

Does Investor Misvaluation Drive the Takeover Market?

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ABSTRACT

This paper uses pre-offer market valuations to evaluate the misvaluation and Q theories of takeovers. Bidder and target valuations (price-to-book, or price-to-residual-income-model-value) are related to means of payment, mode of acquisition, premia, target hostility, offer success, and bidder and target announcement-period returns. The evidence is broadly consistent with both hypotheses. The evidence for the Q hypothesis is stronger in the pre-1990 period than in the 1990–2000 period, whereas the evidence for the misvaluation hypothesis is stronger in the 1990–2000 period than in the pre-1990 period.

Now I'll use my hype-inflated stock to buy companies that have real value.

—Dogbert speaking to Ratbert, *Excuse Me While I Wag*,
Scott Adams, Andrews McMeel Publishing, Kansas City, Missouri, 2001.

The biggest reason AOL Time Warner has been such a dog for investors is that the deal creating the company was done on terms that were insane. And the really painful part is that this was perfectly clear at the time. . . . Trouble was, AOL stock was ridiculously overvalued. . . So don't blame Case for what has happened. He chose the moment, almost to the day, when his stock was most valuable and then used it as currency. He served his shareholders well. It was Time Warner that sold itself for wampum.

—Geoffrey Colvin, "Time Warner, Don't Blame Steve Case,"
February 3, 2003, *Fortune*.

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This paper investigates the motivations for takeovers by documenting the empirical relations between the market valuations of firms and a comprehensive set of takeover characteristics. We test two alternative theories of takeovers, one based upon stock market misvaluation, and the other based upon extensions of the Q theory of investment (Brainard and Tobin (1968)). In doing so, we employ market price-to-fundamental ratios as proxies for investor misvaluation, growth opportunities, and agency problems.

Despite an increasing interest in recent years in psychological approaches to economic decisions, there has been relatively little analysis of the degree to which market misvaluation of firms influences investment decisions.¹ An important type of investment is the purchase of another firm, and a great deal of data are available about the terms and characteristics of takeover transactions. The takeover market is therefore an attractive testing ground for the hypothesis that market misvaluation affects resource allocation and the strategic interaction of firms.

The idea that inefficient market misvaluation is an important driver of the takeover market is not new. For example, Brealey and Myers (2000, p. 949) discuss a bootstrap game, allegedly important during the diversification boom of the 1960s, based on naive investor interpretations of price-to-earnings ratios. Nevertheless, as discussed by Shleifer and Vishny (2003), among academics the misvaluation approach to takeovers has traditionally had a low profile relative to efficient markets approaches. Shleifer and Vishny offer a theory in which irrational shifts in investor sentiment affect takeover decisions. We suggest intuitive extensions to their approach to widen the misvaluation hypothesis's range of implications for takeover characteristics.

The misvaluation hypothesis of takeovers holds that market inefficiency has important effects on takeover activity. These effects stem from the efforts of bidders to profit by buying undervalued targets for cash at a price below fundamental value, or by paying equity for targets that, even if overvalued, are less overvalued than the bidder. As argued by Shleifer and Vishny (2003), target overvaluation encourages target management to voluntarily accept expropriative offers in order to cash out. Bidder and target misvaluation measures should affect expropriation opportunities and managerial incentives, and therefore transaction characteristics including the means of payment (stock versus cash), the form of the offer (merger versus tender offer), bid premium, hostility of the target to the offer, success of the bid, and event-period returns. The misvaluation hypothesis also implies that bidders will tend to be overvalued relative to targets.

¹ On the financing side, several authors provide evidence that firms time new equity issues to exploit market misvaluation, and manage earnings to induce such misvaluation—see, for example, Ritter (1991), Loughran and Ritter (1995), Rajan and Servaes (1997), Teoh, Welch, and Wong (1998a,b), Teoh, Wong, and Rao (1998), Rangan (1998), and Baker and Wurgler (2000). Recent evidence suggests that inefficient market valuations influence levels of investment (Polk and Sapienza (2004)) and the sensitivity of investment to cash flow (Baker, Stein, and Wurgler (2003)).

An alternative theory, which we call the Q hypothesis of takeovers, focuses on how acquisitions redeploy target assets.² High market value is an indicator that a firm is well run or has good business opportunities. Thus, market valuations are proxies for growth opportunities of the bidder and target. Takeovers may be designed to eliminate wasteful target behavior or take advantage of better bidder investment opportunities. Alternatively, takeovers may be used by the managers of inefficient bidders to expand their domains of control.

The Q approach therefore accommodates, though it does not require, agency problems between managers and shareholders. Takeovers of bad targets by good bidders tend to improve efficiency more than takeovers of good targets by bad bidders. Thus, bidder and target valuations are related to announcement-date stock returns of bidders and targets, and potentially to how combative is the offer. As with the misvaluation hypothesis, we suggest intuitive extensions of the Q hypothesis to widen its range of implications. Both the misvaluation and Q approaches imply that market valuations are related to the characteristics of takeover transactions; these approaches are discussed more fully in Section IV.

The two valuation ratios applied in this study are price-to-book value of equity (hereafter P/B), and price to residual income value as derived from the model of Ohlson (1995) (hereafter P/V). We apply P/B to investigate the Q hypothesis, and both P/B and P/V to investigate the misvaluation hypothesis.

Prior literature also considers P/B (or closely allied variables such as proxies for Tobin's Q) as a proxy for information about the ability of the firm to generate high returns on its investments. Because book value reflects historical costs whereas market price reflects forward-looking prospects, we employ P/B as a proxy for expected growth or managerial effectiveness.

To the extent that B or V are proxies for fundamental value, P/B and P/V are proxies for the degree of firm overvaluation (see also Subsection I.A). In several asset pricing and corporate finance contexts, P/B or its reciprocal has been viewed as a mispricing proxy, though controversy remains. In contrast with book value, our estimate of residual income value (V) contains forward-looking information, namely, analysts' forecasts of future earnings. As a result, P/V filters out the extraneous information about growth and managerial agency problems much better than does P/B . Thus, P/V is intended to be a relatively pure measure of misvaluation; it has been used by several authors for this purpose.³

Our use of the P/V proxy allows for a more focused test of the misvaluation hypothesis. However, analyst forecasts may not perfectly filter information about

² Our development of the Q hypothesis is based upon the work on Tobin's Q and takeovers of Lang, Stulz, and Walkling (1989), Servaes (1991), Martin (1996), and Jovanovic and Rousseau (2002), and also on the study of agency, growth, and takeovers of Morck, Shleifer, and Vishny (1990).

³ For example, see Frankel and Lee (1998), Lee, Myers, and Swaminathan (1999), and Ali, Hwang, and Trombley (2003); a corporate finance application is provided by D'Mello and Shroff (2000).

growth from the market price. We further control for growth or agency-related effects by including bidder and target P/B in our multivariate tests of the effects of bidder and target P/V . This is an overly stringent test, because controlling for P/B is likely to remove not only growth, but also part of the misvaluation effect that we seek to measure.⁴ Since P/B and P/V provide complementary information about the misvaluation hypothesis, we perform both univariate and multivariate tests involving both P/B and P/V .

A previous strand of the literature relates P/B or allied variables to takeover characteristics.⁵ Most tests in this work condition on what may be, according to either hypothesis, dependent variables.⁶ Furthermore, most of this literature examines older or more restricted samples. Our sample period of 1978–2000 includes the decade of the 1990s, the period of the greatest takeover wave in history. The total value of transactions (2001 dollars) from the last 8 years of our sample, 1993–2000, is \$4.35 trillion. This is much greater than the total value of transactions in the preceding 15 years of our data set, \$1.18 trillion.

To provide a more comprehensive test of the different facets of alternative theories, we investigate how bidder and target valuations are related to a wide set of takeover characteristics. The characteristics relating to the terms of the offer are the payment method (cash versus stock) and the bid premium. The characteristics relating to combativeness are the mood of the offer (friendly versus hostile), the mode of the offer (merger bid versus tender offer), and the probability of offer success. The characteristics relating to stock market reactions are the bidder and target announcement-period returns.

In the univariate tests, we divide the observations into quintiles ranked by bidder P/B , bidder P/V , target P/B , or target P/V . Each takeover characteristic is compared across the highest and lowest valuation quintiles. In the multivariate analyses, we consider logistic and least squares regressions of takeover characteristics both separately on bidder and target P/B and on bidder and target P/V , and jointly on the four price-to-fundamental variables. We also examine separately the 1978–1989 and 1990–2000 subperiods. The main qualitative findings are summarized in Table AI of the Appendix. While the particular findings in some cases differ across tests, we summarize here the more robust and salient findings.

On average, bidders have significantly higher P/B and P/V than their targets. This is as predicted by the misvaluation hypothesis, and is potentially consistent with the Q approach as well. We also provide evidence on bidder-target

⁴ The evidence from past research (see Section I) suggests that P/B is informative about misvaluation, both on its own and incrementally to P/V .

⁵ See Walkling and Edmister (1985), Lang et al. (1989), Servaes (1991), Martin (1996), Rau and Vermaelen (1998), Jovanovic and Rousseau (2002), and Moeller, Schlingemann, and Stulz (2004, 2005).

⁶ For example, most studies examine samples of successful offers. If misvaluation or growth affects offer success, as well as a given transaction characteristic (such as friendly versus hostile, merger versus tender, or cash versus equity), then examining successful offers can potentially induce a conditional correlation between the misvaluation or growth measure and the characteristic even if misvaluation or growth has no effect on the characteristic.

differentials broken down by transaction type, which provides somewhat more mixed support for the two hypotheses.

We find that higher target valuations are associated with a higher probability that equity rather than cash is the sole means of payment. Targets with higher valuations are less likely to be hostile to the bid, and are more likely to be acquired and to receive merger bids rather than tender offers. Such targets also on average receive lower bid premia, and earn lower announcement-date abnormal stock returns.

High valuation bidders are much more likely to use stock rather than cash as the sole consideration. Greater bidder valuation is associated with a lower probability of tender offer rather than merger. High P/B bidders tend to pay higher premia, especially in the equity subsample.

Higher bidder valuation (P/B and P/V) is strongly associated with lower bidder announcement-date abnormal stock returns. For example, the bidder return in the highest bidder- P/B quintile is on average 1.5% lower than the bidder returns in the lowest bidder- P/B quintile. Similarly, the bidder return in the highest bidder- P/V quintile is on average 1.8% lower than the bidder returns in the lowest bidder- P/V quintile.

We discuss the interpretation of the specific results in Section IV. However, since the alternative hypotheses make opposite predictions about the relation between bidder valuations and bidder returns, the evidence about this relation deserves special note. Under the misvaluation hypothesis, the market reacts negatively to equity offers because it overvalues the equity being offered more than the target assets being acquired. Alternatively, regardless of the form of the offer, if the offer triggers more careful valuations of the bidder, the prices of overvalued bidders will tend to correct downward, on average. Under the Q hypothesis, offers by well-run (high- Q) bidders on average generate greater total gains from takeover, and therefore higher bidder stock returns.

Thus, the P/V and P/B findings are consistent with the misvaluation hypothesis. The Q hypothesis does not have a prediction for P/V , but the evidence is inconsistent with its prediction for P/B . The P/B finding also contrasts with evidence from studies of earlier time periods.⁷ Because of differences in sample and variable construction, these findings are not entirely comparable to ours. Nevertheless, the apparent difference raises the possibility that agency or other resource reallocation effects may have been more important during the merger boom of the 1980s than in more recent years.

