Deviation from the Target Capital Structure and Acquisition Choices

Vahap B. Uysal

Assistant Professor of Finance
University of Oklahoma

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Abstract

This study finds that the deviation from a firm's target capital structure plays an important role in determining acquisition decisions and market's reaction to them. Firms that are underleveraged relative to their target debt ratios are more likely to make acquisitions. They acquire more and larger targets. Fluctuations in actual debt ratio rather than movements in target debt ratio influence acquisition decisions. Finally, consistent with the free cash flow hypothesis, capital markets react unfavorably to takeover announcements of underleveraged bidders.

1. Introduction

Traditional theories of capital structure suggest that firms have target capital structures that are determined by balancing the costs and benefits of debt financing. However, as Myers (1977, 1984) and Myers and Majluf (1984) emphasize, because of problems that relate to debt overhang and asymmetric information, firms deviate from their target capital structures. The deviation from the target debt ratio, which is defined as the leverage deficit, can potentially affect corporate investment choices through two channels. First, information asymmetry between managers and investors makes excess debt capacity (i.e. financial slack) an important source of financing for positive NPV investments, especially if the firm is under-valued (Myers and Majluf 1984). Second, Jensen (1986) suggests that managers of underleveraged firms may make negative NPV investment choices that benefit them personally.

In this paper, I empirically examine how the deviation from a firm's long-term target leverage ratio influences one of its major investment decisions; the acquisition or takeover of another company. I focus on takeovers since there is detailed information about these investments, allowing an in depth evaluation of the potential differences between the acquisition choices of underleveraged and overleveraged firms. Specifically, I examine whether a firm's leverage deficit affects the likelihood of making an acquisition and how capital markets, in turn, react to this acquisition.

To empirically examine the effect of the leverage deficit on acquisition choices I utilize a two-step estimation procedure that is similar to Hovakimian, Opler and Titman (2001). In the first step, I estimate the target leverage ratio by running a regression of

leverage ratios on the main determinants of capital structure considered in the prior studies. In the second stage regressions, I examine whether the deviation from the predicted target capital structure affects acquisition decisions. I find that underleveraged firms are more acquisitive; one standard deviation decrease in leverage deficit increase the likelihood of making an acquisition by 7.4 percent. Underleveraged firms also make more frequent acquisitions and acquire larger targets.

I also explore the role of the target leverage ratio in acquisition decisions. An increase in target leverage ratio creates excess debt capacity and, consequently, may affect acquisition decisions. The findings in this paper indicate that an increase in the target leverage ratio is negatively associated with the probability of making an acquisition. This is in line with Kayhan and Titman (2006) which find that firms are very responsive to changes in target debt ratios. This finding also indicates that the changes in actual leverage ratios rather than movements in the soft target debt ratio facilitate the effects of the leverage deficit.

Finally, I study the market reaction to acquisition announcements of underleveraged firms. I find that stock prices react unfavorably to takeover announcements of underleveraged bidders. Specifically, this effect is more prominent for low market to book acquirers and for unexpected bidders. These findings are consistent with the free cash flow hypothesis and confirm that underleveraged acquirers make poor acquisition decisions.

This paper is related to studies on target capital structure. Graham and Harvey (2001) report that 81% of firms have target debt ratios. Among others, Hovakimian,

Opler and Titman (2001), Fama and French (2002) Flannery and Rangan (2004), Leary and Roberts (2005) and Kayhan and Titman (2005) show that firms move towards their target debt ratios. While these studies focus on benefits of and convergence towards the target capital structure, this paper explores the potential cost of deviation from the target debt ratio.

This paper is also related to prior research that examines how bidders' leverage and cash holdings affect their acquisition choices. There is no consensus on the role of leverage in acquisitions. For example, Maloney, McCormick and Mitchell (1993) find that market reactions increase with the bidder's leverage ratio while Moeller, Schlingemann and Stulz (2004) find no significant effect of leverage on market reactions to takeover announcements. The evidence in my paper suggests that leverage plays an important role in market reactions as long as deviation from the target capital structure is present. In a paper on the role of acquirer cash flows in takeovers, Lang, Stulz and Walkling (1991) find that bidder returns are negatively related to cash flows for bidders with low Tobin's q ratios. In a more recent study, which is more closely related to this paper, Harford (1999) uses a baseline model to identify acquisition differences across firms based on their excess cash reserves and finds negative market reactions to takeover announcements of cash-rich bidders. Some of the issues that he addresses are also addressed in this paper, but the two studies have major differences. Mainly, he focuses on excess cash reserves while this paper investigates the role of the deviation from target capital structure. As I show in the following analysis, the effect of the leverage deficit variable subsumes the impact of Harford's cash-rich variable.

The paper is organized as follows. Section 2 provides details of sample selection and descriptive statistics of the data. Section 3 explains the determinants and estimation procedure of the target leverage ratio. Section 4 examines the empirical findings of the second stage regressions. Section 5 concludes.

2. Sample Selection and Descriptive Statistics

I use firm-level data from the Standard & Poor's COMPUSTAT Annual Files to estimate the target leverage ratio. Following previous studies on capital structure (see Hovakimian, Opler and Titman (2001); Fama and French (2002); Flannery and Rangan (2004); Leary and Roberts (2005); Kayhan and Titman (2005)), I exclude financial firms (6000-6999) and regulated utilities (4900-4999). Furthermore, I drop firms with sales less than 10 million in 1990 dollars. The sample has 46,257 firm-years covering the 1990-2004 period, and all nominal asset values are converted to real values in 1990 dollars. In order to eliminate the effect of outliers, all variables are windsorized at the top and bottom 1 percent levels.

