets. In the public market setting, when a target's stock price is relatively low compared to its reference point (as measured by its 52-week high price), target managers and shareholders may presume that the stock price will naturally revert back to its reference point. Thus, the more discounted the target's prevailing price is (relative to the reference point), the higher the premium that it will require. Bidders may also believe that the target's price may naturally revert to its previous high, and therefore, may be willing to pay a higher premium than if the target's prevailing stock price was near its reference point.

Private firms do not possess a reference point that can be extracted from continuous market valuations; however, they may use an implied reference point that is derived from publicly traded comparable firms. Consider a private company whose publicly traded comparable firms are presently priced to be 40% below their respective reference points on average. This suggests that the comparable public companies are presently heavily discounted in the market. The private company can use this information to estimate its own discount relative to a reference point. To the extent that prices of comparable firms are expected to naturally revert back toward their reference points, the valuation of the private company would revert back to its implied reference point as well. Thus, a private company might negotiate for a higher takeover premium (relative to its present fundamentals) than if comparable publicly

traded firms were presently priced near their respective reference points. Put another way, private companies have sufficient control to resist takeover attempts when market valuations of comparable firms are unusually low unless bidders provide a sufficiently large premium to offset the low valuations. The negotiations are driven by the view of the private firm that the value of priced comparable firms will ultimately revert back to the high levels observed within the last year. Conversely, if the comparable firm's stock prices are presently close to the reference point, the private firm is more willing to accept a lower premium. This leads us to the following hypothesis:

> *Hypothesis 1: In both stock and cash financed deals, the larger the distance between the private target takeover offer price and its implied reference point, the higher the premium demanded by the private target*.

Impact of Bidder Reference Point on Private Target Premiums

Although Baker, Pan, and Wurgler (2012) discuss the rationale that bidders may use to derive the public target's reference point, they do not consider the possible influence of the bidder's own reference point on the offer price. We believe the bidder reference point should be investigated because the bidder also has power in the merger negotiations and the bidder's reference point could affect the price paid for private targets, particularly when stock is used as payment. The bidder may argue that its stock price will also naturally revert back toward its respective reference point over time, similar to the argument made by Baker, Pan, and Wurgler (2012) about public targets using a reference point to assess their own value. In this case, the bidder may believe that its stock is implicitly undervalued when its prevailing stock price is substantially lower than its reference point, which may allow it to pay a lower premium when using stock as payment. Thus, the second hypothesis we investigate is the following:

> *Hypothesis 2: In stock exchange deals, the larger the distance between the bidder's current market price and its reference point, the stronger is the impact of the bidder's reference point on premium, resulting in a lower premium offered by the bidder*.

While the target uses a similar type of argument when its prevailing stock price is low relative to its own reference point, it might not be willing to accept the argument from the bidder. The target's managers may believe that the bidder's stock price is lower than the bidder's reference point because of weak bidder performance and not because of missvaluation. They might only be willing to apply the psychology behind reference point when assessing their own company's valuation. Whether the bidder's reference point affects the premium paid for a private target is an empirical question.

Time Variation in the Influence of Reference Points on Premium of Private Firms

Private firms may recognize that, when the economy is weak, their valuations will be higher if they are patient and wait for the overall market conditions to improve,. However, if private firms decide to participate in the takeover when the economy is weak, they may demand to be compensated for the weak economic conditions by asking for a higher premium. This conclusion may not hold if private target owners need to cash out immediately. If they do not have the option to wait for the economy to improve, they may be willing to accept any premium in order to sell their firms.

During weak economic periods it is also easier for the bidder to justify its focus on the reference point. The bidder can argue that its market valuation is not representative of its performance because overall, all stock prices are depressed. Therefore, its true price will eventually revert to the high price observed in the last year, which means that the target will benefit from an increase in the stock price of the bidder in the near future. On the other hand, the private target's insistence on a higher premium because of its anchoring on its own reference point should be especially pronounced during weak economic conditions, because that is when the target strongly believes that the stock price will correct itself once economic conditions improve. While the bidder is insisting on paying a low premium in weak economic periods, the target is demanding high premiums when stock prices are depressed to compensate for the large distance between its stock price and reference point.

When the economy is strong, the distance between the offer price and the reference point is small and as a result, private firms may be more willing to sell because they anchor less on the reference point.

A smaller offer price distance to the reference point translates into a lower premium for private targets. From the private target's point of view, comparable firms should have high stock prices when the economy is strong, so that the private target's implicit market valuation should be high. Therefore, the private target does not need to anchor on its implied reference point under these conditions. Since its prevailing valuation should be high during strong economic conditions, it should not be as concerned about receiving a high premium above its implied valuation. In a strong economy, the bidder will also put less emphasis on the reference point. Paying a higher premium for the target is less painful for the bidder as its own stock price is high. More importantly, the distance between the bidder stock price to its own reference point is low, creating the perception that the bidder is paying the target adequately.

Overall the performance of the economy has a direct impact on the distance between the stock price and the reference point, leading to an increased sensitivity of the reference point when the economy is performing poorly and a decreased sensitivity when the economy is performing well for both, the target and the bidder. The impact of the bidder and target reference points, however, work in opposite directions. While the bidder wants to pay a low premium in a weak economy because of its increased sensitivity to the reference point, the target demands a higher premium, for the same reason.

The above discussion leads us to our third and last hypothesis:

> *Hypothesis 3: the worse the overall performance of the economy, the stronger the impact of target and bidder reference points on the target's decision about the premium the private target is willing to accept and the bidder's decision about the premium it is willing to pay for a private target.*

Table 1 here

III. RESEARCH METHODS

We identify mergers within the SDC database with a merger announcement date between January 1992 and December 2011 and a transaction value in excess of $1 million. We collect data from SDC for mergers involving US private targets. We only include mergers (M), Acquisitions (A), and Acquisitions

of Majority Interest (MA). For the control variables that are not available in SDC, we match the sample with Compustat Fundamentals Annual for the date closest (before) the merger announcement date.

Process to Identify Matching Publicly Traded Firms

To assess the impact of the target's and bidder's reference points on the premium of the private target, we use a matching set of public firms, using two different methods, as explained below. The main difference between the two methods is that in the first, we use all comparable firms and in the second, only deals that actually occurred.

(a) Method I: Industry average multiples of public firms. Officer (2007) identifies a number of multiples that can be used to calculate the value of private firms. He looks at the multiples of stand-alone and subsidiary private firms reported by SDC, specifically: price to book value of equity, price to earnings per share, deal value to EBITDA, and deal value to sales. Purnanandam and Swaminathan (2004) use various multiples to calculate the price-to-value multiple. They include price-to-sales, price-to-EBITDA and price-to-earnings to derive the price-to-value ratio**.** Liu, Nissim and Thomas (2002) note that book value multiples are a poor representation of valuation accuracy. We follow Officer and use the multiples for PriceEPS, DEAlEBITDA and DealSales. Cooney, Moeller, and Stegemoller (2009) also use multiples as a robustness analysis in their sample of 68 acquisitions of private targets with available pricing information from withdrawn IPOs.

The multiples are calculated by using the price per share of private firm without the liabilities over accounting numbers such as sales or EBITDA from the year before the target was acquired. To calculate the acquisition premium or discount, we use a method similar to Officer, except that we use an average of the industry rather than a one to one match and calculate the multiples for the public firms within the same industry. Ang and Kohers (2001) show that the firms involved in private acquisitions are much smaller than the public firms. Therefore, we split the matched sample into categories based on size: Q1, median and Q3. We run the analysis on Q1 subsample as it most closely represent the type of private firms that get acquired.