Overall, a wide range of evidence in this paper generally supports the misvaluation and Q hypotheses, including the distinctive P/V implications of the misvaluation hypothesis. In some cases our findings are significant with P/B

⁷ In Lang et al. (1989) and Servaes (1991), announcement-period bidder returns among offers that subsequently succeeded were higher when bidders had high Tobin's Q measures; P/B is highly correlated with Q measures (see also footnote 28). Moeller et al. (2005) find essentially no relation between bidder Q and bidder returns in a more recent sample of successful offers; see also the discussion near footnote 25.

but not P/V , an outcome that more strongly supports the Q hypothesis than the misvaluation hypothesis. For several characteristics, the implications of the Q hypothesis are ambiguous. However, a central prediction suggested in past research on the Q hypothesis (Lang et al. (1989), Servaes (1991)), specifically, that high valuation bidders earn higher announcement-period returns, is not confirmed.

There are interesting commonalities and differences across time periods. Valuation effects tend to be stronger in the 1990s (1990–2000) than in the 1980s (1978–1989). Overall, the evidence is supportive of both theories during both early and late time periods. However, the evidence is more consistent with the Q hypothesis in the pre-1990 period than in the subsequent period, and the evidence for the misvaluation hypothesis is stronger in the later period than in the 1980s. This pattern lends some support to the view that the takeovers of the 1980s frequently involved agency problems and real efficiencies, whereas post-1980s takeovers frequently related to market inefficiency.

There is some recent independent work on transaction-level valuations and means of payment in takeovers. Ang and Cheng (2003) use an industry-relative book-to-price ratio and a residual income measure to examine how misvaluation affects means of payment and the long-run abnormal return performance of the combined firm. Rhodes-Kropf, Robinson, and Viswanathan (2004) examine how firm and industry valuations relate to means of payment and merger frequency. In this paper, in order to expose alternative hypotheses to possible disconfirmation on several fronts and to develop a set of stylized facts for future theory to explain, we examine a wider range of takeover characteristics.

The remainder of the paper is structured as follows. Section I describes data and empirical methods. Section II describes univariate tests and Section III describes multivariate tests. Section IV discusses the results in the light of alternative theories. Section V concludes.

I. Data and Methodology

Our sample of takeover bids is obtained from the Securities Data Company (SDC) U.S. mergers and acquisitions database between 1978 and 2000. We include both successful and unsuccessful offers subject to the following selection criteria:

- Both the acquiring and target firms are traded on NYSE, AMEX, or the NASDAQ, and their price and return data are available over the 11-day period around the acquisition announcement from the Center for Research in Security Prices (CRSP).
- The value of the transaction is \$10 million or more.
- The offer is announced between January 1, 1978 and December 31, 2000.
- If an acquirer makes multiple attempts to acquire the same target, only the first announcement is included in the sample.

Table I
Descriptive Statistics for Takeover Bids

Number of takeover bids, mean value of transactions, and percentage of transactions that are successful, hostile, tender offers, merger bids, all-cash payment, all-stock payment, and mixed payment, by calendar year. The sample includes merger bids and tender offers in which both the acquirer and target were listed on the NYSE, AMEX, or NASDAQ during 1978–2000. All dollar figures are in millions of 2001 dollars.

Year	<i>N</i>	Mean Value per Transaction	Successful (%)	Hostile (%)	Tender Offers (%)	Merger Bids (%)	Cash (%)	Stock (%)	Mixed (%)
1978	17	1,046.7	76.5	23.5	29.4	70.6	52.9	47.1	0.0
1979	11	981.1	63.6	10.0	27.3	72.7	90.9	9.1	0.0
1980	29	872.5	75.9	11.5	24.1	75.9	20.7	3.4	75.9
1981	99	1,509.1	60.6	13.1	23.2	76.8	6.1	0.0	93.9
1982	89	624.3	68.5	18.0	28.1	71.9	0.0	0.0	100.0
1983	105	644.0	70.5	11.7	20.0	80.0	4.8	0.0	95.2
1984	120	840.2	61.7	11.0	31.7	68.3	17.5	5.8	76.7
1985	157	1,031.5	67.5	15.3	33.1	66.9	45.9	31.2	22.9
1986	139	813.5	67.6	15.4	31.7	68.3	52.5	26.6	20.9
1987	167	695.5	66.5	13.4	21.0	79.0	40.1	28.1	31.7
1988	161	630.2	55.3	15.2	35.4	64.6	61.5	21.7	16.8
1989	128	972.0	64.1	13.4	30.5	69.5	39.8	38.3	21.9
1990	74	710.5	73.0	7.6	16.2	83.8	35.1	37.8	27.0
1991	85	491.4	78.8	3.7	10.6	89.4	10.6	61.2	28.2
1992	97	423.3	81.4	3.1	5.2	94.8	16.5	62.9	20.6
1993	120	1,101.6	85.8	2.6	10.8	89.2	26.7	47.5	25.8
1994	206	585.2	80.6	7.3	14.6	85.4	29.6	54.9	15.5
1995	248	827.4	84.3	7.3	14.1	85.9	25.0	58.9	16.1
1996	264	1,126.1	84.8	7.2	14.4	85.6	23.9	50.4	25.8
1997	366	1,197.6	87.7	4.2	16.4	83.6	16.4	54.9	28.7
1998	342	2,982.8	89.5	2.4	12.9	87.1	16.1	57.3	26.6
1999	394	3,064.5	84.0	3.9	17.0	83.0	24.1	46.2	29.7
2000	314	2,951.1	85.7	2.3	20.1	79.9	25.5	48.1	26.4
Total	3,732	1,481.1	78.3	7.6	19.4	80.6	26.2	41.6	32.2

The final sample includes 2,922 successful and 810 unsuccessful acquisition bids.⁸ Table I reports the annual breakdown of the sample by outcome, method of payment, mode of acquisition, hostility of the transaction, and whether the bidder and the target are in the same industry.

Accounting data for calculating book value and residual income value (described below) are from COMPUSTAT. Earnings forecasts needed for

⁸ The bid premium is defined as the bid price of the offer divided by the market price of the target 5 days before the announcement. If the bid premium is less than -50% or greater than 200% , then we treat it as missing. We require that the target stock price at the time of the announcement exceed \$3. To ensure data accuracy, for successful acquisitions we compare the CRSP delisting date of the target and the SDC effective date. If the difference between the two dates is greater than 40 trading days, then the acquisition is deleted from the sample.

calculating the residual income intrinsic values are obtained from I/B/E/S. To maintain sample size, we do not exclude a transaction from the overall sample just because of missing accounting or I/B/E/S data items.

A. Motivation for and Calculation of Mispricing Proxies

The reliability of the inferences we draw about different hypotheses of takeover markets rests upon the quality of our empirical proxies, P/B and P/V . The validity of our approach does not, however, require that either book value or residual income value be a better proxy for rational fundamental value than market price. We merely require that these measures contain substantial incremental information about fundamentals above and beyond market price. We would expect this to be the case if a significant portion of variation in market price derives from misvaluation.

A possible alternative means of testing the misvaluation hypothesis is to estimate long-run stock returns. A stock, which is inefficiently mispriced should eventually earn abnormal returns when misvaluation is corrected. Thus, long-run abnormal returns provide an indirect measure of misvaluation. Several authors examine the long-run abnormal returns to successful acquirers, and how these returns relate to means of payment and pre-offer valuation measures.⁹ Such studies generally focus on merged firms, and therefore do not measure how mispricing relates to offer success, nor how distinctive are the effects of bidder versus target misvaluations. Furthermore, there is much controversy about how to interpret long-run post-event returns, which may reflect rational risk premia.¹⁰ A key advantage of tests based on contemporaneous measures of misvaluation is that they do not require drawing inferences from stock returns occurring years after the takeover event.

In support of the P/B proxy, an extensive literature demonstrates that book-to-price ratios are remarkably strong and robust predictors of the cross-section of subsequent one-month returns (see, for example, the review of Daniel et al. (2002)). Psychology-based theoretical models imply that P/B is a proxy for misvaluation, and in turn will predict subsequent abnormal returns (see, for example, Barberis and Huang (2001), Daniel, Hirshleifer, and Subrahmanyam (2001)). Market values reflect mispricing, risk, and differences in true unconditional expected cash flows (or scale). Book value can help filter out irrelevant scale differences, and thus P/B can provide a less noisy measure of mispricing (see Daniel et al. (2001)). On the other hand, P/B is a natural proxy for risk as well. An active debate remains about the extent to which the power of

⁹ See, for example, Franks, Harris, and Titman (1991), Loughran and Vijh (1997), Rau and Vermaelen (1998), and Moeller et al. (2004, 2005).

¹⁰ Some recent overviews include Fama (1998), Loughran and Ritter (2000), and Daniel, Hirshleifer, and Teoh (2002). The outcomes of long-run return studies are often sensitive to the empirical method, including the choice of the return benchmark, the method for compounding returns, and the treatment of cross-event return correlations (Barber and Lyon (1997), Mitchell and Stafford (2000), Fama (1998), Loughran and Ritter (2000)).

book-to-price in predicting returns reflects a rational risk premium or correction of mispricing.¹¹

The association of book-to-price with subsequent abnormal returns suggests that some of its variation derives from misvaluation or risk. However, book-to-price has also been used as a proxy for growth opportunities and for the degree of information asymmetry (Martin (1996)). Furthermore, proxies for Tobin's Q that are highly correlated with P/B have been employed to measure the quality of corporate growth opportunities and the degree of managerial discipline. A further source of noise in P/B for our purposes is that book value, the denominator of P/B , is influenced by firm and industry differences in accounting methods.

We calculate P/B as a ratio of equity rather than total asset values, because it is equity rather than total misvaluation that is likely to matter for takeover decisions; a similar rationale applies to P/V . This would be the case, for example, for a misvalued bidder that contemplates using equity shares to purchase the equity shares of a target firm. Similarly, a potential bidder that is overvalued is presumably more likely to raise equity rather than debt capital to finance a takeover bid.

There is also strong support for P/V (or its reciprocal) as an indicator of mispricing. Lee et al. (1999) find that the aggregate price to residual income value ratio predicts one-month-ahead returns on the Dow 30 stock portfolio better than aggregate price-to-book. Frankel and Lee (1998) find that V is a better predictor than book value of the cross-section of contemporaneous stock prices, and that the price to residual income value ratio (P/V) is a predictor of the 1-year-ahead cross-section of returns. Furthermore, Ali et al. (2003) report that the abnormal returns associated with P/V are partially concentrated around subsequent earnings announcements. They also report that after controlling for a large set of possible risk factors (including beta, size, book-to-market, residual risk, and loadings from the Fama and French (1996) three-factor model), P/V continues to predict future returns significantly. These findings make P/V an attractive index of mispricing. Note that D'Mello and Shroff (2000) have used P/V to measure mispricing of equity repurchasers.¹²

There are other possible indices of misvaluation. An alternative measure that we do not examine is the price-to-earnings (P/E) ratio. Price-to-earnings ratios (or earnings-to-price (E/P) ratios) have drawbacks in the context of our objectives. First, E/P is not as strong a predictor of month-ahead stock returns as book-to-market (see, for example, Fama and French (1996)), suggesting that it is

¹¹ See, for example, Fama and French (1996), Daniel and Titman (1997), and the review of Daniel et al. (2002). More recent empirical papers addressing factor risk versus mispricing as explanations for the book-to-price premium include Griffin and Lemmon (2002), Cohen, Polk, and Vuolteenaho (2003), and Vassalou and Xing (2004).