The sample of completed acquisitions in the U.S. is obtained from the Securities Data Company's (SDC) Mergers and Acquisitions Database for the period between January 1, 1991, and December 31, 2004. I include only those transaction announcements that meet the following criteria:

(i) Transaction is identified by the SDC as a merger or an acquisition of majority interest.

(ii) Both bidder and target are non-financial and non-utility public firms in the U.S.

(iii) Bidder firm is found in both the COMPUSTAT and the CRSP annual files.

(iv) Relative size of transaction to the market capitalization of the bidder is between 1% and 1000%.[1]

(v) Transaction value is not less than 1 million dollars.

After following these criteria, I end up with 6062 acquisitions. I obtain the key accounting and financial information of acquirers from the COMPUSTAT and the CRSP files. Table 1 reports the descriptive statistics of firms in our sample. The book leverage, defined as total assets minus book equity divided by total assets, in our sample has an average of 0.508 and has large standard deviation (0.240) around the mean.[2] The mean book leverage deficit is zero indicating that on average, actual leverage is equal to target debt ratio. However, large variance around the mean implies that a subgroup of firms deviate from their target debt ratios. Specifically, 25 percent of firms in our sample are underleveraged by less than -15% and another 25 percent is over-leveraged by more than 13 percent. We continue to find large variance around the mean for market based leverage deficit. These findings substantiate the view that a large proportion of firms are prone to the cost of deviation from target capital structure. Acquisitions also play an important role in our sample. On average, 10% of firms in our sample make an acquisition during the study period and these acquisitions constitute 3% of total assets.

[1] This restriction ensures that reverse mergers and the trivial impact of small targets are excluded from the analysis.
[2] Variable definitions are in the Appendix.

3. Target Leverage Ratio

3.1 Estimation Procedure

In order to estimate the deviation from the target capital structure, an explicit estimation of target leverage is required. I use book leverage instead of market leverage in the target leverage regression for three reasons.[3] First, there is a mechanical relationship between profitability and market leverage. Second, market-based leverage regressions are more likely to misidentify some firms as underleveraged due to steep run-ups of stock prices in the 1990s. Therefore, these firms may not have as high borrowing capacity as predicted. Third, leverage regressions based on book values are suitable to test both the pecking order and the trade off hypotheses, whereas pecking order hypothesis cannot be fully tested in market leverage regressions (Fama and French, 2002).

$$Book\ Leverage_i = \gamma' X_i + \varepsilon_{1i} \qquad (1)$$

As given in equation (1), I regress book leverage over determinants of capital structure (X_i) used in previous studies (see Rajan and Zingales 1995; Hovakimian et. al 2001). These determinants include proxies for profitability, size, growth opportunities, product uniqueness and tangible assets ratio. In order to control for industry effects, changes in tax rates and macroeconomic changes over years, the regression includes industry dummies based on Fama-French 48 industry definitions as well as year

[3] Results are robust to market-based target leverage estimation.

dummies.[4] The fitted value of this regression is defined as the target leverage ratio. From this variable, I construct a leverage deficit variable defined as actual debt minus the estimated target leverage from the first stage.

In the second stage, the leverage deficit variable is then used in an estimation of likelihood of making an acquisition, number of acquisitions and the ratio of transaction value to total assets, as given in equations (2, 3 and 4).[5] In addition, I test whether stock prices react more unfavorably to takeover announcements by underleveraged bidders in equation 5. Following Fuller et. al (2002), I use cumulative abnormal returns to bidders, *CAR*, which are calculated over a five-day event window (two days before and two days after the announcement date). The benchmark returns are the value-weighted index of returns including dividends for the combined New York Stock Exchange, American Stock Exchange and NASDAQ.

$$P(Acquisition = 1) = \Phi(\beta_0 + \beta_1 \cdot Leverage\ Deficit + \beta_1 \cdot Z_i) \quad (2)$$

$$Number\ of\ Acquisitions = \alpha_0 + \alpha_1 \cdot Leverage\ Deficit + \alpha_1 \cdot Z_i + \varepsilon_{2i} \quad (3)$$

$$Total\ M\&A\ Transaction/TA = \alpha_0 + \alpha_1 \cdot Leverage\ Deficit + \alpha_1 \cdot Z_i + \varepsilon_{2i} \quad (4)$$

$$CAR_i = \theta_0 + \theta_1 \cdot Leverage\ \ Deficit\ + \theta_1 \cdot Z_i + \varepsilon_{3i} \quad (5)$$

3.2 Determinants of the Target Leverage Ratio

In this section, I examine the determinants of target leverage ratio and estimate the leverage deficit. Following the standard methodology in the target capital structure

[4] I find qualitatively similar results when I use 3-digit SIC industry groupings.
[5] Since number of acquisitions has a lower bound of zero, I use Tobit regression, which corrects for the censoring of the dependent variable. I obtain similar results in OLS regressions.

literature, the target leverage regression in equation (1) controls for profitability, size, growth opportunity, product uniqueness and tangible assets ratio (see Rajan and Zingales 1995; Hovakimian et. al 2001).

Large firms are more diversified and have less volatile cash flows. This decreases financial distress cost and increases target leverage ratio (Rajan and Zingales 1995). Furthermore, they have easy access to capital markets. In order to capture this effect, I measure size as natural logarithm of net sales.