The premium is then calculated as the difference between the private multiples and the average of corresponding public firm multiples at the time of the acquisition. The reference points are calculated as the highest industry multiple over the four quarters before the acquisition date. The difference between those multiples is the distance to the reference point.

(b) Method II: Industry average multiples of actual deals . In the second method, instead of using all the public firms in the same industry as a matched sample, we use actual merger deals that happen in the same month. Officer (2007) points out that a shortcoming of this method is the fact that it is hard to find an appropriate match. Another shortcoming is that the true size of the private firm is not known. To adjust for these two shortcomings, we use the industry average of all the deals (private or public) that happened within the same month and derive monthly reference points over the year before the acquisition. Again, to better proxy for the size of the private firms, we only concentrate on the Q1 and median deals, rather than the larger deals.

Measuring Variation in Economic Conditions

To assess the impact of the economic environment, we divide the full sample period into sub periods of strong and weak economic conditions using a number of approaches, as follows.

First, we use the official National Bureau of Economic Research Cycles data. Therefore, the weak economic periods are defined as: (1) July 1990 - March 1991, (2) March 2001 - November 2001 and (3) December 2007 - June 2009. Any dates between 1986 and 2011 that do not fall within the recession dates identified above are labeled as strong economic periods.

Second, merger waves usually occur in strong economic periods. Further, it should be easier for targets to obtain their anchor when the economy is performing well. Therefore, to distinguish between the effects of the economy and the reference points, we use a number of alternative measures of economic/market performance. These measures are based on the performance of the overall stock market and credit availability but they are closely related to the overall performance of the economy. First, as an alternative of the measure of economic performance, we use the quarterly performance of the S&P500 index (SPY) to categorize the quarters as exhibiting good/bad performance.. Secondly, we use the

quarterly volatility index on the S&P 500 (VIX) to parse the sample into periods of high and low volatility. Lastly, we use Harford's (2005) measure of liquidity and financing in the economy. The measure is defined as the spread between the average interest rate on commercial and industrial loans and the Federal Funds rate. Harford shows that there is an inverse relationship between the spread and overall merger activity: "a decrease in the rate spread leads to an increased economic growth and greater merger and acquisition activity" (page 543). Given that more mergers occur during expansionary economic periods, we define good economic periods as periods with the lowest interest spread and weak economic periods as periods with the highest interest spread and examine the hypotheses across the two economic periods.

In summary, we use four different categories and six different measures of economic performance, as follows: (I) official NBER data, where a 1 represents weak economic performance and 0, otherwise, (II) the performance of the SPY index by month. The top 25% worst performing months are assigned a 1 (bad economy) and the rest a 0 (good economy), (III) the performance of the SPY index by month used as a continuous variable, (IV) VIX performance by month. The top 25% highest months are assigned a 1 (high volatility=bad economy) and the rest a 0 (low volatility=good economy), (V) VIX performance by month used as a continuous variable, and (VI) Harford's liquidity measure by quarter used as a continuous variable.

To assess the impact of bidder and target reference points on private targets' premiums, we only consider public bidders in our sample that finance the takeover with partial or all stock. As the bidder is already a public firm, we use the available public information about the stock price before the sale and the reference point. We measure the bidder reference point (BREF) similar to how Baker, Pan, and Wurgler (2012) measured the reference point of public targets, based on the 52-week target high price over the 365 calendar days ending 30 days before the announcement date. Although the existing literature does not provide any proxies for the bidder reference point, the logic for choosing this specific measure is similar to that for choosing the target reference point. In order to avoid a biased reference point that has been

driven up by the insider and speculative trading characteristic to pre-merger announcements, we use the 52-week high that ends a month before the actual merger announcement date.

Variable Definitions and Model

To assess whether the price paid for private targets is associated with the reference point of private targets and the reference point of bidders, we estimate the following model:

$$\text{Premium} = \beta_0 + \beta_1 \text{TDISTANCE/BDISTANCE} + \beta_2 \text{TTECH} + \beta_3 \text{TSIZE} + \beta_4 \text{GROWTH} + \beta_5 \text{TPROFIT} + \beta_6 \text{TLIQ} + \beta_7 \text{TP/E} + \beta_8 \text{BSIZE} + \beta_9 \text{BLIQ} + \beta_{10} \text{BCONF} + \beta_{11} \text{ACTIVITY} + \beta_{12} \text{CASHPAY} + \beta_{13} \text{RELATED} + \beta_{14} \text{NUMBIDS} + u \quad (1)$$

. Where the dependent variable is the price paid for the private target as a multiple to fundamentals, using the two methods described in the previous section. Our primary independent variable is the reference point of the target (TDISTANCE). A second key independent variable is the bidder reference point (BDISTANCE), but this only applies to those observations in which the bidder used more than 50% stock as payment for the private target.

We control for characteristics that could affect the price paid for private targets. These variables are summarized below.

According to Ang and Kohers (2001), targets in the high tech industry (TTECH) may receive a higher premium than other firms because of the growth potential that they inherently represent. High tech firms are growth firms and bidders may overpay for them as they see the high tech firm as valuable high growth investment opportunities. We identify TTECH as a 1 if the target is in the high tech industry and 0 otherwise. We identify high tech companies by the following SIC codes: 3571, 3572, 3575, 3577, and 3578 (computer hardware), 3661, 3663, and 3669 (communications equipment), and 3674 (electronics), 3812 (navigation equipment), 3823, 3825, 3826, 3827, and 3829 (measuring and controlling devices), 4899 (communication services), or 7370, 7371, 7372, 7373, 7374, 7375, 7379 (software).

The size (TSIZE) of the target may determine the premium paid for public and private firms. Pagano, Panetta and Zingales (1998) note that small private firms do not have an alternative to become public except to get acquired by a public firm. They are simply too small to engage in an IPO. As a result,

the smaller private firms may have a weaker bargaining power in the negotiation with the bidder, accepting a lower premium. Another reason related to size that may result in a weaker bargaining position is related to the illiquidity of the small private firms as explained by Poulsen and Stegemoller (2008). If the need to raise cash, they may have no choice but to sell their firm at whatever premium the bidder is offering just to release the liquidity constraints. TSIZE (target size) is proxied by ln (TA).

The more attractive a target seems from the profitability and growth perspective, the more likely it is that the bidder will offer a higher premium. Cheng, Gup and Wall (1989) relate merger premiums to asset growth and profitability of the targets for the banking industry. Similar results are found by Rhoades (1987) and Beatty, Santomero and Smirlock (1987). We measure target growth (TGROWTH) by (i) the market to book ratio and (ii) the increase in sales, especially for the private firms that do not have market to book variables available

The profitability (TPROFIT) of the target is measured as the percent change in net income from the previous period. Another target related characteristics that we control for is the target liquidity (TLIQ), defined as the target's net working capital, or TCA-TCL. The less liquid the target, the stronger is the bargaining power of the bidder, resulting in lower premiums paid for the target.

The P/E heuristic (TP/E) is a proxy for the bidder's excessive optimism. The bidder is more willing to pay a higher premium if the firm under consideration is perceived to be a valuable and profitable firm. Both the ratio and the measure of bidder excessive optimism will be higher in stronger economic periods. It is measured as the most recent price/earnings for the target firm.

Faccio, McConnel and Stolin (2006) draw on Loderer and Martin (1990) and Schwert (2000)'s research to point out that the valuation effects of the bidders in response to an announced offer depend on the size of the bidding firms. As the valuation effect is related to the premium paid for the target, we include the size of the bidder, BSIZE (measured by ln (TA)), as a control variable in this analysis.