¹² To test the hypothesis that private information influences a takeover bidder's choice of means of payment, Chemmanur and Paeglis (2003) use ex post realized earnings as inputs in valuation models to construct proxies for private signals. In contrast, our focus is on measuring market pricing errors relative to publicly available information. We therefore calculate our misvaluation proxies using solely contemporaneous information (current price, book value, and analyst forecasts).

a less accurate measure of mispricing. Second, short-term earnings fluctuations will tend to shift P/E even if the degree of misvaluation is unchanged.

The residual income value has at least two important advantages over book value as a fundamental measure. First, it is designed to be invariant to accounting treatments (to the extent that the “clean surplus” accounting identity obtains; see Ohlson (1995)), making P/V less sensitive to such choices. Second, in addition to the backward-looking information contained in book value, it reflects expectations of future performance as reflected in analyst forecasts of future earnings. The incorporation of analyst forecasts in V filters growth expectations from P .

On the other hand, if analyst forecasts are infected with biases that are correlated with market misperceptions, the residual income value may share some of the misvaluation contained in market price. This could arise if investors are misled by strategic biases in analysts’ forecasts, or if analysts and investors are subject to common psychological biases. The cancellation of common biases can weaken P/V as a proxy for misvaluation. This biases the results of tests using P/V toward finding no effect. Furthermore, the additional requirement of data on analyst forecasts reduces the sample size for P/V tests.

These considerations, that is, the high extraneous variation in P/B as an indicator of mispricing and the possibility of partial cancellation of mispricing in the P/V measure, suggest that either proxy may give an incorrect null result even if misvaluation drives the takeover market. Since neither measure is perfect, it is informative to include both P/B and P/V measures in tests for misvaluation.

In our sample, the correlation of P/B with P/V is not extremely high at 0.530 for bidders and 0.465 for targets. Thus, P/V potentially offers useful independent information beyond P/B regarding misvaluation. This is to be expected, as much of the variation in P/B arises from differences in growth opportunities or in managerial discipline that do not necessarily correspond to misvaluation.

Turning to procedure, we calculate the P/B proxy as the ratio of market value of equity to book value of equity. Each month for each stock, book equity is measured at the end of the prior fiscal year, using the definition as in Baker and Wurgler (2002). Market value of equity is measured at the end of the month.

When a firm has positive book value, the price-to-book ratio P/B is increasing in price, so that P/B is a positive measure of valuation. In contrast, when a firm has negative book value of equity, P/B is negative and decreasing in price. It therefore becomes an inverse measure of valuation. Since the intuition behind the measure is that high price relative to book value indicates greater relative valuation, firms with negative book values (and positive price) should be classified as having high valuation. We therefore assign to firms with negative P/B the maximum value of P/B in the takeover sample (after winsorizing P/B at 1% and 99%).¹³

¹³ Only 1.32% of bidding firms and 1.75% of target firms in our sample have negative book values of equity. When we exclude negative book value firms from our analysis involving P/B , our main results remain unchanged, with slightly lower significance levels in some instances. In addition, our results are generally very robust to the use of the reciprocal, B/P , instead of P/B , and the use of V/P instead of P/V .

Residual income value V includes both book value of equity, and an adjustment to reflect the value of the firm's forecasted excess income (beyond what would be expected based upon the firm's book value). Excess income is measured using analysts' forecasts of future earnings prospects. Our estimation procedure for P/V is similar to that of Lee et al. (1999). For each stock in month t , we estimate the residual income model (RIM) price, denoted by $V(t)$. With the assumption of clean surplus accounting, which states that the change in book value of equity equals earnings minus dividends, the intrinsic value of firm stock can be written as the book value plus the discounted value of an infinite sum of expected residual incomes (see Ohlson (1995)), that is,

$$V(t) = B(t) + \sum_{i=1}^{\infty} \frac{E_t[\{\text{ROE}(t+i) - r_e(t)\} B(t+i-1)]}{[1+r_e(t)]^i}, \quad (1)$$

where E_t is the expectations operator, $B(t)$ is the book value of equity at time t (negative $B(t)$ observations are deleted), $\text{ROE}(t+i)$ is the return on equity for period $t+i$, and $r_e(t)$ is the firm's annualized cost of equity capital.

For practical purposes, the above infinite sum needs to be replaced by a finite series of $T-1$ periods, plus an estimate of the terminal value beyond period T . This terminal value is estimated by viewing the period- T residual income as a perpetuity. Lee et al. (1999) report that the quality of their $V(t)$ estimates is not sensitive to the choice of the forecast horizon beyond 3 years. The residual income valuations are also likely to be less sensitive to errors in terminal value estimates than in a dividend discounting model; pre-terminal values include book value, so that terminal values are based on residual earnings rather than full earnings (or dividends).¹⁴ Of course, the residual income $V(t)$ cannot perfectly capture growth, so our misvaluation proxy P/V does not perfectly filter out growth effects. However, since V reflects forward-looking earnings forecasts, a large portion of the growth effects contained in P/B should be filtered out of P/V .

We use the three-period forecast horizon

$$V(t) = B(t) + \frac{[f^{\text{ROE}}(t+1) - r_e(t)] B(t)}{1+r_e(t)} + \frac{[f^{\text{ROE}}(t+2) - r_e(t)] B(t+1)}{[1+r_e(t)]^2} + \frac{[f^{\text{ROE}}(t+3) - r_e(t)] B(t+2)}{[1+r_e(t)]^2 r_e(t)}, \quad (2)$$

where $f^{\text{ROE}}(t+i)$ is the forecasted return on equity for period $t+i$, the length of a period is 1 year, and the last term discounts the period- $t+3$ residual income as a perpetuity.¹⁵

¹⁴ For example, D'Mello and Shroff (2000) find that in their sample of repurchasing firms, firm terminal value is on average 11% of total residual income value, whereas using a dividend discount model the terminal value is 58% of total value.

¹⁵ Following Lee et al. (1999) and D'Mello and Shroff (2000), in calculating the terminal value component of V we assume that expected residual earnings remain constant after year 3, so that the discount rate for the perpetuity is the firm's cost of equity capital.

Forecasted ROEs are computed as

$$f^{\text{ROE}}(t+i) = \frac{f^{\text{EPS}}(t+i)}{\bar{B}(t+i-1)}, \quad (3)$$

where

$$\bar{B}(t+i-1) \equiv \frac{B(t+i-1) + B(t+i-2)}{2}, \quad (4)$$

and $f^{\text{EPS}}(t+i)$ is the forecasted earnings per share (EPS) for period $t+i$.¹⁶ We require that each of the f^{ROE} s be less than one.

Future book values of equity are computed as

$$B(t+i) = B(t+i-1) + (1-k)f^{\text{EPS}}(t+i), \quad (5)$$

where k is the dividend payout ratio determined by

$$k = \frac{D(t)}{\text{EPS}(t)}, \quad (6)$$

and $D(t)$ and $\text{EPS}(t)$ are, respectively, the dividend and EPS for period t . Following Lee et al. (1999), if $k < 0$ (owing to negative EPS), we divide dividends by $(0.06 \times \text{total assets})$ to derive an estimate of the payout ratio, that is, we assume that earnings are on average 6% of total assets. We delete from this study observations for which the computed k is greater than one.

The annualized cost of equity, $r_e(t)$, is determined as a firm-specific rate using the Capital Asset Pricing Model (CAPM), where the time- t beta is estimated using the trailing 5 years (or, if there is not enough data, at least 2 years) of monthly return data. The market risk premium assumed in the CAPM is the average annual premium over the risk-free rate for the CRSP value-weighted index over the preceding 30 years. Any estimate of the CAPM cost of capital that is outside the range of 3–30% (less than 1% of our estimates) is winsorized to lie at the border of the range. Previous studies report that the predictive ability of P/V is robust to the cost of capital model used (Lee et al. (1999)) and to whether the discount rate is allowed to vary across firms (D'Mello and Shroff (2000)). We verify the robustness of our main findings using the alternative constant discount rate of 12.5% (following D'Mello and Shroff (2000)). The results are similar to those reported here. Finally, P/V is winsorized at the 1% and 99% tails.

To measure the misvaluation of acquirers and targets, we use values of P/B and P/V of the month prior to the acquisition announcement to ensure that information needed for calculating the ratios is available before the announcement. The benchmark for fair valuation is not equal to one for either ratio, for

¹⁶ If the EPS forecast for any horizon is not available, it is substituted by the EPS forecast for the previous horizon and compounded at the long-term growth rate (as provided by I/B/E/S). If the long-term growth rate is not available from I/B/E/S, the EPS forecast for the first preceding available horizon is used as a surrogate for $f^{\text{EPS}}(t+i)$.

two reasons. First, book is an historical value, which does not reflect growth. Second, residual income model valuations have been found to be too low on average. Thus, our tests consider relative comparisons of our misvaluation proxies: Higher values of P/B or P/V indicate relative overvaluation, and lower values indicate undervaluation.

B. Announcement-Period Returns

Announcement-period cumulative abnormal returns (CARs) are computed for the three-day period $(-1, 1)$ around the announcement date (day 0). Following Fuller, Netter, and Stegemoller (2002), we employ the modified market model,

$$\text{CAR}_i = r_i - r_m, \quad (7)$$

where r_i is the firm- i return and r_m is the CRSP value-weighted market return, over the 3-day period around the acquisition announcement.

II. Univariate Tests

This section reports the empirical relations between valuation measures and takeover characteristics in our 1978–2000 sample based on univariate tests; multivariate findings are documented in Section III. Section IV discusses the most robust findings in light of alternative theories of takeover markets.

As observers have often noted, there is clear evidence of aggregate fluctuations in acquisition activity. In Table I, the number of transactions peaks first in the middle of the 1980s, and again in the latter portion of the 1990s through the turn of the millennium. There are twice as many transactions in the latter period; 67% of the transactions occur during 1990–2000, as compared with 33% in 1978–1989. The average transaction value also increases toward the end of the sample period. As a result, the total value of transactions (2001 dollars) during 1978–1992 is \$1.18 trillion, and during the last 8 years of the sample, 1993–2000, is \$4.35 trillion. Indeed, the transaction value from 1997–2000 alone is \$3.59 trillion. Acquisitions are more likely to be successful in more recent years, and more recent acquisitions tend to be mergers. The pre-1990s period has higher frequencies of hostile offers and tender offers. The acquisition wave of the 1990s through the turn of the millennium is characterized by greater use of stock as a means of payment (see, for example, Andrade, Mitchell, and Stafford (2001), Holmstrom and Kaplan (2001)). The average bid premium is 34.4% for the entire sample, and the mean abnormal return is 17.9% for target firms at the announcement of the offer (numbers not reported in table).¹⁷

Table II reports how valuation measures are related to the acquisition mode and means of payment. Means of P/B and P/V , and their differences between

¹⁷ These findings are similar to those of Andrade et al. (2001), who report a median bid premium of 37.9% and mean target announcement abnormal returns of 16% in their takeover sample during 1973–1998.