Growth opportunities of a firm also affect its target capital structure. As Myers (1977) indicates, debt overhang may prevent firms from investing in positive future NPV projects. In particular, this effect is costly for growth firms. Furthermore, Goyal et al. (2002) show that firms in the defense industry increase their leverage ratios as their growth opportunities shrink. I use two proxies for growth opportunities: market-to-book ratio and stock return.[6]

I use the ratio of research and development (R&D) expenditures to total assets, RD/TA, as a proxy for product uniqueness (Titman and Wessels, 1988). product uniqueness increases financial distress cost and decreases target leverage ratio

Another important determinant of target leverage ratio is tangibility of assets. Firms with liquid assets are more likely to borrow against their assets and have lower bankruptcy cost resulting in higher target leverage ratio (Titman and Wessels, 1988). I use the ratio of tangible assets to the book value of total assets as a proxy for tangibility

[6] Stock return is the average split- and dividend-adjusted percentage annual stock return over three years. Among others, Baker and Wurgler (2002) and Welch (2004) argue that stock price changes have prominent effect on capital structure. Even though these studies reject target capital structure, stock price movements may proxy for market performance (Hovakimian et. al(2004)). Results are qualitatively similar if this variable is dropped from the analysis.

of assets. In this paper, profitability is proxied by earnings before taxes, preferred dividends and interest payments over total assets, EBITDA/TA.

Table 2 summarizes coefficient estimates of the target leverage ratio regression with heteroskedasticity consistent p-values. In addition, the regression takes the clustering effect of firms into account in p-value calculations. The estimates are consistent with those found in previous studies. The target capital structure increases with sales (p-value less than 0.001). Furthermore, market to book ratio has a negative effect on the target leverage ratio (p-value less than 0.001). Moreover, there is negative relationship between profitability and the target leverage ratio. The coefficient estimate of *RD/TA* is negative and significant. Consistent with previous studies, I find positive association between tangible assets and book leverage. The average stock return has a negative coefficient estimate (p-value less than 0.001).

4. The Second Stage Analysis

4.1 Are underleveraged firms more acquisitive?

There are two pieces of evidence that link leverage deficit to acquisitions. First, firms use cash, by large, in these acquisitions. Table 3 presents distribution of deal characteristics over the years between 1991 and 2004. Regardless of fluctuations of method of payment over the period, only 18% percent of acquisitions are all-stock offers whereas 82% of the deals have cash component. In particular, 50% of acquisitions are all-cash deals. Among others, Yook (2003) and Bharadwaj and Shivdasani (2003) show that

most cash deals are financed with debt. Thus, borrowing debt capacity (i.e. negative leverage deficit) is very valuable in financing acquisitions.

Second, underleveraged firms are more acquisitive. Table 4 reports the mean values for key variables by book leverage quartiles and sheds some light on whether underleveraged firms, such as those in the first quartile, make different acquisition choices than overleveraged firms those in the fourth quartile. Unconditional probability of acquiring a target is 11.3% for the underleveraged sub-sample whereas it is only 7.7% for the overleveraged firms. Furthermore, underleveraged firms make more acquisitions and acquire larger targets. These suggest an association between acquisition decisions and the deviation from the target capital structure. However, firm characteristics do not always change monotonically with leverage deficit. Therefore, univariate comparison is not sufficient and I resort to the multivariate analysis, which incorporates the effects of other potential determinants of acquisitions.

Table 5 explores three dimensions of M&A activity: probability of making an acquisition, frequency of acquisitions and size of acquisition. I use the probit model to estimate the probability and report marginal effects since coefficient estimates are hard to interpret. Marginal effects of continuous variables are found at their means, while marginal effects of dummy variables are calculated through the difference in the cumulative distribution functions for discrete changes of dummy variables from zero to one. I find strong relationship between leverage deficit and the probability of acquiring a target. One standard deviation increase in leverage deficit decreases the probability of making an acquisition by 7.4 percent. The regressions on number of acquisitions and

transaction value substantiate this argument and confirm the univariate analysis: underleveraged firm make more acquisitions and acquire larger targets.

The target leverage ratio may also affect acquisition decisions. Consistent with the idea of soft target capital structure, ceteris paribus, an increase in target debt ratio creates negative leverage deficit (i.e. financial slack). Therefore, an improvement in the target debt ratio may create more acquisition opportunities. On the contrary, I find negative effect of target book leverage, along with leverage deficit, on acquisition decisions (Table 6). A one standard deviation increase in target book leverage decreases the probability of an acquisition by 13.3 percent. This finding is consistent with Kayhan and Titman (2006) which find that firms are very responsive to changes in target debt ratios. This finding also indicates that the impact of leverage deficit on acquisition decisions is driven by the changes in actual debt ratios rather than movements in the soft target debt ratio.

4.2 Do underleveraged bidders make poor acquisition decisions?

In the previous section, I showed that underleveraged firms are more likely to make acquisitions. In this section, I examine whether these acquisitions are better than those initiated by non-underleveraged acquirers. Table 7 presents the descriptive statistics about the bidders and deals in the sample. On average, bidders have lower debt ratios than their target debt ratios. The mean (median) book leverage deficit is -2.7 (-3.9) percent. This is consistent with the findings in the previous section that underleveraged firms are more likely to make acquisitions.

