Leverage Deficit and Firm Acquisitions

Lukas Moss

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Professor Diana Bonfim

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Abstract

This study analyzes the effect a firm's deviation from its target capital structure has on the value of the pursued acquisitions. By first predicting annually the optimal debt ratio, the leverage deficit for each company was determined relative to its actual debt level. The leverage deficit was then used to examine its influence on the quality of the respective acquisitions by the firms. The results obtained from the target capital structure regression are in line with previous empirical findings about target leverage determinants. The analysis of the value-enhancing effect of the leverage deviation yielded estimates that were either insignificant or indicated an adverse impact of the leverage deficit. In conclusion, no evidence is found supporting the hypothesis that the leverage deficit of a firm has a positive effect on the value of its acquisition targets, suggesting further investigation of the effects of leverage in the context of firm acquisitions.

Keywords: leverage deficit, target capital structure, mergers & acquisitions

Défice de Alavancagem e Aquisições de Empresas

Lukas Moss

Resumo

Este estudo analisa o efeito que o desvio de uma empresa da sua estrutura de capital alvo tem sobre o valor das aquisições efetuadas. Tendo como base uma estimativa anual par ao rácio de endividamento óptimo, o défice de alavancagem para cada empresa foi determinado em relação ao seu nível de endividamento real. O défice de alavancagem foi então utilizado para examinar a sua influência na qualidade das respetivas aquisições por parte das empresas. Os resultados obtidos a partir da regressão da estrutura de capital alvo estão em linha com conclusões empíricas anteriores sobre os determinantes da alavancagem alvo. A análise do efeito de aumento do valor do desvio da alavancagem produziu estimativas que ou eram insignificantes ou indicavam um impacto adverso do défice de alavancagem. Em termos gerais, não foram encontradas provas que sustentem a hipótese de que o défice de alavancagem de uma empresa tenha um efeito positivo sobre o valor dos seus alvos de aquisição, sugerindo a necessidade de uma investigação mais aprofundada dos efeitos da alavancagem no contexto de aquisições de empresas.

Palavras-chave: défice de alavancagem, estrutura de capital alvo, fusões e aquisições

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1. Introduction

For quite some time now, the question of how firms should best finance themselves has been a matter of debate in the literature. The discussion underwent an important turn, when Modigliani and Miller (1958) proposed their irrelevance theorem, that in a frictionless market the share of debt in the capital structure of a firm has no effect on its value. However, academics noted that due to market frictions the proposition is not valid in a real-world scenario. From this point on two main schools of thought evolved, where on the one hand the trade-off theory suggests that companies weigh the advantages such as the tax shield or the mitigation of agency costs against the disadvantages such as the increased distress costs of debt. On the other hand, the pecking order theory indicates, that firms follow a financing hierarchy which results from the adverse selection costs inherent to the different sources of funds that are based on information asymmetries (Myers & Majluf, 1984). Nevertheless, the explanatory power of both theories is still subject to discussion in the literature, with some concluding that while neither theory alone is able to completely explain the large variation between firms in their capital structure, both offer valuable approaches to understand the determinants of corporate financing (Fama & French, 2005; Leary & Roberts, 2010).

Based on the main assumption of the trade-off theory, that by balancing the benefits and costs of debt each firm has a target capital structure, Hovakimian, Opler, and Titman (2001) established the leverage deficit as a company's deviation from its optimal debt level. Since the deviation from the target leverage ratio can result in serious costs and consequences for a firm, an extensive body of literature addressed the impact of it on different corporate behaviors. Despite the prominent role of corporate acquisitions, few have studied the effect of target leverage deviation in the context of firm acquisitions among which Uysal (2011) and Harford, Klasa, and Walcott (2009) are standing out. Arguing that the use of debt counteracts agency-related disadvantages when companies pursue an acquisition, Uysal (2011) suggests that firms that exceed their optimal leverage ratio pick target companies with the highest value. Building upon that line of thought, this thesis contributes to the existing research by applying these theories to a new and more recent dataset from the US including acquisitions from 1990 to 2019. More specifically, this work investigates whether a firm's higher leverage deficit leads to an increased quality of corporate acquisitions. Following previous studies (Hovakimian, Opler, and Titman, 2001; Fama & French, 2002; Uysal, 2011), a two-stage estimation process is utilized for this purpose, during which first the target capital structure will be predicted annually for each firm in the sample with determinants commonly used in previous studies.

With this estimate the leverage deficit is calculated, which allows companies that exceed their target leverage to be classified as overleveraged, while companies that are below their optimal capital structure are defined as underleveraged. In the second stage the leverage deficit is used to test the value-enhancing proposition of debt, where the market reaction around the announcement date of each acquisition represents the quality of the target firm.

The remainder of this paper proceeds as follows. Section 2 provides an overview about capital structure research and the leverage deficit in the context of firm acquisitions. Section 3 explains the methodological concept used in this study. Section 4 describes the sample selection process and the summary statistics. In Section 5 the empirical results are analyzed and discussed while Section 6 finally concludes the thesis.

2. Literature Review

2.1. Modern Capital Structure Theory

Modern theory of corporate finance was introduced by Modigliani and Miller (1958) when they established their irrelevance theorem that in a perfect market the choice of capital structure does not influence the value of the firm. They argue that without financing frictions the total value of the cash flow paid to the security holders of the firm is equal to the market value of the total cash flow generated by the assets of the firm. Consequently, under the law of one price, the total market value of the assets and the securities of a firm have to be equal and are not altered by the type of financing.

In the following years researchers discussed this proposition and noted that due to market frictions the theorem cannot uphold under real market conditions. As a consequence of these findings Modigliani and Miller (1963) published a revised theory primarily adding the tax benefits of debt to their theorem but also mentioning other market frictions that can influence the capital structure.