Ang and Kohers (2001) and Officer (2007) identify the importance of the bidder stock liquidity (BLIQ) of the exchange for the private firm that is acquired by a public bidder. They point out that "liquidity oriented sellers" may value the increased liquidity of shares trading on the NYSE and accept a

lower premium from the bidders that are trading on it. Conversely, the same sellers will ask for a higher premium if the seller is trading over the counter. Public firms may be less interested in the liquidity of the bidder, especially if they are already trading on a liquid exchange. Even for the public firms that are trading over the counter or on a less liquid exchange, moving to the NYSE is not as important as it is to the private firms. Therefore, we only control for bidder liquidity for the private target firms that are getting acquired. We assign a 1 if the bidder is traded on NYSE and 0 otherwise.

Bidder overconfidence (BCONF) is a behavioral bias that contributes to payment of a higher premium. Bidders that are more confident and optimistic are more willing to pay a higher premium because they are sure of the post-merger success. We assign a 1 to bidders that have been involved in any mergers since 1982 and 0 otherwise.

The activity (ACTIVITY) in the market may also influence the premium paid for the firm. The authors point out that in the private market, there might exist a phenomenon similar to the hot market for IPOs. A lot of activity in the market may lead to higher competition and therefore, higher premiums. A similar logic can be applied to the public firms. We measure the activity of the market by the natural log of the number of acquisitions that have been recorded in the same quarter.

The method of payment (CASHPAY) may result in a different premium the bidder pays because of tax considerations. Cash offers may force the bidder to pay a higher premium as the target investors have to immediately pay the taxes associated with the transaction. By comparison, stock offers allow the target investors to delay the payment of taxes until a later day, which may result in a lower premium demanded. However, the impact of mixed payment is more certain, so to account for the majority of cash, we use the percent cash.

The relatedness of the merger (RELATED) has been shown to affect the premium and the market valuation of the merger (Singh and Montgomery, 1987; Shelton, 1988). The synergistic gains expected from an acquisition are higher when the firms are related and the post merger integration can be done faster and easier. Therefore, some bidders may be willing to pay a higher premium for targets that are in the same industry.

Another reason that may affect the premium is the number of bidders (NUMBIDS) that are competing for the target. Increased competition will most likely result in an increased premium as bidders try to outbid each other. The higher is the competition for the target, the higher is the premium that the target can obtain as the result of the acquisition. We assign a 1 if multiple bids are recorded and 0 otherwise. Finally, although not shown in equation (1), we also account for economic conditions, as explained in the previous section.

IV. RESULTS

The results analyzing the impact of the target reference point on premium are presented in Table 2. We use the industry average (of public firms) and average/month match of actual deals, and three multiple measure, price to EPS, deal value to EBITDA and deal value to sales.

We find that the premium paid for private targets is higher, the higher the difference (TDISTANCE) between the value of the private firm and the implied reference point at the time of announcement. For example, when the implied reference point is based on comparable public firms (Method I) and the PriceEPS multiple, the coefficient on TDISTANCE is 0.198, which is significantly different from zero at the 1% level (the p-value is 0.001). The results are similar across the two Methods to estimate private firm value, and across the three multiples, with the only exception being Method II (actual deals) and the DealSales multiple. Overall, the results are consistent with Baker et al. (2012) findings for public firms.

Table 2 here

We report the results regarding the effect of the bidder reference point in stock acquisitions in Table 3. Using multiples of private firms, we find that a larger difference between the 52-week high and the current bidder stock price (i.e., the stock price 30 days prior to the announcement) is associated with a lower premium. For example, using comparable public firms (Method I) and the PriceEPS multiple, the coefficient on the bidder reference point (BDISTANCE) is -0.004 (the p-value is 0.068). As can be seen in Table 3, BDISTANCE is significantly negative across the six models we run, with estimated

coefficients that are significant at the 5% level in four cases. To our knowledge, this is the first time that a relationship between the bidder reference point and the offer premium has been documented.

Table 3 here

Consequently, when the distance between the bidder stock and its reference level is large, the bidder will offer a relatively small premium to the private firm. It is possible that, if private firms are more likely to complete the merger under the bidder's terms (i.e., they may have no other potions), the bidder will be successful in using its reference point to its advantage and hence paying a lower premium for the private target. Bidders may not be able to accomplish the same when acquiring a public firm.

Other factors that influence the premium paid for the private firms are target being a high tech firm (TTECH), target PE ratio (T P/E), bidder liquidity (BLIQ), bidder confidence (BCONF), the overall activity in the market (ACTIVITY), and the similarity of targets and bidders (RELATED). With the exception of bidder liquidity, all the other variables are the same that were found to be significant in Table 2. Consistent with our expectation, we also find that bidders that are trading on a more liquid exchange will pay a smaller premium for the target. Private firms may be more interested in the shares of bidders when they exhibit high liquidity and therefore, more willing to accept a lower premium the higher the liquidity of the bidder.

Next, we consider the possibility of time variation in the influence of reference points on the premium paid for private targets. Specifically we investigate the impact of the economy in tables 4 (target reference point) and 5 (bidder reference point). We also investigate the simultaneous influence of both reference points on the premium.

In Table 4, we report a positive relationship between TDISTANCE and premium, which is consistent with the results found in Table 2. This result offers additional reinforcement that the target reference point is associated with the premium paid for private targets. The three panels present the results for different multiples: price-to-EPS (panel A), deal-to-EBITDA (panel B) and deal-to-sales (panel C).

Table 4 here

As can be seen in Table 4, the variable ECONOMY is significant in only one specification out of six (when ECONOMY is measured by the S&P 500 index). Therefore, there is almost no evidence that the premium paid for private targets varies with economic conditions, after controlling for the other variables included in the regression. In contrast, the coefficient of the interaction term TDIST*ECON is positive and significant in four of the models; this is trueregardless of the multiple used. Thus, the relationship between the target reference point and the premium paid for private firms varies with the performance of the economy (TDIST*ECON). Since ECON is set equal to 1 when the economy is weak, the positive coefficient for this interaction term implies that the premium is more sensitive to TDIST when the economy is weak. Private firms probably realize that if they wait for the overall market conditions to improve, their valuation will be higher.

We report the results regarding bidder reference points in Table 5. Although the bidder reference point continues to significantly and negatively impact the premium, we do not find that the relationship is more pronounced when the economy is weak. With the exception one model, the interaction coefficient between BDIST*ECON is insignificant. Overall, we do not find any evidence that the negative relationship between the bidder reference point and the premium paid for the private target varies with the performance of the economy. While the target reference point impact on premium is sensitive to the performance of the economy, the bidder's reference point impact is not.

Table 5 here

We perform two important robustness checks of the previous results. First, in addition to exploring the impact of the target and bidder reference points on the premium paid for private firms independently, we combine the two reference points in the same model (for stock financed deals)[1]. Consistent with the previous results, the target reference distance (TDISTANCE) is positively and significantly related with the premium paid for private firms and the bidder reference distance (BDISTANCE) is inversely related with the premium paid for private firms.

[1] Results are omitted for brevity and are available upon request

Second, the impact of the reference point on the method of payment may be conditioned on the impact of the reference point on the premium paid. In other words, both the premium and the method of payment could be determined simultaneously. The target could be more willing to accept stock if the premium offered by the bidder is higher than the premium it can extract in a cash payment. On the other hand, the bidder may be more likely to offer undervalued stock if the premium is lower than the premium it has to pay in a cash deal. This dependence of the premium paid on the method of payment (and the other way around) leads to a simultaneous analysis of the target and bidder reference points on the method of payment and premium paid.