Table II
Mean Acquirer and Target Valuation Ratios by Mode of the Offer and Payment Method

The valuation ratios are the price-to-book ratio P/B and the price-to-value ratio P/V . The intrinsic value is estimated using the residual income model when the discount rate is based on firm-specific CAPM. The t -statistic of differences between acquirer and target, and between stock and cash offers, are reported in parentheses. For each valuation ratio, we require that both the acquirer and the target have nonmissing values. The sample includes both successful and unsuccessful merger bids and tender offers in which both the acquirer and target were listed on the NYSE, AMEX, or NASDAQ during 1978–2000.

	Tender Offers				Merger Bids				All				
	Ratio	Acquirer	Target	Acquirer – Target (t -Statistic)	N	Acquirer	Target	Acquirer – Target (t -Statistic)	N	Acquirer	Target	Acquirer – Target (t -Statistic)	N
Cash	P/B	3.550	2.690	0.860 (2.83)	379	2.295	2.016	0.279 (1.48)	387	2.916	2.350	0.566 (3.18)	766
	P/V	1.654	1.843	-0.189 (-1.36)	214	1.623	1.548	0.075 (0.66)	148	1.641	1.722	-0.081 (-0.86)	362
Stock	P/B	4.000	2.975	1.026 (1.16)	19	6.049	4.107	1.943 (8.89)	1,227	6.018	4.089	1.929 (8.95)	1,246
	P/V	1.633	1.840	-0.207 (-1.03)	17	2.583	2.240	0.343 (4.31)	736	2.562	2.231	0.331 (4.24)	753
Mixed	P/B	2.449	2.387	0.062 (0.15)	210	3.746	2.981	0.765 (2.94)	694	3.445	2.843	0.602 (2.72)	904
	P/V	1.560	1.787	-0.228 (-1.51)	90	2.113	1.902	0.212 (1.51)	342	1.998	1.878	0.120 (1.04)	432
All	P/B	3.184	2.594	0.589 (2.47)	608	4.727	3.418	1.310 (9.08)	2,308	4.405	3.246	1.159 (9.30)	2,916
	P/V	1.626	1.827	-0.201 (-1.96)	321	2.336	2.062	0.274 (4.34)	1,226	2.189	2.013	0.176 (3.22)	1,547
Stock – Cash (t -statistic)	P/B	Acquirer 0.451 (0.38)	Target 0.285 (0.30)	Acquirer – Target (14.35)	Acquirer 3,754 (14.35)	Acquirer 2,090 (9.21)	Target 2,090 (9.21)	Acquirer – Target (9.08)	Acquirer 3,102 (11.36)	Acquirer 1,740 (8.40)	Target 1,740 (8.40)	Acquirer – Target (11.36)	Acquirer 3,102 (11.36)
Stock – Cash (t -statistic)	P/V	-0.021 (-0.14)	-0.003 (-0.01)	0.960 (6.65)	0.960 (6.65)	0.692 (5.66)	0.692 (5.66)	0.274 (4.34)	0.920 (7.93)	0.508 (4.05)	0.508 (4.05)	0.407 (3.22)	0.407 (3.22)

acquirer and target firms, are reported in both the overall sample and across modes of acquisition and methods of payment.¹⁸

Result 1: Bidder valuation ratios are higher on average than those of their targets.

In the overall sample, bidding firms on average have higher P/B and P/V than their targets. The average P/B (P/V) for acquirers is 4.405 (2.189) and for target firms is 3.246 (2.013). For the 2,916 (1,547) transactions for which we are able to calculate P/B (P/V), the bidder-target P/B (P/V) differential is 1.159 (0.176), which is highly significant.

Result 2: The bidder-target difference in valuations is on average greater among equity than among cash offers, and among merger bids than among tender offers.

Since the misvaluation approach emphasizes different motivations for equity and cash offers (Shleifer and Vishny (2003)), it is interesting to examine equity and cash subsamples. Bidder valuations tend to exceed target valuations among both cash and equity offers. For the 766 (362) cash transactions for which we are able to calculate P/B (P/V), the bidder-target P/B (P/V) differential is 0.566 (-0.081), significant for P/B but not for P/V . Among the 1,246 (753) stock offers, the bidder-target P/B (P/V) differential is 1.929 (0.331), highly significant for both measures.

Under both measures, the mean valuation differential between bidder and target is significantly larger among equity than among cash offers ($p < 0.01$; tests not reported in table). Furthermore, the difference in bidder-target valuations is greater among merger bids than among tender offers. For the 2,308 (1,226) merger transactions for which we are able to calculate P/B (P/V), the bidder-target P/B (P/V) differential is 1.310 (0.274), highly significant. Bidders also have higher valuations than their targets among tender offers using the P/B measure, but under the P/V measure bidders have lower valuations. Among the 608 (321) tender offers, the bidder-target P/B (P/V) differential is 0.589 (-0.201), highly significant for P/B , and marginally significant at the 5% level for P/V .

Result 3: Equity offers are associated with higher bidder and target valuations than cash offers.

Comparing target valuations, Table II indicates that the targets of cash offers have significantly lower valuations than the targets of stock offers; $P/B = 2.350$ for cash versus 4.089 for stock ($t = 8.40$). Similarly, $P/V = 1.722$ for cash versus 2.231 for stock ($t = 4.05$).

Turning to bidder valuations, stock bidders on average have higher valuations than do cash bidders, using both P/B and P/V measures; $P/B = 6.018$

¹⁸ Median values suggest similar inferences and are not reported. In addition, Table II restricts the sample to observations in which the given valuation ratio (P/B or P/V) is available for both bidder and target firms.

for stock versus 2.916 for cash (difference highly significant). Similarly, $P/V = 2.562$ for stock versus 1.641 for cash (difference highly significant). Closely related findings are described in Result 4 and Result 7 below.

Table III analyzes how a wide range of transaction characteristics are related to pre-offer measures of target and bidder valuations. Panels A and B report the effects of target valuation on takeover characteristics; Panels C and D describe the effects of acquirer valuation. In each month, we rank bidders or targets based on their respective valuation ratios and form quintiles. This monthly sorting procedure ensures that any effects we identify are cross-sectional, and therefore not driven by time-series swings in valuations and takeover characteristics.

Quintile 5, the top valuation quintile, has the highest bidder or target P/B or P/V ; quintile 1 has the lowest valuations. We report differences across the top and bottom valuation quintiles to describe how higher market valuation is related to transaction characteristics.¹⁹

A. Effects of Target Valuations

We first discuss the relation between target valuations and takeover characteristics presented in Panels A and B of Table III.

Result 4: Higher target valuation is associated with

- a. greater use of equity as a means of payment, and
- b. less use of cash as a means of payment.

Stock is much more likely to be used as the method of payment when the target has a higher valuation (21.0% quintile difference in probability (P/B); 16.3% (P/V)), both highly significant. Furthermore, a higher target valuation is associated with a lower probability of a cash offer. The quintile differences in the probability of cash offers are $-12.5%$ (P/B ; highly significant) and $-6.2%$ (P/V ; significant only at 10% level).

Result 5: Higher target valuation is associated with a less combative offer:

- a. a lower probability of hostility,
- b. a lower probability of tender offer rather than merger, and
- c. a higher probability of offer success.

Several findings indicate that transactions are more combative when targets have lower valuations. A transaction is less likely to be hostile when the target has a higher valuation (quintile difference in probability of $-7.5%$ (P/B) or $-5.3%$ (P/V)). A transaction is less likely to take the form of a tender offer (a takeover method sometimes used to bypass the need for approval by target managers) rather than merger bid when the target has higher valuation (quintile difference in probability of $-7.5%$ (P/B) or $-7.7%$ (P/V)). There is also

¹⁹ We occasionally discuss subsample findings not contained in the tables when there are differences in effects within subsamples such as cash versus equity. Of course, such subsample findings must be interpreted with caution when categorizing based upon a dependent variable, except to the extent that theory explicitly offers predictions based on such categories.

Table III
Mean Acquisition Characteristics by Acquirer or Target Valuation Ratio Quintiles

Each month, acquirer and target firms are separately ranked on valuation ratios (P/B and P/V) into quintiles and are assigned a rank between 1 and 5, with 1 being the lowest ratio quintile (most undervalued). P/B is the price-to-book ratio. P/V is the price-to-value ratio, where the intrinsic value is estimated using the residual income model when the discount rate is based on firm-specific CAPM. This table reports mean acquisition characteristics for each of the quintiles and difference in means between ranks 1 and 5. Bid premium is the ratio of the bid price offered by the acquirer to the target stock price 5 days prior to the announcement of the takeover bid. Acquirer and target cumulative abnormal returns (CAR) are measured over the 3 days (-1, 1) around the announcement (day 0) of the acquisition. N is the total number of acquisitions in each quintile. The sample includes merger bids and tender offers where both the acquirer and target were listed on the NYSE, AMEX, or NASDAQ during 1978-2000. ***, **, * denote that the difference in means between ranks 1 and 5 is significant at the 1%, 5%, and 10% level, respectively, based on the two-sample t -test.

Target P/B Rank	N	Target P/B	Probability of Cash Payment (%)	Probability of Stock Payment (%)	Probability of Tender Offer (%)	Probability of Hostile Acquisition (%)	Probability of Successful Acquisition (%)	Bid Premium (%)	Target Announcement CAR (%)	Acquirer Announcement CAR (%)
Panel A: Acquisitions Sorted Monthly by Target P/B Ratio										
1 (Undervalued)	518	0.847	31.3	31.9	22.8	11.2	73.9	38.4	20.1	-0.2
2	677	1.250	26.6	37.1	21.6	10.6	77.3	34.9	18.9	-1.2
3	692	1.784	28.9	40.6	23.1	7.1	80.9	33.2	18.2	-1.1
4	680	2.966	25.3	47.5	22.4	7.8	79.7	32.5	17.9	-1.8
5 (Overvalued)	570	9.651	18.8	52.8	15.3	3.7	82.6	30.0	15.4	-1.8
Difference 5-1		8.804***	-12.5***	21.0***	-7.5***	-7.5***	8.7***	-8.4***	-4.7***	-1.6***
Panel B: Acquisitions Sorted Monthly by Target P/V Ratio										
Target P/V Rank	N	Target P/V								
1 (Undervalued)	282	0.768	27.3	41.1	24.5	9.8	80.1	35.2	19.6	-0.8
2	436	1.112	25.5	40.6	23.6	11.4	77.3	35.9	20.0	-1.3
3	432	1.558	26.6	42.8	25.0	10.8	78.2	34.1	18.9	-1.8
4	433	2.316	22.4	49.2	21.0	8.8	79.2	33.2	17.8	-2.2
5 (Overvalued)	322	4.980	21.1	57.5	16.8	4.5	86.0	32.6	17.2	-2.6
Difference 5-1		4.212***	-6.2*	16.3***	-7.7**	-5.3***	5.9*	-2.6	-2.5	-1.8***

(continued)

Table III—Continued

Acquirer P/B Rank	N	Acquirer P/B	Panel C: Acquisitions Sorted Monthly by Acquirer P/B Ratio									
			Probability of Cash Payment (%)	Probability of Stock Payment (%)	Probability of Tender Offer (%)	Probability of Hostile Acquisition (%)	Probability of Successful Acquisition (%)	Bid Premium (%)	Target Announcement CAR (%)	Acquirer Announcement CAR (%)		
1 (Undervalued)	574	1.022	33.6	28.9	22.3	8.5	78.7	32.1	16.8	-0.3		
2	737	1.571	28.2	38.7	21.0	9.2	77.7	32.2	17.1	-0.9		
3	730	2.270	25.9	44.8	19.0	7.2	78.2	34.3	17.3	-1.6		
4	729	3.846	23.6	45.0	19.9	6.1	81.5	36.2	20.2	-1.5		
5 (Overvalued)	632	12.337	19.3	53.6	15.5	6.5	81.0	36.3	18.9	-1.9		
Difference 5-1		11.315***	-14.3***	24.7***	-6.8***	-2.1	2.3	4.2**	2.1*	-1.5***		
Panel D: Acquisitions Sorted Monthly by Acquirer P/V Ratio												
Acquirer P/V Rank	N	Acquirer P/V										
1 (Undervalued)	429	0.833	26.6	40.6	18.6	7.1	79.5	35.4	18.5	-0.7		
2	592	1.149	26.2	42.6	18.8	6.1	84.1	33.7	18.0	-1.3		
3	583	1.509	26.6	43.7	21.6	8.1	80.4	35.2	19.9	-1.2		
4	590	2.202	29.5	41.5	22.4	6.9	81.4	35.1	21.0	-1.3		
5 (Overvalued)	481	4.843	20.2	55.3	13.7	5.1	80.5	35.5	18.3	-2.6		
Difference 5-1		4.011***	-6.4**	14.7***	-4.9**	-2.0	1.0	0.1	-0.2	-1.8***		

evidence that an offer is less likely to be successful when the target has a lower valuation (the quintile difference in probability is 8.7% (P/B) or 5.9% (P/V)).²⁰

Result 6: Higher target P/B is associated with

- a. a lower bid premium, and
- b. a lower target announcement-period return.