From there on two streams of literature have evolved. On the one hand the trade-off theory building upon the idea that companies balance the costs and benefits of leverage and on the other hand those theories where companies take advantage of the information asymmetry in the market among which the pecking order theory is the most eminent.

2.1.1. Trade-off Theory

Based on the idea of Modigliani and Miller and taking into account the market frictions mentioned above, scholars show with the trade-off theory, that firms weigh the advantages and disadvantages of debt when deciding about their capital structure.

The main benefit of leveraging a company's financing with debt, added by Modigliani and Miller (1963), is the tax shield. By using debt, a firm takes advantage of the feature, that interest payments are deducted from the earnings that are used to determine the taxes payable for the firm. Dividends payed to equity holders, however, are not subject to this benefit (Modigliani & Miller, 1963). Companies that show higher profitability and stable earnings usually face higher tax rates and are therefore expected to reduce their tax burden by taking on more debt (Miller & Scholes, 1978). Another way to protect their earnings is through non-debt tax shields like depreciation and R&D expenditures. Since this approach diminishes the overall tax effect of debt, firms with higher non-debt tax shields are usually less levered (DeAngelo & Masulis, 1980).

Consequently, if just the beneficial tax deductibility is taken into account as a feature of debt, firms should be financed entirely with debt. To offset the tax advantage of debt, bankruptcy costs and increased distress probability coming along with higher debt levels are held against (Frank & Goyal, 2008). These bankruptcy costs are higher for firms that have a greater risk of becoming distressed or when their distressed status results in higher costs. For instance, large firms with consistent cash flow face a lower bankruptcy probability and therefore have higher optimal debt ratios. Supporting evidence was found by Bradley, Jarrell, and Kim (1984) showing an inverse relation between leverage and earnings volatility. Additionally, firms with higher asset tangibility are expected to be able to take on more debt, since the assets can serve as collaterals if the company has to file for bankruptcy (Rajan & Zingales, 1995). Contrary to that, companies with high R&D intensity usually have a lower asset tangibility and are therefore expected to have less debt in their capital structure. This also applies to firms with more unique and specialized products that tend to have less leverage as well. The rationale offered by Titman and Wessels (1988) is that financial distress of these firms can be especially costly for third parties like customers and suppliers. Since these stakeholders also evaluate the financial state of a company before entering business with it, these third-party costs are also considered by firms during decisions about their capital structure.

The mentioned tax benefits and distress costs are not enough to explain the observed capital structures, which encouraged researchers to also investigate characteristics of debt that are based on the agency theory and also influence the capital structure. The two basic conflicts of interests arising around the corporate financing structure are the diverging interests of shareholders and managers on the one hand and those between bondholders and equity holders on the other hand. The principal-agent relationship between managers and stockholders enables self-interested managers to pursue projects with available funds that benefit themselves, but do

not add value for the firm and shareholders (Jensen, 1986). By limiting the amount of free-cash flow at disposal for managers through interest payments, debt can be an instrument to control the actions of management and to align them towards the shareholders' interests (Stulz, 1990). Firms with low growth potential and few investment opportunities are particularly subject to the overinvestment problem through discretionary spending of managers (Jensen, 1986). Thus, these companies are expected to use more debt to protect themselves against the misuse of funds which implies a negative relation between growth and leverage. Whereas, on the side of the capital providers, the different ways in which the share- and bondholders are able to exert their influence on the actions of the management generate two other agency problems. First, in the case of an already highly levered firm, the debt overhang makes the company unable to take on more debt. The financially distressed company furthermore will probably forgo future positive net present value (NPV) opportunities if these merely pay off existing debt obligations. This is due to the fact that shareholders have more control over managers than bondholders and if projects just benefit the creditors, these NPV investments will be rejected leading to an underinvestment problem (Myers S. C., 1977). As forgoing investment opportunities is especially costly for high-growth firms, they use debt more conservatively which also suggests a negative relation between growth and leverage (Frank & Goyal, 2008). Second, building upon the same principle of debt contracts, that earnings of the firm first cover the obligations towards the creditors before the remaining is available to stockholders, and in similarly distressed financial circumstances, shareholders will prefer particularly risky investments. By doing so they can exploit existing shareholders and also destroy firm value by pursuing risky and even negative NPV projects, which Jensen and Meckling (1976) called the asset substitution problem. The dynamics in a fast-growing firm facilitate the risk-shifting of the asset substitution problem by shareholders which, under these conditions, makes it especially harder for bondholders to control for. This leads to higher costs of debt for high-growth firms and therefore to lower levels of leverage (Frank & Goyal, 2008).

The presented findings suggest, that after weighing the costs and benefits of debt, an optimal ratio of debt and equity for each firm exists, which is also known as the target capital structure. This also implies that deviations from this optimal debt level entail higher costs for the company. In this case firms gradually revert back to the leverage target (Jalilvand & Harris, 1984; Kayhan & Titman, 2007). On the other hand, some researchers argue, that the speed of adjustment is not high enough to be regarded as relevant (Fama & French, 2002; Baker & Wurgler, 2002). Whereas when adjustment costs are also considered, evidence shows, that

firms actively rebalance their capital structures (Leary & Roberts, 2005; Flannery & Rangan, 2006).

Moreover, although the trade-off theory would suggest, that through higher taxes, increasing agency costs, and lower bankruptcy probability profitable firms should increase the use of debt, research mostly finds proof for a negative relation between profitability and leverage (Fama & French, 2002). This profitability inconsistency also led to further studies questioning the discussed theory and bringing up new ones that use a different approach to explain capital structure decisions.