Consistent with previous studies on mergers and acquisitions, abnormal returns to bidders is positive. This is largely due to the fact that majority of targets in the sample are

non-public which yield positive CAR to acquirers (Fuller et. al, 2002). The average (median) ratio of transaction value to the market value of acquirer, Relative Size, is 15.2 (6.9) percent. The median and mean market-to-book ratios of bidders are 2.132 and 1.659, respectively. These values are comparable with the previous studies on M&A.

Table 8 shows the relationship of leverage deficit with CAR. Leverage deficit is positively correlated with CAR (p-value less than 0.01). This indicates that capital markets recognize deviation from the target debt ratios and suggests preliminary evidence that underleveraged bidders make poor acquisition choices. The correlation table also allows me to compare leverage deficit with other factors that had been found to be important predictors of market reaction to takeover announcements. For example, Harford (1999) finds that deviation from optimum cash reserves affect acquirer returns. He defines cash deviation as the bidder's actual cash reserves minus the predicted value for its industry by the following model:

$$\begin{aligned} Cas\_Sal_{it} = {} & \beta_0 + \beta_1 \cdot NetCas\_Sal_{it} + \beta_2 \cdot Risk\ \mathrm{Pr}emium_{t+1} + \beta_3 \cdot \mathrm{Re}cession_t \\ & + \beta_4 \cdot \Delta NetCas\_Sal_{i,t+1} + \beta_5 \cdot \Delta NetCas\_Sal_{i,t+1} + \beta_6 \cdot M\_B_{i,t-1} \\ & + \beta_7 \cdot \mathrm{CFOVAR} + \beta_8 \cdot Size_{i,t-1} + \varepsilon \end{aligned}$$

where

Cas_Sal is cash/sales,

NetCas_Sal is operating cash flow net of investments[7],

Recession is a dummy variable for recession, which is identified by the National Bureau of Economic Research,

Risk Premium is the difference between AAA and junk bond yields,

[7] Operating cash flow is defined as in Dechow (1994). Operating cash flow = operating income before depreciation – interest – taxes – difference in non-cash working capital.

M_B1 is the lag of market-to-book ratio,

Size is book value of assets,

CFOVAR is coefficient of variation for the firm's cash flow.[8]

The correlation coefficient of leverage deficit and Harford's cash deviation is -0.17. This is also consistent with the empirical evidence that having excess cash may not be necessarily equivalent to being underleveraged. For example, Moeller et. al (2005) find that small firms have large cash reserves along with large leverage ratios. Thus, leverage deficit is not a proxy for excess cash reserves.

Another potential factor that might be related to leverage deficit is acquirer stock price run-up. Schwert (1995) show that pre-announcement stock price run-up explains significant portion of returns to acquirers. This is also consistent with the view that firms are more likely to use their over-valued equity to acquire targets (Shleifer and Vishny, 2003). Furthermore, firms with better stock price performance are more likely to deviate their target debt ratios. In order to disentangle this mechanical relationship, I follow Schwert (1995) and define stock price run-up as the CAR to acquirer from 260 to 10 days before the acquisition announcement. It is interesting to note that the correlation coefficient of leverage deficit and stock price run-up is only 0.04. Furthermore, leverage deficit is not correlated with deal characteristics. Therefore, leverage deficit is a distinct measure and may capture a component of market reactions beyond the dimensions spanned by traditional determinants.

[8] Harford's definition of cash deviation is based on the difference between the actual and predicted cash reserves for the industry. In order to incorporate firm specific target cash reserves, I follow Hartzell et. al (2006) and calculate the cash deviation based on this model. Predicting firm specific target cash reserves does not improve models and I continue to find insignificant coefficient estimate for cash deviation in the regressions.

The correlation table presents preliminary evidence of the role of leverage deficit in acquisitions, but does not control for several important variables that affect acquirer returns. The following CAR regressions incorporate these bidder and deal characteristics. Book value of the acquirer total assets in the year prior to the announcement of the transaction is included to control for the size of acquirer (Moeller et. al, 2005). I also include market-to book ratio to control for growth opportunities of the acquirer (Rau and Vermaelen, 1998). The regressions also control for acquirer's pre-announcement stock price run-up (Schwert, 1995). In order to incorporate the effect of transaction value, I normalize the transaction value by the market value of acquirer (Datta et al, 2001). In addition to these variables, the regressions control for deal characteristics. For example, they contain the Focus Acquisition dummy variable, which takes value of one if the acquirer and target are categorized in the same Fama-French industry grouping.[9] To control for method of payment, I include two dummy variables: Stock for all-stock offers and Combo for deals financed with both cash and stock (Martin, 1996). Public and Private dummy variables are included to control for the organization of the target. (Fuller et. al, 2002) In order to control for tender offers, I include a tender dummy variable in the CAR regressions (Rau and Vermaelen, 1998).

Other important factors that might affect the second stage regressions are changes in market and macroeconomic conditions. Furthermore, previous studies on takeovers, including Andrade et al. (2001) and Holmstrom and Kaplan (2001), show fundamental

[9] The results are qualitatively the same for focus industry definition based on SIC.

changes in acquirer returns over years. Thus, I include year in the regressions, but do not report them in the interest of brevity.

Table 9 reports the coefficient estimates of regressions of *CAR* over leverage deficit, annual dummies and other explanatory variables detected in the literature. The models have R^2 of 4%, which are comparable to CAR regressions in previous studies. The p-values are calculated based on White's (1980) correction for heteroskedasticity and incorporates clustering of acquirers.