To test the simultaneous impact of the reference point on the method of payment and premium, we run a two-stage least squares regression, using the size of the bidder as an instrumental variable, following the literature that indicates that the size of the bidder is a major determinant of the method of payment. Ismail (2011) performs a similar analysis while investigating the effect of the "management synergy" on the simultaneous effect of premium and method of payment using a 2SLS regression[2]. We find that for private firms, independent of the method of payment, the target reference point distance (TDISTANCE) has an impact on the premium while the bidder reference point distance (BDISTANCE) does not. These results support our prior findings and are consistent with Baker, Wurgler and Pan's (2012) conclusions about public firms.

V. CONCLUSION

We contribute to the literature that examines the influence of reference points on acquisition premiums. We extend the literature along three dimensions. First, apply the reference point theory to acquisitions of private targets. Using comparable firms to derive an implied reference point for each private target, we find consistent evidence that a higher target reference point at the bid announcement is associated with a higher premium. This finding is consistent across two comparable-firm methods and three different valuation multiples.

[2] Other authors that use acquirer size as an instrument for the method of payment are Moeller (2004), Faccio and Masulis (2005), and Chemmanur, Paeglis and Simonyan (2009).

Second, we also find that there is a negative relation between the bidder reference point and the premium paid for private targets. The higher the distance between the bidder reference point and the stock price of the bidder before the acquisition, the lower is the price that the bidder is willing to pay for the target. This finding is also consistent across different methods, including controlling for endogeneity issues. To our knowledge, this is a new finding in the literature.

Finally, we consider the possibility that the influence of reference points on acquisition premiums varies with market conditions. We find that this is indeed the case for target reference points, but nor for bidder reference points. More specifically, the influence of the target reference point on premiums is diminished during periods of good economic conditions. In contrast, there is no evidence that bidder reference points affect premiums in stock-financed acquisitions differently depending on economic conditions. Overall, our findings confirm existing evidence that behavioral biases (reference points) are an important determinant of observed acquisition premiums.

References

Table 1. Descriptive Statistics

TDISTANCE is calculated as the distance between the 52-week target high price over the 365 calendar days ending 30 days prior to the announcement date obtained from CRSP and the stock price 30 days before the merger announcement. BDISTANCE is calculated as the distance between the 52-week target high price over the 365 calendar days ending 30 days prior to the announcement date obtained from CRSP.
Model I uses industry average multiples of public firms to calculate the reference point for the private firm and Model II uses actual deals industry average multiples.
The following control variables are used in the model: TTECH (target high tech firm, 1 if the target is a technology firm and 0 otherwise), TSIZE (target size is proxied by ln (TA)), TGROWTH ((1) the market to book ratio and (2) by the increase in sales, especially for the private firms that do not have market to book variables available), TPROFIT (change in NI), TLIQ (TNWC), BSIZE (bidder size is proxied by ln (TA)), T P/E (most recent price/earnings), BLIQ (bidder liquidity is the ratio of cash and marketable securities to total assets), BCONF (1 if the bidder has been involved in any mergers since 1982 and 0 otherwise), ACTIVITY (ln of the number of bids in the same quarter), CASHPAY (percent of cash offered in the deal), RELATED (if the bidder and the seller are in the same four digits SIC code and 0 otherwise), and NUMBIDS (1 is assigned if multiple bids are recorded in SDC and 0 otherwise.

Variable	Method I Mean (SD)	Method I Median	Method II Mean (SD)	Method II Median
TDISTANCE	28.12 (15.04)	20.33	36.22 (20.45)	30.80
BDISTANCE	22.64 (21.55)	17.75	25.30 (27.85)	26.03
TTECH	28.23 (30.22)	25.22	20.22 (24.12)	20.36
TSIZE	2.20 (1.22)	1.89	1.85 (0.87)	1.55
TGROWTH	3.30 (2.26)	1.58	4.12 (2.10)	3.22
TPROFIT	3.32 (15.02)	1.65	1.80 (20.44)	0.56
TLIQ	15.52 (10.80)	12.08	20.12 (15.22)	18.04
TP/E	13.28 (11.90)	15.52	13.00 (15.05)	12.86
BSIZE	9.98 (30.12)	7.24	8.85 (22.40)	5.88
BLIQ	15.25 (28.22)	17.25	20.20 (35.88)	24.66
BCONF	25.22 (20.24)	21.16	18.18 (25.52)	17.33
ACTIVITY	13.33 (28.85)	6.14	20.14 (15.66)	8.85
CASHPAY	52.57 (22.13)	40.13	58.33 (30.64)	51.12
RELATED	58.25 (31.18)	40.47	69.22 (40.17)	50.39
NUMBIDS	13.35 (10.44)	2.80	8.23 (12.45)	9.88

Table 2. Target reference point and premium for private targets (Test of H1)

Dependent Variable: Private firms' premium calculated based on: price to earnings, deal value to EBITDA, and deal value to sales multiples.
TDISTANCE is calculated as the distance between the 52-week target high price over the 365 calendar days ending 30 days prior to the announcement date obtained from CRSP and the stock price 30 days before the merger announcement. Model I uses industry average multiples of public firms to calculate the reference point for the private firm and Model II uses actual deals industry average multiples.
The following control variables are used in the model: TTECH (target high tech firm, 1 if the target is a technology firm and 0 otherwise), TSIZE (target size is proxied by ln (TA)), TGROWTH ((1) the market to book ratio and (2) by the increase in sales, especially for the private firms that do not have market to book variables available), TPROFIT (change in NI), TLIQ (TNWC), BSIZE (bidder size is proxied by ln (TA)), T P/E (most recent price/earnings), BLIQ (bidder liquidity is the ratio of cash and marketable securities to total assets), BCONF (1 if the bidder has been involved in any mergers since 1982 and 0 otherwise), ACTIVITY (ln of the number of bids in the same quarter), CASHPAY (percent of cash offered in the deal), RELATED (if the bidder and the seller are in the same four digits SIC code and 0 otherwise), and NUMBIDS (1 is assigned if multiple bids are recorded in SDC and 0 otherwise.