2.1.2. Pecking Order Theory

Beside the trade-off theory there is another stream in the literature where researchers base the forces that influence corporate capital structure on the information asymmetries between the insiders of the firm and the outsiders in the market. The pecking order is the most prominent theory based on information asymmetry and was brought forward by Myers (1984) and Myers & Majluf (1984). Rather than assuming that companies move around leverage targets, this theory argues that firms have a hierarchical preference of financing projects. This financing hierarchy is based on the costs of the different sources of funds. Due to the adverse selection, also known by the lemons principle introduced by Akerlof (1970), internal financing is cheaper than external financing. Since managers have more information about the outlooks and risks of the firm than outsiders, these adverse selection costs are charged by creditors and investors when providing funds to the firm. From the two external sources, debt is cheaper than equity issuances given that debt signals the confidence of the managers in the success of the investments and debt also ranks higher in the seniority of claims if the firm goes bankrupt. Based on these circumstances and also bearing in mind that managers tend to issue new shares if they perceive the equity as being overvalued (Myers & Majluf, 1984) investors request higher returns on equity. This results in the financing hierarchy, where firms first use internal funds which are retained earnings and if these are exhausted move on to external financing. In this case companies prefer to take on debt until their debt capacity is reached and only as a last resort issue equity.

While Shyam-Sunder and Myers (1999) find evidence proving the predictions of the pecking order theory by showing the dependency of the leverage ratio on the financing deficit of a firm, others refute the explanatory power of the theory for broad firm types. They object, that the pecking order suits better to explain the financing behavior of large companies or that it is

common for small companies to issue equity (Frank & Goyal, 2003) (Fama & French, 2005). In the end the literature concludes, that neither of the both theories, trade-off and pecking order, are able to explain the large variety of capital structures, but both provide concepts to understand corporate financing decisions (Fama & French, 2005; Leary & Roberts, 2010).

Apart from the pecking order theory another concept should be mentioned that is based on information asymmetries in the market. With the market timing theory Baker and Wurgler (2002) argue, that managers issue equity when they perceive their shares as being overvalued and turn to debt if they consider their equity undervalued.

2.2. Leverage Deficit and Firm Acquisition

As mentioned before, the trade-off theory suggests that when the individual advantages and disadvantages of debt are considered, an optimal capital structure can be determined for each company. Firms naturally deviate from these leverage targets and are commonly described as overleveraged if they exceed their optimal leverage ratio and underleveraged if the proportion of debt in their capital structure is below the target. Introduced by Hovakimian, Opler, and Titman (2001) in this work the term leverage deficit is of particular importance and defined following Harford, Klasa, and Walcott (2009) and Uysal (2011) as the difference between the observed and the target leverage ratio. Based on this definition overleveraged companies have a positive leverage deficit and underleveraged firms a negative leverage deficit.

Although it is common, a deviation from the target capital structure might be costly for a company. While overleveraged firms will face increasing financial distress costs, in the case of underleverage the tax and agency costs of a company might rise. When the concept of leverage deficit is applied to the case of acquisitions, another cost of excessive debt usage occurs. As firm acquisitions usually involve high investment sums, internal financing is not sufficient and further funds from external capital providers are necessary (Harford, Klasa, & Walcott, 2009). But if the debt level of a firm is already above the target capital structure it can face problems borrowing additional capital. The debt market will be more reluctant to provide funds and will raise the costs for overleveraged firms. This is especially disadvantageous as the cash part of acquisitions is mainly financed with debt (Harford, Klasa, & Walcott, 2009). Consequently, the ability of companies with higher leverage deficits to pursue intended investments is limited. Both, the capability of undertaking an acquisition as well as the financing and payment of those are influenced by the leverage deficit (Uysal, 2011).

By contrast and following the principles of the shareholder and management conflict, overleverage might also offer an advantage regarding acquisitions. In the case of an underleveraged company with large amounts of available funds, managers can pursue projects that benefit their personal interest but are not favorable from the shareholder's perspective. These agency costs of free cash-flow are lower returns on the shareholders investments which can be improved through higher leverage levels (Jensen & Meckling, 1976). The increased debt ratio and the fewer funds at discretion could encourage the management to be more careful in their selection of acquisition targets and therefore result in an improved quality of deals (Jensen, 1986). As higher leverage also raises the risk of financial distress, managers are especially forced to choose projects with positive NPVs (Grossman & Hart, 1982).

Collectively, although a firm's positive leverage deficit may lead to a reduced quantity of acquisitions the investments that are undertaken are expected to have a higher quality and value.

3. Methodology

3.1. Estimation of Target Capital Structure

In order to study the effect of leverage deficit on corporate acquisitions a two-stage estimation process will be used following previous studies (Hovakimian, Opler, and Titman, 2001; Fama & French, 2002; Uysal, 2011). During the first stage the leverage deficit for each company is calculated. For this the annual leverage target for each firm has to be estimated by running regressions of market leverage on capital structure determinants as shown in Equation (1). As market leverage is commonly utilized in capital structure research (Hovakimian, Opler, & Titman, 2001; Harford, Klasa, & Walcott, 2009; Uysal, 2011) it will be used as the dependent variable in the regression and from here on will be referred to as leverage. The independent variables in the equation are adapted from the literature as commonly used estimates for the capital structure and described in the following.