The primary result from Table 9 is that the coefficients of leverage deficit are positive and significant in all models. Consistent with the free cash flow hypothesis, this indicates that capital markets react unfavorably to takeover announcements of underleveraged bidders. Specifically, a one standard deviation decrease in leverage deficit results in 40 basis points decrease in CAR to acquirers (p-value of 0.025).

Another focus of interest is to detect the relative importance of excess cash reserves and leverage deficit in *CAR* regressions. Model 2 includes both leverage deficit and cash deviation. The effect of leverage deficit is positive (p-value of 0.024), whereas cash deviation has an insignificant coefficient estimate. Along with the fact that cash offers are financed with debt rather than internally generated cash reserves, this evidence suggests that the major source of value destruction in acquisitions is leverage deficit, not excess cash reserves.

Given that underleveraged firms are more likely to make acquisitions (Table 5), acquisitions of underleveraged firms are less of a surprise and markets might be responsive to takeover announcements to the extend that they are not expected by the

investors. Therefore, I decompose the effect of leverage deficit for expected and un-expected bids. Expected bid takes value of one if the predicted probability of making an acquisition by the probit model in Table 5 exceeds the unconditional probability by one standard deviation. I find that both expected and unexpected interaction terms with leverage deficit are positive, but only the unexpected bid interaction is statistically significant (p-value of 0.035).[10] To the extent that the effect of expected bids is already incorporated in stock prices, these findings suggest that our estimates of leverage deficit conservatively predicts the value destroyed by underleveraged acquirers.

The free cash flow hypothesis have different implications for high and low market to book acquirers (Lang et. al, 1991). To the extent that high market to book ratio indicate positive NPV projects and superior management quality, firms with high market to book ratios are more likely to use financial slack more effectively. In contrast, firms with low market to book ratios are less likely to have positive NPV projects and are more likely to make value-destroying acquisitions. Consistent with these views, I find significantly positive effect of leverage deficit for firms with low market to book ratios, whereas leverage deficit is positive, but not significant, for the sub-sample of acquirers with high market to book ratios. These findings are in line with the free cash flow hypothesis and suggest that firms with poor growth opportunities and excess debt capacity make poor acquisition choices.

[10] Harford (1999) find that unexpected firms w.th excess cash reserves make poor acquisition decisions. I fail to find significant effect of cash deviation for unexpected bidders.

4.3 Robustness

In this paper, I find that underleveraged firms are more likely to make acquisitions. Morellec and Zhdanov (2007) suggest an alternative explanation for the increased probability that an underleveraged firm will be more acquisitive. They argue that firms maintain low leverage ratios to create value through acquisitions. This argument implies that capital markets should react positively to the acquisitions of underleveraged firms; however my analysis suggests the alternative. I find that capital markets react negatively to acquisitions by underleveraged firms.

Another potential explanation is that highly leveraged firms are significantly less likely to make acquisitions and more conservative with regard to acquisition activity. To mitigate the effect of overleveraged firms on my results; I eliminate the top 10% of overleveraged firms fro my analysis. I run regressions for this new subsample and find similar results with the most overleveraged firms eliminated.[11]

5. Conclusions

This paper sheds light on the link between a firm's deviation from its target capital structure and its acquisition choices. I find that firms that are underleveraged relative to their target leverage ratios are more likely to make an acquisition. Furthermore, they make more acquisitions and acquire larger targets. In addition, capital markets react unfavorably to takeover announcements of underleveraged bidders. These

[11] These are not reported, but available upon request.

findings are in line with the free cash flow hypothesis. These findings are robust when I control for factors that have been found be important determinants of market reactions.

This study supports the usefulness of the target leverage concept. Hovakimian et al. (2001) show that the deviation from the target capital structure affects the type of the security issuance, and this paper suggests that the deviation from the target capital structure affects acquisition decisions.

In addition to the effect of deviation; the target leverage ratio affects acquisition decisions. Firms with higher target leverage ratios are less likely to make acquisitions. To the best of my knowledge, this is the first finding suggests the effect of the target leverage on acquisition decisions. This calls for new research avenue for the effects of the target leverage ratio and the deviation from it on other corporate decisions.

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Table 1. Summary Statistics for the 1990-2004 COMPUSTAT Sample

The sample consists of 46,257 firm-year observations between 1990 and 2004. Variable definitions are in the Appendix. All variables are windsorized at the bottom and top 1% level.

	N	Mean	Stdev	Q1	Median	Q3
Sales	46257	5.245	1.772	3.849	5.069	6.400
Market to Book	46257	1.806	1.294	1.044	1.379	2.035
Book Leverage	46257	0.508	0.240	0.324	0.499	0.669
Book Leverage Deficit	46257	0.000	0.212	-0.153	-0.018	0.134
log(Cash/TA)	45850	-2.686	1.813	-3.927	-2.634	-1.360
R&D / TA	46257	0.039	0.071	0.000	0.000	0.048
EBITDA/TA	46209	0.126	0.174	0.060	0.131	0.203
Tangible Assets/TA	46249	0.289	0.220	0.115	0.229	0.409
Average Stock Return	46257	0.191	0.422	-0.062	0.123	0.345
Ratio of Bidders	46257	0.106	0.308	0.000	0.000	0.000
Acquisitions per firm	46257	0.131	0.435	0.000	0.000	0.000
Total M&A Transaction Value/TA	46257	0.030	0.128	0.000	0.000	0.000