Variable	Coeff (PValue) Method I PriceEPS	Coeff (PValue) Method I DealEBITDA	Coeff (PValue) Method I DealSales	Coeff (PValue) Method II PriceEPS	Coeff (PValue) Method II DealEBITDA	Coeff (PValue) Method II DealSales
Constant	9.2890 (0.497)	1.989 (0.155)	9.177 (0.256)	5.457 (0.851)	3.84 (0.262)	6.983 (0.078)**
TDISTANCE	0.198 (0.001)***	0.109 (0.000)***	0.811 (0.000)***	0.0438 (0.02)**	0.476 (0.000)***	0.608 (0.182)
TTECH	7.6313 (0.028)**	6.788 (0.078)*	3.005 (0.002)***	7.8293 (0.050)**	6.8144 (0.036)**	2.249 (0.086)*
TSIZE	6.250 (0.035)**	0.908 (0.632)	1.9977 (0.412)	3.1780 (0.747)	0.6904 (0.089)*	1.3407 (0.090)*
TGROWTH	0.1055 (0.159)	1.3922 (0.502)	4.578 (0.555)	0.020 (0.610)	1.164 (0.613)	3.194 (0.618)
TPROFIT	0.946 (0.595)	1.2117 (0.318)	0.0410 (0.816)	1.119 (0.406)	1.001 (0.555)	0.0511 (0.700)
TLIQ	1.3547 (0.406)	0.5819 (0.008)***	1.738 (0.008)***	0.4147 (0.975)	0.499 (0.000)***	1.0324 (0.019)**
TP/E	0.822 (0.000)***	0.1799 (0.000)***	0.0090 (0.564)	0.0109 (0.530)	0.2243 (0.032)**	0.0113 (0.541)
BSIZE	-0.908 (0.807)	0.7449 (0.536)	1.0973 (0.393)	0.0644 (0.442)	0.6847 (0.328)	1.5251 (0.080)*
BLIQ	-0.506 (0.951)	-1.4539 (0.157)	-2.8112 (0.660)	-0.3661 (0.631)	-1.616 (0.521)	-1.625 (0.334)
BCONF	6.148 (0.582)	4.5062 (0.212)	1.1712 (0.292)	5.670 (0.771)	5.102 (0.305)	0.2441 (0.895)
ACTIVITY	2.2379 (0.358)	4.7708 (0.111)	7.0375 (0.091)*	3.777 (0.749)	3.9462 (0.265)	8.8567 (0.088)**
CASHPAY	-0.1406 (0.411)	-0.135 (0.286)	-0.1422 (0.733)	-0.3895 (0.682)	0.547 (0.344)	-0.100 (0.847)
RELATED	4.414 (0.583)	0.9220 (0.015)**	2.4057 (0.746)	7.7851 (0.650)	0.030 (0.660)	3.200 (0.079)*
NUMBIDS	2.6867 (0.813)	1.672 (0.169)	1.858 (0.129)	2.128 (0.903)	0.711 (0.864)	1.410 (0.266)
N	1,452	1,401	1,452	1,452	1,401	1,452
PVALUE	0.0000	0.0000	0.0814	0.0235	0.0030	0.0316
R^2	0.0861	0.1450	0.0750	0.0955	0.0781	0.0428

Table 3. Bidder reference point and premium for private targets (Test of H2)

Dependent Variable: Private firms' premium calculated based on: price to earnings, deal value to EBITDA, and deal value to sales multiples.
BDISTANCE is calculated as the distance between the 52-week target high price over the 365 calendar days ending 30 days prior to the announcement date obtained from CRSP. Model I uses industry average multiples of public firms to calculate the reference point for the private firm and Model II uses actual deals industry average multiples.
The following control variables are used in the model[3]: TTECH (target high tech firm, 1 if the target is a technology firm and 0 otherwise), TSIZE (target size is proxied by ln (TA)), TGROWTH ((1) the market to book ratio and (2) by the increase in sales, especially for the private firms that do not have market to book variables available), TPROFIT (change in NI), TLIQ (TNWC), BSIZE (bidder size is proxied by ln (TA)), T P/E (most recent price/earnings), BLIQ (bidder liquidity is the ratio of cash and marketable securities to total assets), BCONF (1 if the bidder has been involved in any mergers since 1982 and 0 otherwise), ACTIVITY (ln of the number of bids in the same quarter), CASHPAY (percent of cash offered in the deal), RELATED (if the bidder and the seller are in the same four digits SIC code and 0 otherwise), and NUMBIDS (1 is assigned if multiple bids are recorded in SDC and 0 otherwise.

Variable	Coeff (PValue) Method I PriceEPS	Coeff (PValue) Method I DealEBITDA	Coeff (PValue) Method I DealSales	Coeff (PValue) Method II PriceEPS	Coeff (PValue) Method II DealEBITDA	Coeff (PValue) Method II DealSales
Constant	8.1751 (0.720)	8.361 (0.927)	5.8013 (0.686)	5.1358 (0.268)	3.8022 (0.018)**	3.9724 (0.362)
BDISTANCE	-0.004 (0.068)*	-0.002 (0.005)***	-0.006 (0.008)***	-0.034 (0.043)**	-0.0008 (0.023)**	-0.0003 (0.089)*
TTECH	6.390 (0.000)***	8.8341 (0.000)***	4.277 (0.003)***	2.8953 (0.262)	0.8451 (0.286)	0.6845 (0.050)**
TSIZE	1.418 (0.488)	2.5433 (0.010)**	0.7754 (0.896)	0.0979 (0.876)	0.0943 (0.808)	0.057 (0.560)
TPROFIT	0.8538 (0.685)	1.3850 (0.055)*	0.0756 (0.954)	0.0195 (0.798)	0.0209 (0.357)	0.0083 (0.323)
TLIQ	1.2025 (0.580)	2.5833 (0.231)	1.2044 (0.947)	3.2030 (0.317)	0.0303 (0.833)	0.0496 (0.757)
TP/E	0.0854 (0.053)*	-0.0275 (0.407)	0.3776 (0.006)***	0.101 (0.400)**	0.0005 (0.344)	0.0002 (0.050)**
BSIZE	1.4919 (0.889)	1.3884 (0.443)	1.5733 (0.140)	-0.4480 (0.457)	0.4046 (0.278)	0.3155 (0.181)
BLIQ	-3.320 (0.020)**	-4.96 (0.085)*	-3.473 (0.044)**	-0.3955 (0.777)	-1.9714 (0.034)**	-0.7369 (0.100)*
BCONF	1.364 (0.305)	1.6072 (0.048)*	0.8601 (0.312)	1.0237 (0.023)**	0.7530 (0.334)	0.0048 (0.987)
ACTIVITY	1.598 (0.544)	1.218 (0.023)**	1.0625 (0.681)	1.1045 (0.169)	1.7503 (0.020)**	1.5852 (0.083)*
CASHPAY	0.9722 (0.148)	-0.5956 (0.431)	-0.6623 (0.314)	---	--	--
RELATED	3.9628 (0.024)**	3.8537 (0.001)***	2.8748 (0.048)**	0.5691 (0.674)	0.1563 (0.823)	0.5416 (0.241)
NUMBIDS	4.145 (0.000)***	1.218 (0.023)**	1.7272 (0.117)	3.812 (0.001)***	1.559 (0.000)***	1.160 (0.030)**
N	1,225	1,229	1,225	1,225	1,229	1,225
PVALUE	0.0000	0.0000	0.0000	0.0380	0.0411	0.0302
R^2	0.1116	0.1132	0.1300	0.0636	0.1209	0.1191

[3] -- denotes that a variable was dropped from a specific model because of the lack in data variability (in case of dummy variables) or due to high correlation with other variables in the same model.

Table 4. Target reference point, the economy, and premium paid for private targets (Test of H3)[4]

Dependent Variable: Private firms' premium calculated based on the match with public firms' industry average for price to earnings, deal value to EBITDA, and deal value to sales multiples. TDISTANCE is calculated as the distance between the 52-week target high price over the 365 calendar days ending 30 days prior to the announcement date obtained from CRSP.

Four different measures of the economy are used : (I) official NBER data, where 1 represents a bad economy, and zero otherwise, (II) the performance of the SPY index by month. The top 25% worst performing months are assigned a 1 (bad economy) and the rest a 0 (good economy). (III) the performance of the SPY index by month used as a continuous variable. (IV) VIX performance by month. The top 25% highest months are assigned a 1 (high volatility=bad economy) and the rest a 0 (low volatility=good economy) (V) VIX performance by month used as a continuous variable. (VI) Harford's liquidity measure by quarter used as a continuous variable. It is defined as the spread between the average interest rate on commercial and industrial loans and the Federal Funds rate.