Both bid premia and target announcement-period returns are lower on average for high valuation targets.²¹ The quintile difference for bid premium is -8.4% (-2.6%) for $P/B(P/V)$ and the quintile difference for target announcement-period returns is -4.7% (-2.5%), P/V insignificant for both.

Result 6c: Higher target valuation is associated with a lower bidder announcement-period return.

Using either measure, bidder announcement returns are substantially lower when targets are more highly valued prior to announcement. The quintile difference for bidder announcement-period returns is -1.6% (-1.8%) for $P/B(P/V)$. This effect derives primarily from stock acquisitions, which have quintile differences of -1.9% (-2.4%) (not reported in table).²²

B. Effects of Bidder Valuations

We turn next to the relation between bidder valuations and takeover characteristics described in Panels C and D of Table III.

Result 7: Higher bidder valuation is associated with

- a. greater use of equity, and
- b. less use of cash as a means of payment.

Bidders with higher valuations are much more likely to use stock as the means of payment. The difference in probability of using stock between the top and bottom valuation quintiles is a sizable 24.7% (P/B) or 14.7% (P/V). Similarly, high valuation acquirers are less likely to use cash as consideration. The difference in the fraction of cash offers between the top and bottom valuation quintiles is -14.3% (P/B) and -6.4% (P/V).²³

²⁰ Schwert (2000) provides related findings in a 1975–1996 sample period.

²¹ In an early sample, Walkling and Edmister (1985) report that target book-to-price is related to the bid premium; Lang et al. (1989) and Servaes (1991) find that, conditional on subsequent offer success, target announcement returns are decreasing in target Q measures. Although he does not focus on this issue, Table 7 of Pinkowitz (2000) indicates little relation between target book-assets/market-assets and premia in a 1985–1994 sample of hostile offers.

²² Servaes (1991) and Morck et al. (1990) report evidence that, conditional on subsequent offer success, bidder returns are lower when the target has a high Q or is rapidly growing.

²³ Applying data primarily from the 1980s, Martin (1996) and Rau and Vermaelen (1998) establish that high bidder valuation is, conditional upon subsequent offer success, associated with the use of equity as a means of payment. In addition to providing a forward-looking P/B test, our finding that undervaluation as measured by P/V predicts the use of cash rather than equity provides evidence that misvaluation matters above and beyond any possible growth-related effects.

Result 8: Higher bidder valuation increases the likelihood of a merger bid rather than tender offer.

High valuation bidders are less likely to use tender offers and more likely to use merger bids. In Panels C and D, the quintile difference in the probability of a tender offer is -6.8% (significant at the 1% level) and -4.9% (significant at the 5% level) for P/B and P/V .

Result 9a: Higher bidder P/B is associated with higher bid premia.

There is some evidence that high valuation acquirers pay higher bid premia, especially when the form of consideration is stock. Using the P/B measure in Panel C, the quintile difference in premium is 4.2% for the whole sample and (not reported in the table) 8.0% for stock acquisitions, with significant differences. There is no significant effect for P/V in Panel D.

Result 9b: Higher bidder P/B is associated with higher target stock returns.

There is some evidence that offers by high valuation bidders are associated with higher target announcement-period returns. This effect is also much stronger among stock bids than in the entire sample. In Panel C, the P/B quintile difference in target announcement-period stock returns is 2.1% for the whole sample (significant at the 10% level), and (not reported in the table) 6.1% among stock acquisitions (highly significant). In contrast, the older samples of Lang et al. (1989) and Servaes (1991) indicate that (conditioning on subsequent offer success), there was no significant relation between bidder Q and target return. In Panel D P/V has essentially no effect; among stock offers (not reported in table) there is a quintile difference of 3.7% , which is significant at the 10% level.

Result 9c: Higher bidder valuation is associated with lower bidder announcement-period returns.

Mean acquirer announcement-period returns are significantly more negative when the acquirer has high valuation based on either measure. The mean bidder abnormal return (describing the quintile difference in mean returns from going long in high valuation and short on low valuation bidders upon offer announcement) is -1.5% (P/B) or -1.8% (P/V). For P/B the effect derives from the stock and merger subsamples; for P/V the effect is strong for both the stock and cash subsamples, and both the merger and tender offer subsamples (not reported in tables).

As mentioned in the introduction, studies of earlier samples on Tobin's Q variables (which tend to be highly correlated with P/B) find very different results, namely, that higher bidder valuation is associated with higher bidder returns. For example, our finding contrasts with the evidence, based on proxies for Tobin's Q in a sample of successful mergers and tender offers from 1972 to 1987 of Servaes (1991). Moreover, our finding within the tender offer subsample of no significant relation between acquirer P/B ratios and announcement-period

acquirer returns (with a point estimate indicating low returns for bidders with low P/B) contrasts with the findings for successful tender offers of Lang et al. (1989) (from 1968 to 1986); see also footnote 28. Thus, our overall P/B finding suggests that the 1990s period may be different from the earlier period.²⁴

Our P/B findings also contrast, though not quite as starkly, with the finding of Moeller et al. (2005) in a 1980–2001 sample of public acquisitions of essentially no relation between Tobin's Q and the bidder's announcement-period return. The differing conclusions may derive from their conditioning of returns on the success of the offer, our longer sample period, or differences in control variables and valuation proxies.²⁵ For our purpose here, that is, distinguishing between the misvaluation and Q hypotheses, a cleaner test involves examining unconditional mean bidder announcement-period returns, since offer success is not known at the time that the announcement returns are realized.

III. Multivariate Tests

Proxies for misvaluation can be correlated with growth prospects for at least two distinct reasons. First, for psychological reasons investor misperceptions may be related to growth—"inherent confounding." For example, the market may overvalue rapidly growing firms (see Lakonishok, Shleifer, and Vishny (1994)). Second, measurement error in the mispricing proxy may be correlated with growth opportunities—"measurement confounding." For example, market price in P/B and P/V reflects the market's rational assessment of future growth, not just pricing errors.

A crucial advantage of P/V is that, by taking into account analyst forecasts of future earnings, it addresses mismeasurement confounding. Furthermore, in multivariate testing for the effect of P/V , controlling for P/B , which depends heavily on growth prospects, can address inherent confounding while also resolving any remaining mismeasurement confounding. On the other hand, by definition removing the effects of inherent confounding removes part of the misvaluation effect that we wish to assess. Furthermore, as discussed earlier, P/B is itself likely to contain incremental information about misvaluation. It is therefore informative to examine tests that use each variable separately, as well as jointly.

We therefore perform multivariate analysis with additional controls as described in Tables IV and V. All regressions include size variables, leverage, year,

²⁴ Our results and those of earlier studies are not entirely comparable due to differences in sample and variable definitions. Lang et al. (1989) use successful tender offers in the University of Rochester Merc Database and Austin Tenderbase, and Servaes (1991) uses successful mergers and tender offers from CRSP. When we restrict our sample to the years of partial overlap with the time periods of these two papers (with or without the success restriction), we do not find a significant relation between bidder abnormal returns and bidder P/B . However, our sample has very few observations prior to 1981.

²⁵ Since bidders with high P/B (documented here) and high Q (Martin (1996)) tend to pay with equity, and since equity bidders for public firms tend to earn lower abnormal returns than do cash bidders (Travlos (1987), Brown and Ryngaert (1991), Fuller et al. (2002), Bhagat et al. (2005)), our finding is compatible with some other available evidence.

Table IV
Logistic Regressions

The sample includes merger bids and tender offers in which both the acquirer and target were listed on the NYSE, AMEX, or NASDAQ during 1978–2000, and the data needed to calculate both P/B and P/V are available. P/B is the price-to-book ratio, P/V is the price-to-value ratio, where the intrinsic value is estimated using the residual income model when the discount rate is based on firm-specific CAPM. P/B and P/V are ranked monthly among all CRSP stocks and assigned a value between 1 and 100. Diversifying = 1 if the acquirer and target share the same three-digit COMPUSTAT SIC codes; zero otherwise. Relative size = acquirer market value / target market value. Target size = target market value of equity. Leverage = acquirer total debt/total assets. For each coefficient, the second row reports the p -value. All regressions include year and acquirer two-digit SIC major industry dummies.

	Dependent Variable (= 1 If Yes, 0 Otherwise)											
	Cash		Stock		Tender Offer		Hostile		Success			
Target P/B	-0.009	0.020	0.018	-0.014	-0.012	-0.021	-0.021	0.017	0.017	0.017	0.017	
	0.011	0.000	0.000	0.000	0.002	0.000	0.000	0.000	0.000	0.000	0.000	
Acquirer P/B	-0.025	0.028	0.024	-0.021	-0.016	0.000	-0.001	-0.006	-0.001	-0.006	-0.006	
	0.000	0.000	0.000	0.000	0.000	0.975	0.934	0.124	0.934	0.124	0.178	
Target P/V	-0.005	0.003	0.005	0.000	-0.007	-0.005	-0.008	0.002	-0.006	0.002	0.000	
	0.094	0.239	0.047	0.026	0.077	0.094	0.094	0.550	0.223	0.550	0.967	
Acquirer P/V	-0.017	-0.009	0.019	-0.008	-0.019	-0.013	-0.001	0.001	0.003	0.001	-0.001	
	0.000	0.008	0.000	0.000	0.000	0.825	0.825	0.844	0.583	0.844	0.731	
Diversifying	0.361	0.386	-0.470	0.526	0.538	0.549	0.739	-0.262	0.756	-0.249	-0.260	
	0.030	0.020	0.002	0.001	0.003	0.003	0.005	0.140	0.004	0.159	0.144	
Log of relative size	0.417	0.339	-0.220	0.216	0.154	0.247	-0.523	0.448	-0.512	0.447	0.449	
	0.000	0.000	0.000	0.000	0.005	0.000	0.000	0.000	0.000	0.000	0.000	
Log of target size	0.062	0.000	-0.173	0.192	0.126	0.223	0.368	0.000	0.386	-0.148	-0.148	
	0.302	0.998	0.177	0.001	0.032	0.000	0.000	0.013	0.000	0.085	0.014	
Leverage	-0.691	-0.407	-0.785	-0.894	-0.630	-1.076	0.208	0.634	0.202	0.634	0.631	
	0.222	0.459	0.172	0.058	0.264	0.068	0.798	0.261	0.805	0.499	0.263	
Intercept	-0.631	-0.868	-1.097	-0.526	-0.511	-1.113	-4.325	1.775	-4.386	1.775	1.807	
	0.271	0.127	0.028	0.356	0.371	0.846	0.000	0.004	0.000	0.004	0.003	
N	1,513	1,513	1,513	1,513	1,513	1,479	1,479	1,513	1,479	1,513	1,513	
Pseudo- R^2	0.1790	0.1634	0.1850	0.1915	0.1851	0.2044	0.2238	0.1359	0.2256	0.1359	0.1227	