Table 2. Regression Estimates of the Target Leverage Ratio

This table presents the OLS estimates of target leverage ratio over key financial measures documented in the literature. The dependent variable is Book Leverage. Variable Definitions are in Appendix 1. ***, ** and * stand for statistical significance at the 1%, 5% and 10% levels, respectively.

$$Book\ Leverage_{it}=\beta_0+\beta_1\ Sales+\beta_2\ Market\ to\ Book+\beta_3\ RD\ Missing+\beta_4\ RD/TA+\beta_5\ EBITDA/TA+\beta_6\ Tangible\ Assets/TA+\beta_6\ Average\ Stock\ Return+\varepsilon$$

	Book Leverage	
Sales	0.032	***
	0.000	
Market to Book	-0.009	***
	0.000	
RD Missing	0.024	***
	0.000	
RD/TA	-0.258	***
	0.000	
EBITDA/TA	-0.427	***
	0.000	
Tangible Asset/TA	0.090	***
	0.000	
Average Stock Return	-0.036	***
	0.000	
N	46,257	
Adj. R2	0.22	

Table 3. Deal Characteristics between 1991 and 2004

This table shows the deal characteristics of acquisitions between 1991 and 2004. Deal characteristics are obtained from the SDC Mergers and Acquisitions Database. Variable Definitions are in the Appendix.

Year	N	Public	Private	Focus Acquisitions	Stock	Cash
1991	156	0.122	0.429	0.660	0.154	0.513
1992	214	0.103	0.472	0.607	0.229	0.439
1993	307	0.098	0.414	0.577	0.156	0.541
1994	323	0.142	0.440	0.557	0.214	0.495
1995	434	0.214	0.442	0.647	0.267	0.488
1996	553	0.181	0.488	0.631	0.251	0.472
1997	667	0.165	0.514	0.610	0.186	0.466
1998	644	0.220	0.461	0.606	0.199	0.438
1999	572	0.231	0.488	0.612	0.231	0.469
2000	474	0.249	0.492	0.565	0.251	0.443
2001	381	0.210	0.446	0.635	0.136	0.488
2002	426	0.148	0.472	0.627	0.085	0.538
2003	429	0.175	0.476	0.606	0.072	0.580
2004	482	0.129	0.556	0.620	0.050	0.633
All	6062	0.180	0.477	0.611	0.180	0.497

Table 4. Firm Characteristics by Book Leverage Deficit Quartiles

This table reports means of key variables of 46,257 firm-years recorded in the COMPUSTAT between 1990 and 2004. Quartiles for Book Leverage Deficit are determined for each year. The t-statistic is for a difference of means test from the first to the fourth quartile. Variable definitions are in the Appendix. ***, ** and * stand for statistical significance at the 1%, 5% and 10% levels, respectively.

	Book Leverage Deficit					
	Q1 (Lowest)	Q2	Q3	Q4(Largest)	t stat	
Sales	4.915	5.468	5.568	5.031	-5.277	***
Market to Book	1.849	1.845	1.719	1.81	2.237	***
Book Leverage	0.252	0.417	0.566	0.799	-300	***
Book Leverage Deficit	-0.254	-0.084	0.054	0.285	-410	***
log(Cash/TA)	-1.905	-2.652	-3.052	-3.141	53.713	***
R&D / TA	0.042	0.04	0.035	0.038	4.482	***
EBITDA/TA	0.115	0.151	0.141	0.097	6.962	***
Tangible Assets/TA	0.28	0.3	0.288	0.288	-2.9	***
Average Stock Return	0.162	0.219	0.214	0.167	-0.833	
Ratio of Bidders	0.113	0.124	0.11	0.077	9.15	***
Acquisitions per firm	0.137	0.151	0.134	0.102	6.276	***
Total M&A Transaction Value/TA	0.033	0.033	0.029	0.024	5.087	***

Table 5. Does Leverage Deficit Affect Acquisition Decisions?

The table reports the effects of key firm characteristics on acquisition decisions. The whole sample consists of firms for which I can predict the target leverage. Variable definitions are in the Appendix. P-values are given in italics and are adjusted for heteroskedasticity and clustering of firms. All regressions include year dummies. ***, ** and * stand for statistical significance at the 1%, 5% and 10% levels, respectively.

	P(Bidder=1)	Number of Acquisitions	Total M&A Transaction Value/TA
Book Leverage Deficit	-0.074 ***	-0.950 ***	-0.016 ***
	0.000	*0.000*	*0.000*
Sales	0.010 ***	0.130 ***	0.000
	0.000	*0.000*	*0.631*
Average Stock Return	0.047 ***	0.646 ***	0.017 ***
	0.000	*0.000*	*0.000*
Market to Book	0.003 **	0.033 **	0.008 ***
	0.047	*0.032*	*0.000*
EBITDA/TA	0.097 ***	1.298 ***	0.036 ***
	0.000	*0.000*	*0.000*
Industry M&A Liquidity	0.164 ***	2.123 ***	0.133 ***
	0.000	*0.000*	*0.000*
Herfindahl Index	-0.101 **	-1.310 **	-0.027
	0.021	*0.025*	*0.122*
N	46164	46209	46209
Pseudo R2	0.07	0.05	
R2			0.04

Table 6. Does Target Debt Ratio Affect Acquisition Decisions?