The following control variables are used in the model: TTECH (target high tech firm, 1 if the target is a technology firm and 0 otherwise), TSIZE (target size is proxied by ln (TA)), TGROWTH ((1) the market to book ratio and (2) by the increase in sales, especially for the private firms that do not have market to book variables available), TPROFIT (change in NI), TLIQ (TNWC), BSIZE (bidder size is proxied by ln (TA)), T P/E (most recent price/earnings), BLIQ (bidder liquidity is the ratio of cash and marketable securities to total assets), BCONF (1 if the bidder has been involved in any mergers since 1982 and 0 otherwise), ACTIVITY (ln of the number of bids in the same quarter), CASHPAY (percent of cash offered in the deal), RELATED (if the bidder and the seller are in the same four digits SIC code and 0 otherwise), and NUMBIDS (1 is assigned if multiple bids are recorded in SDC and 0 otherwise)[5].

Panel A: using Price-to-EPS as a multiple to calculate premium

Variable	Coeff (PValue) PriceEPS Economy I	Coeff (PValue) PriceEPS Economy II	Coeff (PValue) PriceEPS Economy III	Coeff (PValue) PriceEPS Economy IV	Coeff (PValue) PriceEPS Economy V	Coeff (PValue) PriceEPS Economy VI
Constant	7.388 (0.404)	6.818 (0.703)	2.386 (0.917)	1.844 (0.435)	1.202 (0.349)	2.054 (0.352)
TDISTANCE	0.367 (0.000)***	0.398 (0.000)***	0.303 (0.000)***	0.365 (0.001)***	0.490 (0.008)***	0.486 (0.002)***
ECONOMY	1.720 (0.489)	2.195 (0.029)	3.982 (0.003)***	1.568 (0.585)	0.291 (0.797)	5.065 (0.250)
TDIST*ECON	0.131 (0.025)**	-0.267 (0.003)***	0.039 (0.014)**	0.008 (0.440)	0.009 (0.021)**	0.066 (0.035)**
TTECH	7.604 (0.000)***	3.776 (0.003)***	6.835 (0.478)	3.019 (0.004)***	2.589 (0.005)***	2.748 (0.007)***
TSIZE	1.823 (0.672)	1.188 (0.883)	1.807 (0.470)	1.653 (0.820)	2.653 (0.766)	0.948 (0.903)
TPROFIT	3.093 (0.682)	2.882 (0.715)	2.151 (0.812)	1.900 (0.916)	3.800 (0.774)	2.017 (0.852)
TLIQ	0.248 (0.735)	1.441 (0.157)	1.345 (0.118)	1.369 (0.237)	1.566 (0.355)	1.669 (0.207)
TP/E	0.762 (0.000)***	0.654 (0.000)***	0.596 (0.000)***	0.679 (0.000)***	0.716 (0.000)***	0.679 (0.000)***
BSIZE	1.9559 (0.523)	-2.741 (0.732)	-3.800 (0.337)	-1.408 (0.860)	-0.749 (0.935)	-2.551 (0.760)
BLIQ	-4.877 (0.510)	-2.104 (0.130)	-2.435 (0.169)	-1.938 (0.217)	-2.539 (0.253)	-2.717 (0.209)
BCONF	2.205 (0.404)	0.182 (0.343)	0.131 (0.496)	0.237 (0.403)	1.162 (0.534)	1.599 (0.473)
ACTIVITY	4.664 (0.813)	3.947 (0.732)	4.113 (0.905)	4.601 (0.464)	2.654 (0.766)	3.549 (0.374)
CASHPAY	-0.277 (0.189)	-0.182 (0.343)	-0.131 (0.496)	-0.295 (0.162)	-0.207 (0.321)	-0.343 (0.089)*
RELATED	3.247 (0.022)**	4.104 (0.031)**	4.485 (0.027)**	5.986 (0.040)**	2.242 (0.030)**	1.382 (0.022)**
NUMBIDS	5.049 (0.484)	5.646 (0.243)	7.584 (0.155)	5.455 (0.241)	4.210 (0.288)	2.383 (0.069)
N	1,452	1,401	1,452	1,452	1,401	1,452

[4] Due to the similarity of results, we present the ones for Method I matching only, *using industry average multiples of public firm.*

[5] TGROWTH was dropped due to high correlation with T P/E and TSIZE.

PVALUE	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
R^2	0.0800	0.0909	0.0994	0.0889	0.0826	0.0821

Panel B: Deal-to-EBITDA as a multiple to calculate premium

Variable	Coeff (PValue) DealEBITDA Economy I	Coeff (PValue) DealEBITDA Economy II	Coeff (PValue) DealEBITDA Economy III	Coeff (PValue) DealEBITDA Economy IV	Coeff (PValue) DealEBITDA Economy V	Coeff (PValue) DealEBITDA Economy VI
Constant	5.796 (0.909)	3.118 (0.674)	4.681 (0.606)	4.657 (0.579)	4.192 (0.335)	5.053 (0.461)
TDISTANCE	0.104 (0.000)***	0.092 (0.000)***	0.095 (0.001)***	0.105 (0.000)***	0.097 (0.000)***	0.097 (0.000)***
ECONOMY	4.395 (0.262)	5.342 (0.222)	0.339 (0.584)	1.293 (0.733)	0.430 (0.094)*	1.521 (0.434)
TDIST*ECON	0.085 (0.001)***	-0.019 (0.578)	0.001 (0.820)	0.044 (0.098)*	0.000 (0.059)*	0.002 (0.002)***
TPROFIT	1.128 (0.558)	1.881 (0.449)	0.991 (0.775)	1.640 (0.500)	2.001 (0.335)	0.997 (0.782)
TTECH	5.309 (0.303)	4.317 (0.426)	4.023 (0.453)	4.416 (0.394)	2.412 (0.617)	2.167(0.671)
TSIZE	2.475 (0.131)	2.353 (0.178)	2.471 (0.157)	1.832 (0.254)	2.552 (0.124)	2.571 (0.129)
TLIQ	0.785 (0.009)***	0.676 (0.038)**	0.719 (0.044)**	0.361 (0.185)	0.599 (0.035)**	0.695 (0.020)**
BSIZE	1.083 (0.287)	0.951 (0.345)	1.017 (0.315)	0.745 (0.457)	1.045 (0.307)	0.993 (0.324)
TP/E	0.108 (0.001)***	0.121 (0.001)***	0.118 (0.001)***	0.111 (0.001)***	0.125 (0.000)***	0.126 (0.000)***
BLIQ	-6.202 (0.203)	-5.845 (0.233)	-6.063 (0.223)	-5.449 (0.259)	-5.002 (0.318)	-5.450 (0.274)
BCONF	4.770 (0.245)	1.908 (0.639)	2.292 (0.584)	2.206 (0.590)	2.183 (0.582)	2.280 (0.566)
ACTIVITY	2.013 (0.797)	4.774 (0.572)	5.139 (0.549)	6.973 (0.399)	10.836 (0.223)	9.796 (0.412)
CASHPAY	-0.058 (0.400)	-0.059 (0.388)	-0.050 (0.486)	-0.047 (0.509)	-0.048 (0.465)	-0.053 (0.444)
RELATED	6.677 (0.045)**	7.582 (0.172)	6.849 (0.218)	7.760 (0.179)	5.224 (0.351)	6.175 (0.281)
NUMBIDS	1.156 (0.224)	1.532 (0.180)	1.757 (0.199)	1.089 (0.185)	1.389 (0.182)	1.357 (0.209)
N	1,401	1,401	1,401	1,401	1,401	1,401
PVALUE	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
R^2	0.0425	0.0417	0.0399	0.0412	0.4070	0.0424