One of these determinants is the firm size, which is proxied by the natural logarithm of net sales (*Sales*). An increased diversification and reduced volatility of cash flows allows for a higher debt level for larger firms (Rajan & Zingales, 1995). Additionally, a bigger firm size also comes along with a better accessibility to capital markets which results in improved financing options for these companies and supports expectation that firm size increases the target leverage. The variables *Market-to-Book* and *Stock Return* indicate the growth opportunities of a firm. As shown above the overinvestment, underinvestment, and asset substitution problem suggest a negative relation between a firm's growth opportunities and its leverage (Jensen, 1986; Frank

& Goyal, 2008). The optimal debt level is therefore expected to decrease with a rising market-to-book ratio and the stock return. Moreover, the ratio of selling expenses to sales (*Selling Exp./Sales*) and *R&D Dummy* are included as proxies for the product uniqueness of a firm. Due to the lack of shared R&D data the *R&D Dummy* shows whether a company reports positive R&D expenditures. Since third-party stakeholders like customers and employees of firms with more unique and specialized products are more dependent on the continued existence of the company, its financial distress costs therefore also increase leading to lower optimal debt ratios (Titman & Wessels, 1988). R&D expenditures also constitute a form of non-debt tax shields that reduce the beneficial effect of debt and emphasize moreover the negative relation between R&D and leverage (DeAngelo & Masulis, 1980). Another common determinant is the asset tangibility of a firm which is represented by the ratio of tangible assets to the book value of total assets (*Tangible Assets/TA*). As companies with more tangible assets can offer more collateral, they are granted with more debt which implies a higher target leverage (Rajan & Zingales, 1995). Profitability, on the other hand, proxied by the ratio of earnings before taxes, preferred dividends, and interest payments over total assets (*EBITDA/TA*), is an explanatory variable with an effect on leverage that is subject to discussion in the literature. The profitability inconsistency resides from the traditional trade-off proposition, that due to the higher tax burden (Miller & Scholes, 1978), the higher agency costs, and the lower bankruptcy probability optimal debt level should be expected to increase with profitability, whereas most of the empirical findings show a negative relation between profitability and leverage (Fama & French, 2002).

In order to mitigate the effect of endogeneity all determinants listed above are lagged by one year (Antão & Bonfim, 2014). Moreover, the dependent variable leverage is also included as a lagged variable (η_i) to eliminate the serial correlation through firm fixed effects in Equation (1) (Lemmon, Roberts, & Zender, 2008). Industry effects are controlled for by including industry indicator variables (ψ_i) that are based on the classification of 48 industries (Kayhan & Titman, 2007). The p-values in this OLS regression are based on standard errors produced by the Newey-West estimator and are therefore robust to heteroskedasticity and autocorrelation.

The predicted value from the target capital structure regression is used as the target leverage ratio. With this the leverage deficit (*Lev. Deficit*) is calculated by subtracting the target leverage ratio from the actual leverage of each firm. Furthermore, leverage deficit quartiles are created where firms in the quartile with the highest leverage deficit are defined as overleveraged and those in the quartile with the lowest deficit as underleveraged.

$$Leverage_{i,t} = \alpha + \beta_1 Sales_{i,t-1} + \beta_2 Market - to - Book_{i,t-1} + \beta_3 R\&D\ Dummy_{i,t-1} + \beta_4 Selling\ \ Exp./Sales_{i,t-1} + \beta_5 EBITDA/TA_{i,t-1} + \beta_6 Tangible\ Assets/TA_{i,t-1} + \beta_7 Stock\ Return_{i,t-1} + \eta_i + \psi_i + \varepsilon_i \quad (1)$$

3.2. Analysis of the Market Reaction to Acquisition Announcements

During the second stage of the process studying the influence of leverage deviation on corporate acquisitions, the *Lev. Deficit* variable, which was determined annually for each firm in the first step, will be used. It is employed to test the proposition of (Uysal, 2011) that firms exceeding their optimal debt level make more value-enhancing acquisitions. As an indicator for the quality of the acquisitions, the market reactions in form of abnormal share price deviations of the acquiring company around the announcement date are analyzed. The dependent variable in Equation (2) is therefore the cumulative abnormal return (CAR), which, following Moeller, Schlingemann, and Stulz (2004), will be computed for a three-day period, beginning one day before the announcement date and ending one day thereafter. The abnormal returns are calculated based on the market-adjusted model with the benchmark returns being the CRSP value-weighted market returns including dividends.

The determinant of interest in this regression is the leverage deficit variable, which will be used as the main explanatory variable in Model 1 and a combination of dummy variables indicating, whether a firm belongs to the highest (overleveraged) or the lowest (underleveraged) leverage deficit quartile, is used in Model 2. Since an overvaluation of a firm's equity and its growth prospects might have a negative effect on the leverage deficit, the variables *Stock Return* and *Market-to-Book* are added as a mitigation of these factors (Uysal, 2011). Further variables as *Av. Market Leverage*, *EBITDA/DA*, and *Sales* are included to control for acquirer characteristics that might influence the abnormal return which were also used by Uysal (2011). Following the findings of Fuller, Netter, and Stegemoller (2002) about the ownership status of targets, that the acquisition of public firms results in negative abnormal returns and conversely positive for private ones, the ownership dummies *Public Target* and *Private Target* are also integrated. Based on the adverse selection problem from Myers and Majluf (1984) the negative effect of equity in an acquisition is well known, as well as the positive signals firms send to investors, when they pay with cash. Therefore, the *AllCash* indicator controls for the effect which the method of payment has on the CAR. As Asquit, Bruner, and Mullins (1983) show, another deal characteristic with influence is the relative deal size of the acquiror to the target firm, which the

variable *Rel.Size* mitigates. Finally, in order to control for time fixed effects, a year dummy is added to Equation (2).