Table V
Least Squares Regressions

Acquirer and target announcement period cumulative abnormal returns (CAR) are measured over the 3 days (-1, 1) around the announcement (day 0) of the acquisition. Bid premium is the ratio of the bid price offered by the acquirer to the target stock price 5 days prior to the announcement of the takeover bid. The sample includes merger bids and tender offers in which both the acquirer and target were listed on the NYSE, AMEX, or NASDAQ during 1978–2000 and the data needed to calculate both P/B and P/V are available. P/B is the price-to-book ratio. P/V is the price-to-value ratio, where the intrinsic value is estimated using the residual income model when the discount rate is based on firm-specific CAPM. P/B and P/V are ranked monthly among all CRSP stocks and assigned a value between 1 and 100. Relative Size = acquirer market value / target market value. Target size = target market value of equity. Leverage = acquirer total debt/total assets. For each coefficient, the second row reports the t -statistic. All regressions include year and acquirer two-digit SIC major industry dummies.

	Dependent Variable								
	Bid Premium			Target Announcement Period CAR			Acquirer Announcement Period CAR		
Target P/B	-0.222	-0.207	-0.136	-0.114	-0.007	-0.001			
	-6.45	-5.92	-5.18	-4.28	-0.79	-0.08			
Acquirer P/B	0.066	0.065	0.019	0.044	-0.056	-0.042			
	1.68	1.57	0.64	1.42	-5.26	-3.72			
Target P/V	-0.108	-0.086		-0.080	-0.068	-0.008	-0.008	-0.006	
	-3.94	-3.15		-3.85	-3.26	-1.07	-1.07	-0.87	
Acquirer P/V	0.004	0.028		-0.048	-0.037	-0.044	-0.044	-0.031	
	0.12	0.84		-2.05	-1.47	-5.23	-5.23	-3.36	
Log of relative size	1.977	2.020	2.093	3.263	3.408	3.422	0.778	0.668	0.824
	3.73	3.91	3.94	8.06	8.71	8.46	5.36	4.76	5.67
Log of target size	-0.584	-0.964	-0.335	0.300	0.206	0.535	0.130	0.067	0.168
	-1.07	-1.80	-0.61	0.72	0.51	1.28	0.87	0.46	1.12
Leverage	-13.074	-10.927	-13.372	-7.836	-6.783	-8.025	1.941	2.418	1.892
	-2.57	-2.14	-2.63	-2.03	-1.77	-2.09	1.40	1.76	1.37
Intercept	48.525	48.196	48.558	17.755	19.289	19.249	-2.561	-2.712	-1.732
	9.17	9.07	9.09	4.40	4.80	4.74	-1.77	-1.88	-1.19
N	1,479	1,479	1,479	1,513	1,513	1,513	1,513	1,513	1,513
Adjusted- R^2	0.0869	0.0710	0.0920	0.0978	0.0965	0.1064	0.0576	0.0569	0.0654

and industry as controls. The industry controls are bidder two-digit SIC major industry dummies as defined by Moskowitz and Grinblatt (1999). To ensure that the effects we identify are not spurious artifacts of low-frequency time-series swings, in the multivariate regressions in Tables IV and V, each month we rank bidder and target P/B and P/V among all CRSP stocks and assign a value between 1 and 100 (see Frankel and Lee (1998)).

Theories of financing and capital structure predict that leverage levels will be related to a firm's growth opportunities, so leverage and P/B may be correlated. It is possible that leverage and financing constraints influence bidder behavior, inducing a correlation of B/P with takeover characteristics. We therefore include leverage as one of the control variables in the multivariate tests.²⁶

²⁶ To make the regressions comparable, we impose the condition that data for both P/B and P/V be available. The results are generally similar if we expand the sample to include all firms for which data for P/B are available in the regressions that do not involve P/V .

Table IV summarizes logistic regressions relating bidder and target valuation measures to the means of payment and to the mode and mood of the offer. The dependent variables we consider are: (1) cash payment, (2) stock payment, (3) tender offer, (4) hostility, and (5) success. We report three specifications for each dependent variable. First, we regress on bidder and target P/B ranks. Second, we regress on bidder and target P/V . Third, we include both P/B and P/V ranks to examine whether there is incremental explanatory power from P/V as a misvaluation measure given P/B . If so, this confirms in a stringent test that the identified effect is a result of misvaluation, rather than other economic factors possibly captured by P/B , such as risk premia, growth opportunities, or the degree of managerial discipline (“stringent” because P/B is likely to extract part of the misvaluation effect from P/V).

The multivariate findings for target valuations in Table IV are generally consistent with those of the univariate analysis. As in the univariate analysis, higher target valuation (higher P/B or P/V) is associated with greater use of stock (Result 4a), less use of cash (Result 4b), a lower probability of a tender offer rather than a merger (Result 5b), and a lower probability that the offer is hostile (Result 5a; the P/V effect on cash and hostility does not withstand inclusion of P/B in the regression). Also, in the multivariate analysis, the effect of valuation on probability of success (Result 5c) remains highly significant with the P/B measure, but is not significant with the P/V measure.

The findings for bidder valuations in Table IV are also generally similar to those of the univariate analysis. As in the univariate analysis, higher bidder valuation (P/B or P/V) is associated with greater use of stock (Result 7a), less use of cash (Result 7b), and a lower probability of a tender offer rather than a merger (Result 8).

There are also some differences between the multivariate and univariate findings. Table V indicates that, as with the univariate findings, higher target valuation as indicated by higher P/B is associated with lower bid premia (Result 6a) and lower target announcement-period returns (Result 6b). However, in contrast with the univariate tests, in the multivariate test these relationships apply with the P/V measure as well. As for the effect of target valuation on bidder returns (Result 6c), in contrast with the strong negative effect in the univariate tests, in the multivariate tests there is no significant relation.

The positive relation between bidder valuation, as indicated by P/B , with bid premium (Result 9a) is weaker in the multivariate tests than in the univariate tests. The confidence level is $p < 0.10$ when only P/B is included in the regression, and is $p = 0.12$ when both P/B and P/V are included. This relation becomes significant at the 1% level within the stock offer subsample (not reported in tables).

The evidence as to whether bidder valuation is associated with target announcement-period returns is mixed. The univariate finding that high bidder P/B is associated with higher target returns (Result 9b) does not hold up in the multivariate tests.

Consistent with the univariate findings, for both P/B and P/V , high valuation bidders earn lower bidder announcement-period returns (Result 9c). These

findings contrast with evidence, discussed in Section II, of other studies based on different time periods and empirical measures; see also footnote 28. As with the univariate evidence, these are highly significant effects.

IV. Discussion

We now discuss the more salient empirical findings of the previous two sections from the perspective of two theories of takeovers, the misvaluation hypothesis and the Q hypothesis. In the approach of Shleifer and Vishny (2003), managers value firms rationally, whereas investors do not. Cash takeovers result from the efforts of bidders to acquire undervalued targets at prices below fundamental value. Equity takeovers result from the efforts of highly overvalued bidders to trade their assets for less overvalued target assets, thereby achieving a favorable real exchange ratio. Target managers accept such offers if the target is also overvalued, as takeover gives target management the chance to cash out of illiquid stock or option holdings. More generally, the misvaluation hypothesis reflects the insight that the willingness of target management to cash out should tend to be greater when the target is less undervalued (or more overvalued).²⁷

Under the misvaluation hypothesis, P/B and P/V measure equity misvaluation. Misvaluation affects the ability of a bidder to finance a bid at a favorable price. Furthermore, bidder and target misvaluation create different strategic incentives that affect not only the means of payment (as described above), but also the combativeness of the transaction, the premium paid, and the likelihood of offer success.

The Q hypothesis of takeovers (Lang et al. (1989), Servaes (1991), Jovanovic and Rousseau (2002)) asserts that takeovers reallocate target assets to different uses. These uses can generate higher or lower payoffs depending on the quality of bidder and target management, and on the business opportunities of bidder and target firms.

In this approach, Tobin's Q , proxied by the ratio of firm market value to book value, is an indicator of the degree to which a firm has good opportunities to create shareholder market value from invested resources. On the other hand, poorly run bidders may waste resources on takeovers and make poor use of target assets. For example, bidders may waste their free cash flow (Jensen (1986)), or make empire-building equity offers.

The variable P/B provides a measure of the bidder or target's ability to create value from existing assets.²⁸ The Q hypothesis predicts that greater total gains

²⁷ It is not necessary for the hypothesis to be that voluntary acceptance occurs if and only if a target is overvalued. In practice the manager of an undervalued target may be pressured to sell by shareholders enthusiastic about the offered premium, or induced to sell by bidders offering indirect side payments. Such effects smooth the relationship between target valuation and the probability that the target is willing to sell the firm to an expropriative bidder.

²⁸ Empirical studies on Tobin's Q and takeovers use Q proxies relating to the ratio of total asset rather than equity values. However, equity P/B is highly correlated with asset P/B ; furthermore, our multivariate tests include leverage controls.

are generated by acquisitions involving bad targets and good bidders than by transactions involving good targets and bad bidders. These larger gains are shared between the bidder and the target. So, higher bidder valuation and lower target valuation are predicted to be associated with high bidder and target returns (see Lang et al. (1989), Servaes (1991)), and (we further predict) higher bid premia.

Since P/V is purified of much of the growth effects contained in P/B , our univariate P/V tests are much less subject to an interpretation in terms of growth or leverage-induced financing constraints. Examining the effects of P/V after controlling for P/B provides an even more stringent test for misvaluation.

The misvaluation and Q hypotheses share several implications, which make it harder to distinguish between these alternative theories. Neither has unambiguous predictions about the effects of investor valuations on every takeover characteristic. In our discussion we suggest how each approach can rationalize different findings, and which results present the greatest challenges to each approach. Further theoretical work to extend the range of predictions of each hypothesis is likely to provide additional insights.

A. Relative Bidder-Target Valuations

Result 1, that on average bidding firms have significantly higher valuations than target firms (higher P/B and P/V) in the overall sample is consistent with the misvaluation hypothesis. The findings for equity offers and merger bids are strong, and for cash offers and tender offers more mixed. Intuitively, under the misvaluation hypothesis the way a stock bidder can profit from misvaluation is to acquire a less overvalued (though still overvalued) target. Cash bidders should also be overvalued on average relative to their targets, for two reasons. First, the ability to raise capital cheaply loosens a firm's cash constraints, so overvaluation encourages making a cash bid over no bid. Second, cash bidders profit by acquiring undervalued targets.