Panel C: Deal-to-Sales as a multiple to calculate premium

Variable	Coeff (PValue) DealSales Economy I	Coeff (PValue) DealSales Economy II	Coeff (PValue) DealSales Economy III	Coeff (PValue) DealSales Economy IV	Coeff (PValue) DealSales Economy V	Coeff (PValue) DealSales Economy VI
Constant	5.760 (0.806)	5.027 (0.962)	2.659 (0.799)	2.297 (0.140)	2.413 (0.553)	4.439 (0.186)
TDISTANCE	0.109 (0.035)**	0.115 (0.039)**	0.087 (0.169)	0.067 (0.000)***	0.163 (0.542)	0.028 (0.000)***
ECONOMY	1.326 (0.467)	1.475 (0.202)	2.747 (0.000)***	7.286 (0.419)	7.699 (0.279)	7.659 (0.053)*
TDIST*ECON	0.414 (0.627)	-0.218 (0.445)	0.090 (0.004)***	0.481 (0.025)**	0.020 (0.370)	0.428 (0.000)***
TTECH	4.875 (0.363)	4.121 (0.311)	3.078 (0.321)	2.694 (0.409)	4.185 (0.405)	6.828 (0.049)**
TSIZE	0.9062 (0.173)	0.842 (0.179)	0.157 (0.114)	0.464 (0.066)*	0.080 (0.079)*	0.647 (0.864)
TPROFIT	2.441 (0.331)	2.121 (0.415)	1.337 (0.773)	2.991 (0.188)	1.110 (0.884)	2.001 (0.412)
TLIQ	1.970 (0.101)	2.870 (0.087)*	1.563 (0.078)*	1.193 (0.079)*	0.700 (0.086)*	1.965 (0.053)*
TP/E	0.485 (0.220)	0.370 (0.187)	0.063 (0.497)	0.273 (0.005)***	0.375 (0.032)**	0.021 (0.494)

BSIZE	2.060 (0.223)	3.240 (0.250)	4.817 (0.539)	3.889 (0.133)	3.211 (0.140)	2.160 (0.297)
BLIQ	-1.519 (0.721)	-1.024 (0.676)	-2.956 (0.398)	-1.009 (0.198)	-2.017 (0.389)	-1.843 (0.731)
BCONF	1.105 (0.019)**	1.997 (0.012)**	1.458 (0.012)***	1.314 (0.031)**	1.189 (0.023)**	2.959 (0.044)**
ACTIVITY	2.830 (0.915)	2.664 (0.899)	2.109 (0.107)	2.967 (0.059)*	1.858 (0.155)	1.008 (0.080)*
CASHPAY	-0.313 (0.079)*	-0.201 (0.046)**	-0.577 (0.180)	-0.306 (0.0910)*	-0.313 (0.083)*	-0.176 (0.308)
RELATED	1.979 (0.090)*	1.679 (0.069)*	1.060 (0.011)**	1.746 (0.163)	1.752 (0.069)*	1.873 (0.033)**
NUMBIDS	4.129 (0.626)	3.626 (0.967)	5.033 (0.232)	3.998 (0.930)	2.253 (0.660)	1.663 (0.166)
N	1,452	1,452	1,452	1,452	1,452	1,452
PVALUE	0.0116	0.0000	0.0000	0.0000	0.0000	0.0000
R^2	0.0380	0.0687	0.0665	0.0608	0.0499	0.0985

Table 5. Bidder reference point, the economy, and premium paid for private targets (Test of H3)[6]

Dependent Variable: Private firms' premium calculated based on the match with public firms' industry average: price to earnings, deal value to EBITDA, and deal value to sales multiples. The sample only includes firms that are primarily financed with stock. BDISTANCE is calculated based as the 52-week bidder high price over the 365 calendar days ending 30 days prior to the announcement date obtained from CRSP.

Four different measures of the economy are used : (I) official NBER data, where 1 represents a bad economy, and zero otherwise, II) the performance of the SPY index by month. The top 25% worst performing months are assigned a 1 (bad economy) and the rest a 0 (good economy). (III) the performance of the SPY index by month used as a continuous variable. (IV) VIX performance by month. The top 25% highest months are assigned a 1 (high volatility=bad economy) and the rest a 0 (low volatility=good economy) (V) VIX performance by month used as a continuous variable. (VI) Harford's liquidity measure by quarter used as a continuous variable. It is defined as the spread between the average interest rate on commercial and industrial loans and the Federal Funds rate.

The following control variables are used in the model: TTECH (target high tech firm, 1 if the target is a technology firm and 0 otherwise), TSIZE (target size is proxied by ln (TA)), TGROWTH ((1) the market to book ratio and (2) by the increase in sales, especially for the private firms that do not have market to book variables available), TPROFIT (change in NI), TLIQ (TNWC), BSIZE (bidder size is proxied by ln (TA)), T P/E (most recent price/earnings), BLIQ (bidder liquidity is the ratio of cash and marketable securities to total assets), BCONF (1 if the bidder has been involved in any mergers since 1982 and 0 otherwise), ACTIVITY (ln of the number of bids in the same quarter), CASHPAY (percent of cash offered in the deal), RELATED (if the bidder and the seller are in the same four digits SIC code and 0 otherwise), and NUMBIDS (1 is assigned if multiple bids are recorded in SDC and 0 otherwise.

Panel A: using Price-to-EPS as a multiple to calculate premium

Variable	Coeff (PValue) PriceEPS Economy I	Coeff (PValue) PriceEPS Economy II	Coeff (PValue) PriceEPS Economy III	Coeff (PValue) PriceEPS Economy IV	Coeff (PValue) PriceEPS Economy V	Coeff (PValue) PriceEPS Economy VI
Constant	2.349 (0.270)	2.815 (0.274)	2.469 (0.243)	2.675 (0.257)	1.915 (0.437)	2.096 (0.255)
BDISTANCE	-0.193 (0.085)*	-0.315 (0.077)*	-0.819 (0.059)*	-0.273 (0.491)	-0.094 (0.777)	-0.864 (0.065)*
ECONOMY	-4.697 (0.919)	-2.144 (0.495)	-3.467 (0.376)	-2.802 (0.519)	-2.072 (0.412)	-6.826 (0.216)
BDIST*ECON	-1.939 (0.551)	2.759 (0.575)	-0.631 (0.154)	-0.234 (0.863)	-0.029 (0.759)	-0.648 (0.583)
TTECH	3.732 (0.000)***	3.174 (0.000)***	3.812 (0.000)***	3.013 (0.000)***	3.417(0.000)***	3.740 (0.000)***
TSIZE	1.207 (0.422)	1.131 (0.380)	1.969 (0.424)	1.297 (0.414)	2.695 (0.811)	1.278 (0.376)
TP/E	0.030 (0.638)	0.030 (0.639)	0.032 (0.614)	0.032 (0.618)	0.031 (0.639)	0.030 (0.642)
TPROFIT	0.703 (0.497)	0.745 (0.466)	0.536 (0.602)	0.721 (0.487)	0.698 (0.501)	0.701 (0.501)
TLIQ	1.092 (0.638)	0.846 (0.711)	1.059 (0.630)	1.308 (0.551)	1.261 (0.582)	1.133 (0.609)
BSIZE	3.506 (0.755)	3.549 (0.750)	2.643 (0.813)	3.386 (0.761)	2.695 (0.811)	2.905 (0.794)
BLIQ	-0.867 (0.018)**	-0.864 (0.020)**	-0.868 (0.019)**	-0.855 (0.021)**	-0.869 (0.021)**	-0.863 (0.019)**
BCONF	3.928 (0.322)	3.905 (0.346)	3.594 (0.289)	3.457 (0.326)	3.851 (0.335)	3.758 (0.325)
ACTIVITY	1.604 (0.221)	1.497 (0.223)	1.622 (0.196)	1.669 (0.210)	1.714 (0.188)	1.932 (0.216)
CASHPAY	0.772 (0.218)	0.695 (0.251)	0.497 (0.417)	0.732 (0.234)	0.731 (0.235)	0.794 (0.200)
RELATED	1.007 (0.076)*	0.705 (0.081)*	0.741 (0.072)*	0.728 (0.074)*	0.726 (0.076)*	1.802 (0.081)*
NUMBIDS	2.076 (0.000)***	2.728 (0.000)***	2.435 (0.000)***	2.792 (0.000)***	2.990 (0.000)***	2.012 (0.000)***
N	1,225	1,225	1,225	1,225	1,225	1,225
PVALUE	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
R^2	0.1125	0.1134	0.1137	0.1130	0.1135	0.1129