$$CAR_{i,t} = \alpha + \beta_1 Lev.\ Deficit_i + \beta_2 Av.\ Market\ Leverage_i + \beta_3 Sales_i + \beta_4 Rel.Size_i + \beta_5 Market - to - Book_i + \beta_6 EBITDA/TA_i + \beta_7 Stock\ Return_i + \beta_8 Public\ Target_i + \beta_9 Private\ Target_i + \beta_{10} All\ Cash_i + \nu_t + \varepsilon_i \quad (2)$$

4. Data

4.1. Firm Sample

The dataset for the estimation of the target capital structure consists of firms for which Compustat and the Center for Research in Security Prices (CRSP) provides data in the period from 1990 to 2019. Of the companies obtained, those that can be identified as operating in the financial sector (SIC codes 6000 to 6999) and the regulated utilities sector (4900 to 4900) are dropped because their capital structure is likely to be largely influenced by their industry specific characteristic or state regulation (Hovakimian, Opler, and Titman, 2001; Fama & French, 2002; Flannery & Rangan, 2006). Furthermore, companies reporting sales of less than $10 million, adjusted for inflation to the 1990 base year, are also excluded (Uysal, 2011). To prevent the impact of outliers, the variables are winsorized at the first and last percent. Finally, firm-year observations for which data needed to predict the leverage target level is missing are also not considered.

The sample selection process provides sufficient data for the target capital structure regression from Equation (1) to estimate the target leverage for 74,424 firm-year observations. The summary statistics in Table 1 show that these firms hold total assets worth $3,033 million on average. Their market leverage has a mean of 0.384 and a large standard deviation of 0.248. With a standard deviation of 0.122 the leverage deficit variable indicates that a considerable proportion of firms deviate from their optimal debt levels, which will be used to analyze the effect on corporate acquisitions.

Table 1 - Summary Statistics of the Firm Sample

The table presents the summary statistics of the firm sample, including all firms provided by both Compustat and the Center for Research in Security Prices during the sample period from 1990 to 2019, that meet the criteria explained subsequently. Companies of the financial sector (SIC codes 6000 to 6999) and the regulated utilities sector (4900 to 4900), as well as those with inflation-adjusted sales of less than $10 million as of the 1990 base year, are excluded. Observations with missing data needed to predict the target capital ratio are also dropped. All variables are winsorized at the first and last percentile. This sample selection process results in 74,424 firm-year observations with the following descriptive statistics.

Variable	Obs.	Mean	Std. Dev.	Min	Max
Total Assets ($ million)	74,424	3,033	16,828	0.895	797,769
Sales	74,386	5.505	1.782	2.371	10.05
Stock Return	74,424	0.159	0.809	-0.896	5.047
Market-to-Book	74,424	1.800	1.249	0.568	9.064
EBITDA/TA	74,333	0.102	0.132	-0.555	0.440
Tangible Assets/TA	74,417	0.273	0.225	0.005	0.901
Selling Exp./Sales	74,209	0.275	0.209	0.020	1.362
R&D/TA	44,227	0.060	0.083	0.000	0.539
Market Leverage	74,424	0.384	0.248	0.018	0.977
Av. Market Leverage	74,424	0.364	0.228	0.018	0.977
Leverage Deficit	74,424	0.000	0.122	-0.868	0.849

Additionally, Table 2 displays the pairwise correlation between the main variables and their corresponding significance in a correlation matrix. Consistent with Rajan and Zingales (1995), the variable *Sales* as a proxy for firm size is positively correlated with leverage, which suggests that larger firms are able to take on more debt as they have steady and diversified cash flows and enhanced access to capital markets. As described by Goyal, Lehn, and Racic (2002) the optimal amount of debt in a firms' capital structure decreases with more growth opportunities. Therefore, as predicted, the relationship between the *Stock Return* and *Market-to-Book* variables, which represent the growth opportunities of a firm, and the leverage ratio is negative and also significant. The aforementioned inconsistency in profitability is a result of the expectation of the trade-off theory that more profitable firms should take on more debt to mitigate tax and agency costs while taking advantage of their lower risk of financial distress, whereas on the other hand, Fama and French (2002) demonstrate an inverse relationship of profitability towards the target leverage ratio. With a significant negative value of -0.259, the pairwise correlation between the variable *EBITDA/TA*, which represents the profitability of firm in this work, and leverage supports the findings of Fama and French (2002). Besides firm size, asset tangibility, proxied by *Tangible Assets/TA*, is one of the only two variables that is

positively correlated with leverage. However, this positive relation is based on the fact, that firms with better asset tangibility are able to take on more debt against those collaterals, which Rajan and Zingales (1995) documented in their work. Another factor influencing the leverage ratio is the product uniqueness of a firm and was introduced by Titman and Wessels (1988). They argue, that if a company's products are more unique and specialized, its customers will be more affected by a disruption or termination of its operations, which leads to higher distress costs and thus decreasing the optimal debt level of the firm. Supporting this theory, both proxies for product uniqueness in this sample, *Selling Exp./Sales* and *R&D/TA*, are significantly negatively correlated with leverage. The negative relation of *R&D/TA* towards the leverage ratio can also be explained by the findings of DeAngelo and Masulis (1980), that the R&D costs of a firm represent a type of non-debt tax shields, which decreases the marginal value of leverage. Finally, companies with higher expenditures for research and development have more intangible assets, which are more difficult to liquidate and therefore reduce the amount of collateral against which the firm can raise debt.