The table reports the effects of key firm characteristics on acquisition decisions. The whole sample consists of firms in COMPUSTAT for which the target debt ratio can be predicted. Variable definitions are in the Appendix. P-values are given in italics and are adjusted for heteroskedasticity and clustering of firms. All regressions include year dummies. ***, ** and * stand for statistical significance at the 1%, 5% and 10% levels, respectively.

	P(Bidder=1)		Number of Acquisitions		Total M&A Transaction Value/TA	
Book Leverage Deficit	-0.075	***	-0.972	***	-0.016	***
	0.000		*0.000*		*0.000*	
Target Book Leverage	-0.133	***	-1.702	***	-0.025	*
	0.000		*0.000*		*0.085*	
Sales	0.014	***	0.179	***	0.001	
	0.000		*0.000*		*0.407*	
Average Stock Return	0.041	***	0.569	***	0.015	***
	0.000		*0.000*		*0.000*	
Market to Book	0.001		0.013		0.008	***
	0.395		*0.399*		*0.000*	
EBITDA/TA	0.063	***	0.857	***	0.030	***
	0.000		*0.000*		*0.000*	
Industry M&A Liquidity	0.167	***	2.164	***	0.133	***
	0.000		*0.000*		*0.000*	
Herfindahl Index	-0.101	**	-1.322	**	-0.026	
	0.020		*0.023*		*0.126*	
N	46164		46209		46209	
Pseudo R2	0.07		0.05			
R2					0.04	

Table 7. Summary Statistics of Acquirers and Deals

The table reports descriptive statistics for 6062 completed acquisitions in the U.S. (listed in SDC) between 1991 and 2004. Variable definitions are in the appendix.

	N	Mean	Stdev	Q1	Median	Q3
CAR(-2,+2)	6062	0.020	0.104	-0.029	0.011	0.061
Book Leverage	6062	0.465	0.221	0.296	0.465	0.614
EBITDA/TA	6060	0.176	0.173	0.104	0.170	0.248
Book Leverage Deficit	6062	-0.027	0.190	-0.161	-0.039	0.092
Market Leverage Deficit	6062	-0.036	0.166	-0.151	-0.053	0.070
Cash Deviation	6062	-0.126	0.534	-0.323	-0.121	-0.020
Total Asset	6062	1248	3867	77	246	831
Market-to-Book	6062	2.132	1.463	1.234	1.659	2.402
Stock price run-up	6062	0.232	0.547	-0.094	0.149	0.481
Relative Size	6062	0.152	0.267	0.031	0.069	0.164
Focus Acquisition	6062	0.611	0.488	0	1	1
Tender Offer	6062	0.045	0.207	0	0	0
Competed	6062	0.010	0.101	0	0	0
Cash	6062	0.497	0.500	0	0	1
Combo	6062	0.323	0.468	0	0	1
Hostile	6062	0.004	0.063	0	0	0
Public	6062	0.180	0.384	0	0	0
Private	6062	0.477	0.500	0	0	1
Industry Liquidity Index	6062	0.018	0.041	0.000	0.003	0.018

Table 8. Correlation Matrix

Correlation matrix for key acquirer and deal characteristics for 6062 completed acquisitions in the U.S. (listed in SDC) between 1991 and 2004. Variable definitions are in the appendix. ***, ** and * stand for statistical significance at the 1%, 5% and 10% levels, respectively.

	Variable	1		2		3		4		5		6		7		8		9		10		11		12		13		14		15		16
1	CAR(-2,+2)	1																														
2	EBITDA/TA	-0.02	*	1																												
3	Book Leverage Deficit	0.03	***	0.04	***	1																										
4	Cash Deviation	0.00		-0.17	***	-0.14	***	1																								
5	Total Asset	-0.07	***	0.01		-0.02	*	-0.08	***	1																						
6	Market-to-Book	-0.04	***	0.26	***	-0.01		0.03	**	0.01		1																				
7	Stock price run-up	0.03	***	-0.02		0.04	***	0.07	***	-0.07	***	0.28	***	1																		
8	Relative Size	0.08	***	-0.07	***	-0.03	**	-0.02		-0.06	***	-0.06	***	0.05	***	1																
9	Focus Acquisition	-0.01		0.02		0.01		-0.03	**	0.02	*	0.01		-0.01		0.02	*	1														
10	Tender Offer	-0.03	***	0.03	**	-0.01		-0.03	**	0.13	***	-0.02	*	-0.07	***	0.03	**	0.00		1												
11	Competed	-0.01		-0.01		0.00		0.00		0.06	***	-0.02		-0.03	**	0.04	***	0.02		0.20	***	1										
12	Cash	-0.01		0.04	***	-0.01		-0.04	***	-0.02	*	-0.18	***	-0.13	***	-0.17	***	0.01		0.05	***	-0.02		1								
13	Combo	0.03	**	-0.08	***	0.02		0.02		0.02		-0.08	***	0.01		0.12	***	0.00		0.01		0.03	**	-0.69	***	1						
14	Hostile	-0.01		0.00		0.02		-0.03	***	0.10	***	-0.01		-0.02		0.04	***	0.00		0.21	***	0.23	***	-0.02		0.02	*	1				
15	Public	-0.14	***	0.02	*	-0.01		-0.02	*	0.21	***	0.09	***	-0.02		0.18	***	0.04	***	0.46	***	0.18	***	-0.22	***	0.03	**	0.13	***	1		
16	Private	0.05	***	0.02	*	-0.05	***	0.09	***	-0.17	***	0.07	***	0.10	***	-0.13	***	-0.05	***	-0.21	***	-0.09	***	-0.11	***	0.08	***	-0.06	***	-0.45	***	1

Table 9. OLS Regressions of Acquirer Returns

The table reports coefficient estimates of acquirer returns which are calculated over a five-day event window (two days before and two days after the announcement date). The benchmark returns are the value-weighted index of returns including dividends for the combined New York Stock Exchange, American Stock Exchange and NASDAQ. Variable definitions are in the Appendix. P-values are given in italics and are adjusted for heteroskedasticity and clustering of firms. All regressions include year dummies. ***, ** and * stand for statistical significance at the 1%, 5% and 10% levels, respectively.