[6] Due to the similarity of results, we present the ones for Method I matching only, *using industry average multiples of public firm.*

Panel B: Deal-to-EBITDA as a multiple to calculate premium

Variable	Coeff (PValue) DealEBITDA Economy I	Coeff (PValue) DealEBITDA Economy II	Coeff (PValue) DealEBITDA Economy III	Coeff (PValue) DealEBITDA Economy IV	Coeff (PValue) DealEBITDA Economy V	Coeff (PValue) DealEBITDA Economy VI
Constant	0.663 (0.878)	0.943 (0.833)	1.042 (0.816)	1.733 (0.713)	3.403 (0.638)	0.560 (0.937)
BDISTANCE	-2.393 (0.002)***	-2.388 (0.001)***	-2.488 (0.003)***	-2.958 (0.001)***	-6.846 (0.001)***	-0.790 (0.682)
ECONOMY	-1.276 (.0169)	-1.033 (0.064)*	-2.656 (0.537)	-1.259 (0.610)	-4.428 (0.300)	-4.727 (0.831)
BDIST*ECON	-1.011 (0.169)	0.646 (0.526)	-0.015 (0.893)	-0.803 (0.217)	-0.172 (0.008)***	-1.035 (0.372)
TTECH	1.878 (0.000)***	1.800 (0.000)***	1.817 (0.000)***	1.710 (0.000)***	1.255 (0.000)***	1.315 (0.000)***
TSIZE	3.450 (0.001)***	3.397 (0.000)***	3.451 (0.000)***	3.349 (0.000)***	3.149 (0.000)***	3.517 (0.000)***
TPROFIT	3.042 (0.000)***	3.153 (0.000)***	3.150 (0.000)***	3.159 (0.000)***	3.202 (0.000)***	3.220 (0.000)***
TLIQ	1.290 (0.001)***	1.653 (0.000)***	1.043 (0.000)***	1.235 (0.000)***	2.018 (0.000)***	1.891 (0.000)***
TP/E	0.027 (0.323)	0.029 (0.295)	0.029 (0.311)	0.024 (0.374)	0.027 (0.329)	0.026 (0.348)
BSIZE	4.308 (0.714)	1.383 (0.908)	1.528 (0.899)	1.895 (0.874)	3.107 (0.787)	2.091 (0.862)
BLIQ	-0.703 (0.105)	-0.786 (0.075)*	-0.774 (0.049)**	-0.769 (0.080)*	-0.808 (0.068)*	-0.765 (0.082)*
BCONF	3.931 (0.174)	4.405 (0.142)	4.551 (0.148)	4.489 (0.142)	4.549 (0.139)	4.204 (0.135)
ACTIVITY	0.892 (0.895)	1.545 (0.867)	1.393 (0.870)	2.277 (0.749)	3.273 (0.488)	1.730 (0.909)
CASHPAY	-0.365 (0.607)	-0.574 (0.449)	-0.766 (0.336)	-0.578 (0.443)	-0.413 (0.527)	-0.526 (0.475)
RELATED	1.237 (0.000)***	0.991 (0.000)***	0.983 (0.000)***	0.973 (0.000)***	0.962 (0.000)***	0.954 (0.000)***
NUMBIDS	1.758 (0.541)	1.021 (0.562)	2.780 (0.446)	2.507 (0.460)	0.932 (0.781)	2.530 (0.545)
N	1,229	1,229	1,229	1,229	1,229	1,229
PVALUE	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
R^2	0.1412	0.1322	0.1294	0.1291	0.1405	0.1288

Panel C: Deal-to-Sales as a multiple to calculate premium

Variable	Coeff (PValue) DealSales Economy I	Coeff (PValue) DealSales Economy II	Coeff (PValue) DealSales Economy III	Coeff (PValue) DealSales Economy IV	Coeff (PValue) DealSales Economy V	Coeff (PValue) DealSales Economy VI
Constant	3.912 (0.347)	3.404 (0.335)	3.597 (0.349)	1.968 (0.954)	1.430 (0.453)	1.799 (0.978)
BDISTANCE	-2.396 (0.260)	-1.218 (0.055)*	-1.391 (0.252)	-3.950 (0.062)*	-2.298 (0.036)**	-1.309 (0.053)*
ECONOMY	-2.292 (0.278)	-3.449 (0.165)	-1.892 (0.409)	-1.055 (0.621)	-1.297 (0.409)	-1.182 (0.479)
BDIST*ECON	-0.914 (0.727)	-0.214 (0.607)	-0.086 (0.826)	-0.310 (0.559)	-0.491 (0.461)	-1.447 (0.382)
TTECH	4.738 (0.100)*	4.068 (0.105)	4.423 (0.104)	4.852 (0.095)*	4.685 (0.090)*	3.918 (0.073)*
TSIZE	0.872 (0.034)**	0.831 (0.032)**	0.849 (0.032)**	1.140 (0.048)**	0.804 (0.033)**	0.747 (0.033)**
TPROFIT	1.380 (0.278)	1.548 (0.273)	1.692 (0.272)	1.669 (0.273)	1.770 (0.273)	1.037 (0.269)
TLIQ	1.378 (0.082)*	1.280 (0.088)*	1.071 (0.091)*	1.038 (0.081)*	1.752 (0.0591)*	1.082 (0.078)*
TP/E	0.042 (0.852)	0.060 (0.792)	0.088 (0.829)	0.031 (0.885)	0.036 (0.868)	0.052 (0.818)
BSIZE	3.471 (0.071)*	3.224 (0.062)*	3.399 (0.063)*	3.350 (0.061)*	4.403 (0.021)**	4.293 (0.064)*
BLIQ	-3.411 (0.060)*	-3.432 (0.060)*	-3.650 (0.062)*	-3.394 (0.071)*	-3.565 (0.067)*	-3.400 (0.055)*

BCONF	5.562 (0.165)	5.809 (0.162)	5.609 (0.163)	5.286 (0.165)	5.961 (0.163)	5.740 (0.160)
ACTIVITY	4.104 (0.451)	4.040 (0.433)	4.527 (0.445)	3.309 (0.500)	2.718 (0.641)	1.458 (0.902)
CASHPAY	-0.419 (0.142)	-0.425 (0130)	-0.400 (0.149)	-0.405 (0.158)	-0.400 (0.165)	-0.405 (0.145)
RELATED	4.577 (0.183)	4.693 (0.186)	4.538 (0.183)	4.940 (0.181)	4.177 (0.183)	4.455 (0.178)
NUMBIDS	1.709 (0.221)	1.848 (0.120)	1.730 (0.216)	1.546 (0.245)	1.062 (0.178)	0.633 (0.750)
N	1,225	1,225	1,225	1,225	1,225	1,225
PVALUE	0.0036	0.0064	0.0038	0.0044	0.0070	0.0035
R^2	0.0628	0.0650	0.0628	0.0621	0.0634	0.0619