Table 2 - Correlation Matrix

The table presents the pairwise correlation between the main variables and their corresponding significance in this correlation matrix. *Market Leverage* is represented by m_lev, *Sales* is represented by sales, *Stock Return* is represented by stock_ret, *Market-to-Book* is represented by m/b, *EBITDA/TA* is represented by ebitda/ta, *Tangible Assets/TA* is represented by t_assets, *Selling Exp./Sales* is represented by s_exp/s, and *RD/TA* is represented by rd/ta. The asterisk indicates whether a correlation is significant at the 1% level.

	m_lev	sales	stock_ret	m/b	ebitda/ta	t_assets	s_exp/s	rd/ta
m_lev	1							
sales	0.058*	1						
stock_ret	-0.151*	-0.049*	1					
m/b	-0.506*	0.011*	0.210*	1				
ebitda/ta	-0.259*	0.318*	0.110*	0.192*	1			
t_assets	0.197*	0.124*	-0.031*	-0.157*	0.151*	1		
s_exp/s	-0.243*	-0.339*	-0.015*	0.260*	-0.423*	-0.364*	1	
rd/ta	-0.237*	-0.317*	0.003	0.267*	-0.407*	-0.314*	0.644*	1

4.2. Deal Sample

Based on the data sample obtained in Section 4.1 all acquisitions from each firm completed in the period from 1990 to 2019 are retrieved from the Securities Data Corporation (SDC) M&A database. Following Uysal (2011) just domestic acquisitions in the US are considered and

include following deal forms: Merger, Acquisition of Majority Interest, Acquisition of Assets, Acquisition of Certain Assets. Moreover, observations where the ratio of the transaction value to the acquirer's total assets is below 1% are excluded from the deal sample (Moeller, Schlingemann, & Stulz, 2004).

As a result, 10,084 acquisitions that fulfil the selection criteria can be assigned to the companies in the sample ranging from 1990 to 2019. The deal characteristics presented in Table 3 show, that 44.7% of these deals are paid entirely with cash and 89.3% have at least a cash part. Since acquisitions paid by cash are usually financed with debt (Harford, Klasa, & Walcott, 2009), the high share of cash deals in the sample demonstrates the importance of the leverage deficit in corporate acquisitions.

Table 3 - Summary Statistics of the Deal Sample

The table presents the summary statistics of the deal sample, including all domestic acquisitions provided by the Securities Data Corporation's M&A database, completed by a constituent of the firm sample during the sample period from 1990 to 2019, that meet the criteria explained subsequently. Following deal forms are considered: Merger, Acquisition of Majority Interest, Acquisition of Assets, Acquisition of Certain Assets. Observations with a ratio of the transaction value to the acquirer's total assets of less than 1% are excluded. This sample selection process results in 10,084 deal observations with the following descriptive statistics.

Variable	Obs.	Mean	Std. Dev.	Min	Max
All Cash	10,084	0.447	0.497	0	1
All Stock	10,084	0.107	0.310	0	1
Combo	10,084	0.446	0.497	0	1
Public Target	10,084	0.148	0.355	0	1
Private Target	10,084	0.508	0.500	0	1
Firm Acquisition	10,084	0.391	0.488	0	1

Table 4 provides further details about the development of the amount of acquisitions pursued, their method of payment, and the ownership status of the target firm throughout the course of the sample period. Considering the number of acquisitions in the second column, three merger wave patterns can be identified. The first wave already starts at the beginning of the sample period but intensifies from 1994 onwards until it finally reaches its peak in 1998 with 635 acquisitions. This observation in the data sample is attributable to the last major merger wave of the past millennium, which took place during the 1990s. After a sharp decline in the following years, a new wave emerged from 2002 on and lead to another merger boom. The continuously rising number of deals peaked in 2007 at 462 acquisitions, after which the

financial crisis also heavily disrupted the global merger market. However, shortly thereafter, the amount of acquisitions started to increase again, until the most recent merger wave peaked in the year 2014 with 344 deals and since then has leveled off.

Although it appears in Table 3 that the share of acquisitions payed for exclusively with cash is almost the same as the share of those payed for with a combination of stock and cash, a closer look at the annual share of the different payment methods in Table 4 reveals that this is only true as an average value for the entire sample period, whereas in fact the shares of the different payment types changed fundamentally over the course of the sample period. While in the first year of the dataset, 27.3% of the deals were paid all by cash and, with 53.6%, most were paid with a combination of both types of payment, by the end of this sample almost 20 years later, this distribution had changed such that now most of the acquisitions are paid exclusively with cash (70.4%) and just 23.0% are paid with a combination of cash and stock. Hence, this development emphasizes the increasing importance of debt, as Harford, Klasa and Walcott (2009) pointed out, that deals paid with cash are primarily financed by debt. This in turn highlights the significance of the leverage deficit, as already highly levered companies face growing difficulties to raise further debt capital in order to finance new acquisitions. On the other hand, the steady decline of the share of deals that are paid all by stock since the beginning of this millennium, in combination with the sharp decline in the combo payment method over the last five years, underscores the role of the adverse selection problem outlined by Myers and Majluf (1984), which described the negative signaling towards investors when acquisitions are paid for by the exchange of shares, while cash is a demonstration of the confidence that managers have in their pursued ventures. Finally, the last two columns of Table 4 describe the annual distribution of the ownership status of the acquired target firms in this sample, showing that the share of public targets (14.8%) is consistently lower than the average level of private targets (50.8%), without any major fluctuations around their mean over the entire sample period. This observation is in line with the research of Fuller, Netter, and Stegemoller (2002), who illustrated the negative market reactions to the acquisition of public firms and favorable stock market returns in the case of private target companies.

Table 4 - Deal Sample Distribution by Year and Deal Characteristics

The table presents the annual distribution of the acquisition number over the sample period, with sub-samples clustered by different deal characteristics that include the payment method and the ownership status of the target company. Grouped under the payment method, the annual shares of deals paid all by cash, just with stock, and a combination of both are shown. Grouped under the ownership status of the target firm, the annual shares of public targets and private targets are shown.