	Model 1	Model 2	Model 3	Model 4
Book Leverage Deficit	0.019 **	0.019 **		
	0.025	*0.024*		
Cash Deviation		-0.001		
		0.871		
Book Leverage Deficit * Expected Bid			0.011	
			0.458	
Book Leverage Deficit * Unexpected Bid			0.021 **	
			0.035	
Expected Bid			0.000	
			0.912	
Book Leverage Deficit * HMB				0.014
				0.228
Book Leverage Deficit * LMB				0.025 **
				0.040
HMB				-0.003
				0.464
Log(Total Asset)	-0.006 ***	-0.006 ***	-0.006 ***	-0.006 ***
	0.000	*0.000*	*0.000*	*0.000*
Market-to Book	-0.002	-0.002	-0.002	
	0.140	*0.140*	*0.188*	
Stock price run-up	0.004	0.004	0.004	0.003
	0.369	*0.369*	*0.368*	*0.423*
Relative Size	0.032 ***	0.032 ***	0.032 ***	0.032 ***
	0.008	*0.008*	*0.008*	*0.007*
Focus Acquisition	0.001	0.001	0.001	0.001
	0.716	*0.719*	*0.733*	*0.756*

Table 9 (*continued*)

Tender Offer	0.027	***	0.027	***	0.027	***	0.027	***
	0.000		0.000		0.000		0.000	
Competed	0.008		0.008		0.008		0.008	
	0.593		0.592		0.602		0.591	
Stock	0.009	*	0.009	*	0.009	*	0.008	*
	0.077		0.073		0.076		0.095	
Combo	0.006	*	0.006	*	0.006	*	0.006	*
	0.068		0.066		0.069		0.074	
Hostile	0.000		0.000		0.000		-0.001	
	0.990		0.984		0.984		0.920	
Public	-0.046	***	-0.046	***	-0.046	***	-0.045	***
	0.000		0.000		0.000		0.000	
Private	-0.007	**	-0.007	**	-0.007	**	-0.007	**
	0.026		0.030		0.027		0.031	
Liquidity Index	-0.006		-0.007		-0.005		-0.010	
	0.839		0.829		0.858		0.740	
N	6062		6062		6062		6062	
Adj. R2	0.04		0.04		0.04		0.04	
F	8.44	***	8.14	***	7.89	***	8.26	

Data Appendix

Total Assets (TA) is measured as the book value of assets (Item 6).

Market Equity (ME) is common shares outstanding (Item 25) times the stock price (Item 199).

Preferred Stock (PS) is equal to liquidating value (Item 10) if available, else redemption value (Item 56) if available, else carrying value (Item 130).

Market Value (MV) is defined as liabilities (Item181) minus balance sheet deferred taxes and investment tax credit (Item35) plus PS plus ME.

Book Equity (BE) is defined as TA minus liabilities (Item 181) plus balance sheet deferred taxes and investment tax credit (Item35) minus PS.

Market-to-Book ratio is defined as MV over TA.

Book Debt is TA minus BE.

Book Leverage is Book Debt over TA..

Book Leverage Deficit is actual leverage minus predicted target debt ratio.

Market Leverage is Book Debt over MV.

Sales is the natural logarithm of sales (Item 12) in 1990 dollars.

EBITDA/TA is EBITDA (Item13) over lagged TA.

Tangible Assets/ TA is net property, plant and equipment (Item 8) over TA.

R&D/ TA is defined as R&D expenses (Item 46) over TA.

R&D Dummy takes the value of one if COMPUSTAT reports R&D expense as missing.

Average Stock Return is the average split- and dividend-adjusted percentage annual stock return over three years.

CAR is the cumulative abnormal returns (in percentage) which are calculated over a five-day event window (two days before and two days after the announcement date). The benchmark returns are the value-weighted index of returns including dividends for the combined New York Stock Exchange, American Stock Exchange and NASDAQ.

Stock Price Run-up is CAR to acquirer from 260 to 10 days before the acquisition announcement.

Public takes value of one if target is a public firm.

Private takes value of one if target is a private firm.

Stock is a dummy variable for all-stock deals.

Combo takes value of one if deal is financed by both stock and cash.

Relative Size is the ratio of transaction value to the market value of acquirer.

Tender is a dummy for tender offers.

Industry M&A Liquidity is the ratio of value of total transaction value of within industry acquisitions for each year and Fama-French industry to the total value of assets of all COMPUSTAT firms in the same year and Fama-French industry.

Focus takes value of one if target and acquirer are categorized in the same Fama-French industry grouping.

Hostile takes value of 1 if the management describes the deal as unfriendly.

Competed takes value of one if there are more than one offers for the target.

Expected bid takes value of one if the predicted probability of making an acquisition by the probit model in Table 5 exceeds the unconditional probability by one standard deviation.