The bidder-versus-target findings for P/B are related to findings of Andrade et al. (2001) and Jovanovic and Rousseau (2002), although their studies condition upon offer success. Jovanovic and Rousseau (2002) propose a version of the Q hypothesis in which takeovers are generally value-increasing (thereby ruling out, for example, takeovers involving overinvestment of free cash flow). Our finding and theirs are consistent with this version of the Q approach, as well as with the misvaluation hypothesis. More generally, the Q approach as developed by Lang et al. (1989) and Servaes (1991) does not specify whether good or bad transactions predominate, so it is consistent with bidders having either higher or lower market valuation ratios than targets. However, one reason that good bidders may predominate is that if bad bidders create less value, they may have a harder time than good bidders at getting their boards to approve bids.

Neither hypothesis specifically predicts the Result 2 finding that the bidder-target difference in valuations is on average greater among equity than among cash offers, and among merger bids than among tender offers. However, under the misvaluation hypothesis, a profitable equity offer requires the bidder to be

overvalued relative to the target. Although the differential is also likely to be positive for a profitable cash offer (since the target must be undervalued), it does not have to be, suggesting a smaller bidder-target valuation difference. A similar point applies to mergers versus tender offers, because tender offers tend to be done in cash while mergers predominantly involve equity. This correlation makes sense under the misvaluation hypothesis because overvalued bidders can profit from friendly equity merger bids, rather than hostile cash tender offers.²⁹

An interpretation of Result 2 under the Q hypothesis is that friendly offers (associated with mergers and the use of equity) are made in transactions in which there are large total gains to share, and that gains are largest when high Q bidders acquire low Q targets, so that target resources can be allocated to more efficient uses. It follows that merger bidding and equity payment should be associated with a larger bidder-target difference in valuations. On the other hand, if there are agency problems, then friendly merger and equity bids should tend to be made to well-run, high Q targets; bad targets are the ones that require discipline. *Ceteris paribus*, this effect tends to reduce the bidder-target valuation difference in mergers and equity offers. Thus, a possible explanation for Result 2 is that the first effect is stronger than the second one.

B. Target Valuation and Takeover Characteristics

The Result 3 finding that the targets of cash offers have significantly lower valuations than the targets of stock offers, and the basically equivalent findings of Results 4a and 4b that higher target valuation is associated with equity rather than cash offers, are consistent with the misvaluation hypothesis. As discussed earlier, in Shleifer and Vishny (2003) overvalued targets receive equity offers since overvalued target management is willing to cash out even to relatively overvalued equity bidders. Two further arguments reinforce this point. First, *ceteris paribus*, the more overvalued (or less undervalued) the target, the stronger the incentive of the bidder to leave part of the target's misvaluation on the shoulders of target shareholders by paying with stock rather than cash. (For a given premium over market, greater target overvaluation increases the cost to the bidder of either a cash or equity offer. However, the increase in the cost of an equity offer is smaller to the extent that target shareholders overvalue the merged equity being offered.) Second, if target firms are resistant to selling when they are undervalued, the bidder may seek to circumvent target management and consummate swiftly by means of a cash tender offer. The P/V finding that bidder valuation promotes the use of equity indicates an effect of measured misvaluation even in a test that stringently filters out growth-related effects.

Several findings (Results 5a–5c) indicate that low target valuation is associated with a more combative transaction, that is, low target valuation is associated with hostility, a tender offer rather than a merger, and a lower probability of success, using both measures in univariate tests. However, there is no effect

²⁹ The use of cash can expedite a hostile transaction by avoiding the SEC filing requirements associated with equity issuance, and, perhaps, by making it easier for investors to evaluate the offer.

of target P/V on hostility after controlling for P/B , and only a univariate P/V effect on success.

These findings are generally consistent with both the Q hypothesis and the misvaluation hypothesis. Under the Q hypothesis, it is reasonable to expect managers of poorly run and therefore low valued (low P/B) targets to oppose a takeover in order to avoid being fired. This leads to hostility, the use of a tender offer, and a lower probability of offer success.

Under the misvaluation hypothesis, bidders for undervalued targets have an incentive to profit by bidding below true target value. This should provoke greater opposition by the target to the offer (consistent with the evidence discussed above), thereby reducing the probability of success. The manager of an undervalued target has an incentive to fight hard either to block the offer or drive up the price. This in turn increases the incentive of the bidder to bypass management through a tender offer. Cash offers exploit unwilling, undervalued targets, whereas less undervalued or more overvalued targets are more willing to cash out to relatively overvalued equity offers. Furthermore, since target overvaluation encourages target management acceptance, it should also improve the probability of offer success.

The evidence (Result 6a) that bid premia are higher on average for more undervalued targets under the P/B measure is consistent with both hypotheses. However, the P/V finding, which is insignificant (though of the right sign) in the univariate test but strong in the multivariate analysis, provides only partial support for the misvaluation hypothesis.

Under the Q hypothesis, there is greater room to improve a poorly run target. The bidder can therefore afford to pay a higher premium for the target. Furthermore, the managers of a poorly run target may fight harder to prevent takeover in order to avoid being fired. Thus, low valuation targets under the P/B measure should receive higher premia.

Under the misvaluation hypothesis, greater undervaluation increases a target's incentive to fight to maintain a premium (or avoid a discount) relative to fundamental value. In addition, a bidder has a stronger incentive to increase its bid relative to market in order to ensure success. Thus, more undervalued targets (P/B or P/V) should earn higher premia relative to the market price.

The evidence (Result 6b) that target announcement-period returns are higher on average for low valuation targets is consistent with undervalued targets fighting for a higher premium (relative to an unduly low market price), and with takeover bids acting to correct preexisting target mispricing.

The Q hypothesis provides an alternative explanation for the significant P/B findings. The largest value improvements are possible for bad targets with low valuations. This larger gain can be shared with target shareholders, increasing the announcement-period return (see, for example, Lang et al. (1989), Servaes (1991)).

C. Bidder Valuation and Takeover Characteristics

The finding that on average stock bidders are more highly valued than cash bidders (Result 3), and the basically equivalent finding that bidders with higher

valuations are more likely to use stock rather than cash as consideration (Results 7a and 7b), are consistent with the hypothesis that overvalued bidders prefer to acquire target resources using their overpriced stock as currency. Intuitively, given a bid, greater bidder overvaluation increases the incentive to pay with equity rather than cash by reducing the fundamental cost per dollar of market value offered as consideration.³⁰

Theories of financing and capital structure offer an alternative explanation of this finding. Bidders with strong growth opportunities may prefer to keep their leverage low to avoid being capital constrained in the future. They can do so by financing their offers with equity (as argued by Jung, Kim, and Stulz (1996) and Martin (1996)).

Neither hypothesis specifically predicts Result 8, that greater bidder valuation is associated with a lower probability of a tender offer rather than a merger bid. A possible interpretation under the misvaluation hypothesis is that overvalued bidders tend to use equity, which is rarely used in tender offers. A possible interpretation under the Q hypothesis is that bidders with good growth opportunities should reduce leverage by issuing equity, which again is associated with a merger rather than a tender offer.

Result 9a states that bidders with high valuation as measured by P/B pay higher bid premia, especially when the form of consideration is stock. A possible explanation is that overvalued bidders either find it easier to raise enough capital to make a high bid, or are more willing to make a high bid using an overvalued currency, their stock. Furthermore, an overvalued equity offer is less attractive to target management than a corresponding cash premium, so overvaluation increases the pressure on an equity bidder to boost the premium.

The Q hypothesis provides an alternative explanation: Good (high valuation) bidders are able to create greater value from an acquisition, and they share some of this larger gain with target shareholders in the form of a higher premium. Since there is no significant finding for P/V , this evidence supports the Q hypothesis more strongly than the misvaluation hypothesis. On the other hand, the Q hypothesis does not address the greater strength of the effect among equity than among cash bids.

Despite the evidence that among stock offers, bidders with higher valuation pay higher premia, there is no evidence that targets are more likely to view offers from high valuation bidders as friendly, nor that such offers have a greater probability of success. This is reasonable if target management understands that the bidder is overvalued (as in the approach of Shleifer and Vishny (2003)). If so, then a higher premium relative to market in a stock offer merely compensates for the fact that the market value of the offered shares

³⁰ See Rau and Vermaelen (1998) and Shleifer and Vishny (2003). Overvaluation encourages making either a stock or a cash offer relative to no offer. The incentive of an overvalued firm to make an equity offer is direct: the ability to pay with overvalued equity. Cash bids are encouraged indirectly; the ability of an overvalued firm to raise equity capital cheaply relaxes capital constraints. Since performing a separate equity issue in addition to a takeover bid is costly (investment banking fees, management time, and possible offer delay), overvaluation should encourage stock over cash offers.

is inflated relative to the fundamental value. Alternatively, under the Q approach, it could be that well-run (high valuation) bidders are more likely to remove the target management. If so, target management will fight harder in opposition to the bid, forcing a higher premium.

The finding that on average bidders with higher valuations (using both measures) earn substantially lower announcement-period returns (Result 9c) contrasts with findings of studies that use earlier samples. The evidence is also in sharp conflict with the Q hypothesis, which predicts that a well-run bidder can generate greater gains from takeover (Lang et al. (1989), Servaes (1991)). Furthermore, the fact that this effect is present within each of the cash and stock subsamples indicates that this finding does not derive from the correlation of P/B with the use of equity as a means of payment (as in the adverse selection effect of Myers and Majluf (1984)).

From a misvaluation perspective, as discussed above, overvalued bidders are predicted to offer high bid premia to targets. In the case of equity offers, the market tends to believe mistakenly that the bidder is paying too much (since the market overvalues the equity offered more than it overvalues the target assets). Thus, investors tend to view an offer by an undervalued bidder as a masterful stroke, and an offer by an overvalued bidder as a clumsy blunder.

More generally, this empirical finding is consistent with the announcement of a takeover bid alerting investors to preexisting mispricing, thereby causing a partial correction. An alternative argument is that takeover bids may incite greater bidder mispricing. Some existing behavioral theory predicts that discretionary corporate events are associated with a corrective effect on prior mispricing (see Daniel, Hirshleifer, and Subrahmanyam (1998)). Intuitively, takeover bids are salient events that call attention to the firms involved. To the extent that more careful analysis helps investors correct misvaluation, the stock price reaction tends to oppose the prior misvaluation.³¹ However, we do not exclude the opposite possibility.

Overall, as indicated in Table AI, for the entire time period, there are a variety of robust regularities about valuations and takeover behavior that offer substantial support for both the misvaluation and the Q hypotheses. Neither theory explains all aspects of the data, and for some takeover characteristics the hypotheses do not offer unambiguous predictions. The distinctive P/V findings of the misvaluation hypothesis receive substantial support. However, in

³¹ Some past evidence suggests that when new public information about a firm arrives, the market price tends to move to correct prior mispricing. For example, Skinner and Sloan (2002) and Ali et al. (2003) report that firms that are overvalued by P/V measures tend to earn low returns at subsequent earnings announcement dates. Some authors explore whether the markets overreact to sales growth trends (Lakonishok et al. (1994), Dechow and Sloan (1997)). Overreaction to public news could potentially exacerbate preexisting mispricing instead of correcting it. However, more recent studies suggest that the market tends to underreact to public or “tangible” news arrivals (Daniel and Titman (2003), Chan (2003)). Furthermore, a body of evidence about various types of discretionary corporate actions suggests that there is a tendency toward partial correction of prior mispricings; post-event long-run abnormal returns tend to be of the same sign as initial event-date reactions (this empirical literature is reviewed in Hirshleifer (2001)).

some cases there are findings that are significant with P/B but not P/V , an outcome that tends to be more strongly supportive of the Q hypothesis. On the other hand, the Q hypothesis is directly contradicted in one of the predictions offered by some of its originators, namely, that high valuation bidders will earn higher announcement-period returns. This disagreement is strongest in the 1990s subsample.