Year	Number of Acquisitions	Payment Method			Ownership Status	
		All Cash	All Stock	Combo	Public Target	Private Target
1991	110	0.273	0.191	0.536	0.136	0.500
1992	173	0.266	0.214	0.520	0.116	0.462
1993	193	0.337	0.176	0.487	0.093	0.446
1994	268	0.258	0.216	0.526	0.168	0.403
1995	379	0.274	0.235	0.491	0.166	0.486
1996	485	0.245	0.260	0.495	0.173	0.534
1997	543	0.282	0.201	0.518	0.169	0.503
1998	635	0.310	0.186	0.504	0.167	0.502
1999	508	0.301	0.185	0.514	0.179	0.545
2000	438	0.315	0.272	0.413	0.194	0.527
2001	370	0.376	0.146	0.478	0.160	0.492
2002	383	0.431	0.065	0.504	0.162	0.436
2003	392	0.444	0.074	0.482	0.161	0.503
2004	459	0.501	0.044	0.455	0.122	0.549
2005	443	0.494	0.034	0.472	0.129	0.560
2006	440	0.550	0.039	0.411	0.143	0.548
2007	462	0.535	0.030	0.435	0.123	0.578
2008	310	0.494	0.019	0.487	0.123	0.571
2009	220	0.523	0.064	0.414	0.164	0.518
2010	276	0.612	0.025	0.362	0.174	0.478
2011	298	0.560	0.013	0.426	0.081	0.527
2012	313	0.514	0.022	0.463	0.099	0.537
2013	299	0.559	0.013	0.428	0.094	0.492
2014	344	0.491	0.032	0.477	0.113	0.535
2015	315	0.622	0.035	0.343	0.168	0.476
2016	281	0.708	0.032	0.260	0.171	0.416
2017	271	0.694	0.030	0.277	0.129	0.450
2018	263	0.696	0.038	0.266	0.156	0.468
2019	213	0.704	0.066	0.230	0.183	0.498
Total	10,084	0.447	0.107	0.446	0.148	0.508

5. Empirical Analysis and Results

5.1. Target Capital Structure Regression Results

The first part of the two-stage analysis involves the target capital structure regression for which the results are presented in Table 5. The estimated coefficients of the optimal leverage ratio are mainly in line with previous findings. Proxying for product uniqueness, *Selling Exp./Sales* and *R&D Dummy* are both significantly negative and therefore consistent with the prediction, that firms with more specialized and unique products tend to use less debt in their capital (Titman & Wessels, 1988). The predicted coefficient for *EBITDA/TA* also results in a significant and inverse relation towards the target leverage. Against the suggestion of the trade-off theory, that profitability should increase the use of debt, this finding is in line with that of Fama and French (2002), which also indicated a negative relationship supporting the profitability inconsistency. As already unanimously identified by the existing literature, asset tangibility represented by *Tangible Assets/TA* is estimated with a positive coefficient which is significant at the 1% level. This result supports the theory that firms with a greater amount of accessible collateral are able to take on more debt for financing (Rajan & Zingales, 1995). In addition, the lagged leverage variable representing firm-fixed effects is also consistent with the finding of Lemmon, Roberts, and Zender (2008) of a positive and significant impact on the leverage ratio. On the other hand, some results of the regression contradict expectations based on prior research. According to the estimated p-value for *Sales*, which is far above usual significance levels with a value of 0.184, the variable for firm size has no statistical relevance for the changes of a firm's leverage ratio in this sample. Following Goyal, Lehn, and Racic (2002) the debt levels of companies should decrease with growth opportunities. The coefficients for *Market-to-Book* ratio and *Stock Return* however, show both a positive relation significant at the 1% level towards the leverage target, which is also contrary to the suggestion of the over- and underinvestment problem that optimal debt levels should decrease with better growth opportunities (Jensen, 1986; Frank & Goyal, 2008).

Table 5 - Target Capital Structure Regression Results

The table presents the estimate results of the target capital structure regression on capital structure determinants from Equation (1) with *Market Leverage* as the dependent variable. The p-values reported in parentheses are based on standard errors produced by the Newey-West estimator and are robust to heteroskedasticity and autocorrelation. Asterisks ***, **, and * indicate a statistical significance at the 1%, 5%, and 10% level.

	Market Leverage
$Sales_{t-1}$	0.000
	(0.184)
$Market\text{-}to\text{-}Book_{t-1}$	0.002***
	(0.000)
$R\&D\ Dummy_{t-1}$	-0.015***
	(0.000)
$Selling\ Exp./Sales_{t-1}$	-0.038***
	(0.000)
$EBITDA/TA_{t-1}$	-0.103***
	(0.000)
$Tangible\ Assets/TA_{t-1}$	0.012***
	(0.000)
$Stock\ Return_{t-1}$	0.003***
	(0.000)
$Market\ Leverage_{t-1}$	0.847***
	(0.000)
Constant	0.067***
	(0.000)
Observations	74,424

5.2. CAR Analysis

As a preliminary overview of the effect of the leverage deficit and other deal characteristics on the cumulative abnormal returns around the announcement of acquisitions, Table 6 presents the mean CAR values for the whole acquisition sample and for the different sub-samples formed by deal characteristics and the leverage deficit quartiles. With an average CAR of 0.016 over all acquisitions in the whole sample, the market tends to react positively to the takeover announcements in this dataset. However, the mean values for the different leverage deficit quartiles for all acquisitions display a pattern that is contrary to the value-enhancing effect of leverage on firm acquisitions. Since the most overleveraged companies with the highest leverage deficit are clustered in the fourth quartile and those with the lowest debt levels relative to their target capital structure are grouped in the first leverage deficit quartile, the result of this analysis showing with a mean CAR of 0.028 higher returns in the first quartile than in the fourth

quartile (0.011) is inconsistent with Uysal's (2011) proposition, that leverage deficit leads to a higher quality of acquisitions and thus to better market reactions to their announcement. This trend progresses gradually and significantly through all four quartiles and also holds true within the different sub-samples based on deal characteristics, where the first quartiles report higher cumulative abnormal returns than the fourth, suggesting an opposite effect of higher levels of leverage deficit on the stock market reaction.