D. Differences in Valuation Effects over Time

Observers often portray the takeovers of the 1980s as relating to agency problems and real efficiencies, and the takeovers of the 1990s and turn of the millennium as relating to market inefficiency. Subsample analysis indicates that the empirical findings in the overall sample are to a large extent present in both the 1980s subsample, which runs from 1978 to 1989, and the 1990s subsample, which runs from 1990 to 2000. Most findings identified in the overall sample remain strong in the later period; the findings for the 1980s tend to be weaker. Statistical significance in the 1980s is also reduced by the smaller sample size (1,222) in the earlier period than in the later period (2,510); there are only 324 P/V observations of bidder-target pairs in the earlier period, compared with 1,223 P/V observations in the later period. Table AI summarizes findings for the two subperiods.

The evidence on the whole tends to be supportive of both theories during both early and late time periods. However, some differences in findings across the two periods tend to be more consistent with the misvaluation hypothesis in the 1990s than in the 1980s, and to be more consistent with the Q hypothesis in the 1980s than in the later period. The full-sample finding that bidders have higher valuations than targets applies only within the 1990s.³² Indeed, during the 1980s targets had higher valuations than bidders using the P/V measure, which opposes the misvaluation hypothesis.³³ Tender offer targets have higher P/V than their bidders in the entire time period; this effect is inconsistent with the misvaluation hypothesis, and derives entirely from the 1980s. The evidence regarding P/V does not provide compelling support for the Q hypothesis either, since P/V is not a proxy for managerial quality. However, in the 1980s bidders do tend to have a marginally higher P/B than targets.

In the univariate tests, the full-period findings regarding effects of bidder P/B and P/V are all strong in the 1990s subsample, as are the effects of target P/B ; the effects of target P/V are also strong in the 1990s except for the effects on hostility and success.

³² On the other hand, in a sample of 50 successful mergers in the 1950s, Gort (1969) finds that acquirers on average have higher price-earnings ratios than their targets (significant in a sign test, though not at the 5% level in a parametric test).

³³ A speculative explanation for the observed pattern relates to the lower analyst coverage of firms prior to the 1990s. Since bidders are larger than targets, bidder forecasts are available more often than target forecasts. Thus, in the 1980s subsample there is a stronger sample selection in P/V tests for targets with high market valuations.

Most of the findings for target P/B are quantitatively similar in the 1980s to the full sample, though the significance tends to be weaker because of smaller sample size. However, the effect of target P/B on means of payment (a prediction of the misvaluation hypothesis) is not present in the 1980s sample.

Owing partly to differences in sample size, the full-sample findings for target P/V become much less significant during the 1980s (though in some cases the point estimates for the 1980s appear to be substantial). Some but not all of the full-sample results for bidder P/B remain in the 1980s. The full-sample effects of bidder P/V vanish entirely in the 1980s.

In the multivariate tests, almost all of the full-sample findings for target P/B , bidder P/B , and bidder P/V continue to hold in the 1990s subsample, as do most of the target P/V findings.

Most of the full-period findings for target P/B hold up in the 1980s, but the full-period findings for target P/V vanish, which fails to support the misvaluation hypothesis during the 1980s. For bidder P/B , some of the full-period findings survive but others vanish in the 1980s, indicating weaker support for both theories. For bidder P/V , most of the full-sample findings vanish, though an indication of an effect on bidder announcement-period returns remains.

The greatest challenge to the Q hypothesis is the finding that high bidder valuation as measured by P/B is associated with lower bidder announcement-period returns. This effect is very strong in the 1990s subsample, but is not present during the 1980s. Thus, this challenge is milder during the 1980s than in the full-period sample.

In summary, neither theory explains all aspects of the data, and in some cases the hypotheses do not offer unambiguous predictions. Nevertheless, the main weight of the evidence tends to be supportive of both theories, with greater consistency with the Q hypothesis in the 1980s and greater consistency with the misvaluation hypothesis in the 1990s.

With regard to the misvaluation hypothesis, it could be argued that it is not actual misvaluation that influences takeovers, but merely an incorrect perception by managers that there is overvaluation. If managers believe that the price-to-book ratio is an indicator of misvaluation, they may make takeover decisions based on this measure. However, most managers are probably unfamiliar with P/V , so this argument does not explain the P/V effects that obtain after controlling for P/B .

V. Summary and Conclusion

We examine the misvaluation hypothesis—that inefficient stock market misvaluation is an important driver of the takeover market—and the Q hypothesis—that high quality bidders improve bad targets more than bad bidders improve good targets—using contemporaneous measures of the valuations of bidders and targets, namely, price-to-book (P/B), and the ratio of price to residual income valuation (P/V). The P/V variable helps us evaluate whether a relation between market valuations and takeover characteristics is due to mispricing or other effects deriving from growth opportunities or from the quality of bidder and target management.

Several empirical patterns emerge. With one or both measures, bidders are more highly valued relative to their targets in the full sample, especially among equity offers and merger bids. More highly valued bidders are more likely to use stock and less likely to use cash as consideration, are willing to pay more relative to the target market price, are less inclined to use a tender offer rather than a merger bid, and earn lower announcement-period returns. Low valuation targets receive higher premia relative to market price, are more likely to be hostile to the offer, are more likely to receive tender offers rather than merger bids, have a lower probability of being successfully acquired, and earn higher announcement-period returns.

Most of the effects we identify are stronger in the 1990s subsample than in the 1980s. In addition, the evidence is broadly supportive of both the *Q* and misvaluation hypotheses in both periods, but tends to be more supportive of the *Q* hypothesis in the 1980s, and of the misvaluation hypothesis in the 1990s.

The cross-sectional tests we offer here filter away any effects of aggregate valuations and disentangle the effects of bidder versus target misvaluation. Our findings raise the question of whether market valuations drive aggregate patterns of takeover activity. Some recent papers examine aggregate valuation and the takeover market (Bouwman, Fuller, and Nain (2004), Verter (2003)). These papers confirm that there are long-term swings in market valuation and aggregate takeover activity, and offer independent support for the view that valuations affect takeover activity. A challenge for this literature is the fact that the effective sample size is reduced by the low frequency of merger waves, and the fact that aggregate measures mix the effects of bidder and target valuations. Our tests are therefore complementary with those of these papers.

A challenge for distinguishing between alternatives is that the misvaluation and *Q* hypotheses share several implications. Furthermore, each hypothesis is ambiguous with respect to some takeover characteristics. We suggest how each approach can rationalize different findings, and which results present the greatest challenges to each approach. Further theoretical work will be valuable in developing further predictions that distinguish between alternative hypotheses more sharply.

There is no reason to believe that the influence of market valuations (rational or otherwise) on managerial decisions is limited to the takeover market. As discussed earlier, recent research provides evidence that financing, repurchasing, reporting, and investment decisions are related to valuation measures. Our evidence contributes to an emerging theme in the recent literature that valuations (and, some have argued, misvaluations) may be important for many of the decisions that firms make.

The recently emerging misvaluation perspective offers an alternative to the traditional approaches to corporate finance, including the *Q* theory, which are premised upon the efficient markets hypothesis. Initial steps have been taken toward incorporating misvaluation into the theory of takeover transactions (see Shleifer and Vishny (2003)), financing, and investment decisions (Stein (1996), Daniel et al. (1998)). The emerging indications of possible misvaluation effects suggest that further theoretical analysis of how firms can exploit misvaluation may be fruitful.

Table A1
Summary of Main Findings

This table summarizes the main results of the paper. Panel A reports the acquirer minus target mean differences in price-to-book (P/B) ratios and in price-to-value (P/V) ratios for given means of payment and forms of transaction. Panel A also reports stock minus cash mean differences in valuation ratios among acquirers and among targets. The relation between takeover characteristics and target and acquirer misvaluation measures in univariate tests is reported in Panel B and in multivariate tests is reported in Panel C. In each panel, the columns “all”, “80s”, and “90s” report results based on the whole sample period 1978–2000, subperiod 1978–1989, and subperiod 1990–2000, respectively. The intrinsic value V is calculated from the Residual Income Model. Cash = 1 if the acquisition is all cash; zero otherwise. Stock = 1 if the acquisition is all stock; zero otherwise. Tender Offer = 1 if the acquisition is a tender offer; zero otherwise. Hostile = 1 if the acquisition is viewed as hostile by target management; zero otherwise. Success = 1 if the offer is successful; zero otherwise. Acquirer and target announcement-period cumulative abnormal returns (CAR) are measured over the 3 days (-1, 1) around the announcement (day 0) of the acquisition. Bid premium is the ratio of the bid price offered by the acquirer to the target stock price 5 days prior to the announcement of the takeover bid.

Panel A: Valuation Difference

	Acquirer - Target												Stock - Cash						
	Cash			Stock			Tender Offer			Merger			Target			Acquirer			
	All	80s	90s	All	80s	90s	All	80s	90s	All	80s	90s	All	80s	90s	All	80s	90s	
P/B	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
	***	***	***	***	***	***	***	***	**	***	*	***	***	**	***	***	***	**	***
P/V	+	-	+	+	-	-	+	-	-	+	-	+	+	+	+	+	+	+	+
	***	***	***	***	**	**	***	***	**	***	**	***	***	**	***	***	***	**	***

Panel B: Univariate Tests

	Cash		Stock		Tender Offer		Hostile		Success		Bid Premium		Target CAR		Acquirer CAR	
	All	90s	All	90s	All	90s	All	90s	All	90s	All	90s	All	90s	All	90s
Target P/B	-	***	+	***	-	***	-	***	+	***	-	***	-	***	-	***
Acquirer P/B	-	***	+	***	-	***	-	***	+	***	+	***	+	***	-	***
Target P/V	*	***	+	***	-	***	-	***	+	***	*	***	-	***	-	***
Acquirer P/V	-	***	+	***	-	***	-	***	+	***	*	***	-	***	-	***

Panel C: Multivariate Tests

	Cash		Stock		Tender Offer		Hostile		Success		Bid Premium		Target CAR		Acquirer CAR	
	All	90s	All	90s	All	90s	All	90s	All	90s	All	90s	All	90s	All	90s
Target P/B	-	***	+	***	-	***	-	***	+	***	-	***	-	***	-	***
Acquirer P/B	-	***	+	***	-	***	-	***	+	***	+	***	+	***	-	***
Target P/V	*(b)	***	+	***	-	***	*(b)	***	*	***	-	***	-	***	-	***
Acquirer P/V	-	***	+	***	-	***	+	***	+	***	*(b)	***	*(b)	***	-	***

Notes:

1. + (-) indicates a positive (negative) relation between the P/B and P/V measures with the takeover characteristics.
2. ***, **, * indicate significance at the 1%, 5%, and 10% levels, two-tailed tests, respectively.
3. The significance levels for Panel C (the multivariate tests) are based on the regressions using all four misvaluation measures.
4. (a) indicates significance at the 13% level, two-tailed test.
5. (b) reports significance for the regression when acquirer and target P/V measures are included but acquirer and target P/B measures are excluded. For these cells, the variable is insignificant when all four misvaluation ratios are included in the regression.

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