Table 6 - Mean CAR Values by Leverage Deficit Quartiles

The table presents mean cumulative abnormal returns for the whole acquisition sample and for the different sub-samples formed by deal characteristics and the leverage deficit quartiles. Asterisks ***, **, and * indicate a statistical significance at the 1%, 5%, and 10% level.

	Whole Sample	Leverage Deficit Quartiles			
		1	2	3	4
All Acquisitions	0.016***	0.028***	0.015***	0.013***	0.011***
All Cash	0.015***	0.024***	0.015***	0.013***	0.012***
All Stock	0.006*	0.031***	0.004	-0.009	-0.008
Combo	0.019***	0.029***	0.020***	0.017***	0.013***
Public Target	-0.008***	-0.005	-0.004	-0.007*	-0.015***
Private Target	0.017***	0.032***	0.012***	0.015***	0.013***

Building upon the results from the target capital structure regression, the second stage of the analysis uses each acquiror's deviation from its predicted leverage target to examine the effect on the corresponding acquisitions, for which the results are presented in Table 7. Although the primary interest applies to the leverage deficit variables, the estimated coefficients for the control variables presented in the following offer mixed results. While the negative relation between *Sales* and the cumulative abnormal returns supports the findings of Moeller, Schlingemann, and Stulz (2004) that acquirers with larger firm size tend to be associated with a decrease in market reaction. In contrast, the proxies for equity overvaluation and growth opportunities, included following Uysal (2011), show different results. Against the expected negative relationship, the estimated coefficients indicate a significantly positive association for *Stock Return* whereas the influence of the *Market-to-Book* variable is statistically insignificant. The regression furthermore results in a positive effect of *Rel.Size* on the dependent variable CAR which is in line with Asquith, Bruner, and Mullins (1983) and suggests an improved market reaction if the transaction value increases relative to the total assets of the acquiring company. With an estimated coefficient of -0.033 in both models for the *Public Target* variable,

the results indicate a negative effect from the public status of the acquired firm, which is consistent with the empirical findings of Fuller, Netter, and Stegemoller (2002) about the ownership status of targets involved in corporate acquisitions. Another sign for the importance of acquiring firms using debt in their capital structure is the positive effect that the trailing three-year average market leverage has on the abnormal returns around the announcement date, which supports the findings of Uysal (2011). Resulting from the adverse selection problem from Myers and Majluf (1984) cash should be the highest valued method of payment from a shareholder point of view. Thus, it is not surprising that the results for the *AllCash* dummy variable indicate that acquisitions which are paid exclusively with cash are associated with a better market reaction. However, the predicted regression results for the main determinants of CAR, the leverage deficit variables, provide a contradictory outcome, which is analyzed more closely in the next section.

Table 7 – Regression of Acquiror Returns

The table presents the coefficient estimate results of the analysis of the market reaction to acquisition announcements from Equation (2). The dependent variable CAR is calculated for a three-day period beginning one day before the day of announcement and ending one day after. Abnormal returns are computed based on the market-adjusted model, with benchmark returns being the CRSP value-weighted market returns including dividends. In Model 1 leverage deficit is applied as the main explanatory variable, whereas in Model 2, dummies representing the fourth (overleveraged) and the first (underleveraged) leverage deficit quartile are used. Robust p-values are reported in parentheses. Asterisks ***, **, and * indicate a statistical significance at the 1%, 5%, and 10% level.

Variable	(1) CAR	(2) CAR
Leverage Deficit	0.022	
	(0.410)	
Overleveraged Firm		-0.005**
		(0.045)
Underleveraged Firm		-0.010
		(0.198)
Av. Market Leverage	0.044***	0.046***
	(0.000)	(0.000)
Sales	-0.002***	-0.002***
	(0.006)	(0.004)
Relative Size	0.007***	0.008***
	(0.000)	(0.000)
Market-to-Book	0.001	0.000
	(0.563)	(0.995)
EBITDA/TA	0.002	-0.004
	(0.877)	(0.744)
Stock Return	0.024***	0.024***
	(0.002)	(0.001)
Public Target	-0.033***	-0.033***
	(0.000)	(0.000)
Private Target	-0.003	-0.003
	(0.232)	(0.224)
All Cash	0.003*	0.003*
	(0.076)	(0.079)
Constant	0.029**	0.036***
	(0.039)	(0.007)
Observations	9,653	9,653
R-squared	0.059	0.060

5.3. Discussion of the Leverage Deficit Variable

The goal of the two-step estimation process which was adapted from Uysal (2011) was to first find the optimal capital structure for each firm and then to analyze whether a positive deviation from this leverage target results in more value enhancing acquisitions. As a measure of acquisition quality, the market reaction around the announcement date in form of the CAR is utilized. While in Model (1) *Leverage Deficit* is the independent variable representing a firm's deviation from its optimal debt level, Model (2) uses the *Overleveraged Firm* dummy to indicate whether a company belongs to the highest deficit quartile and the *Underleveraged Firm* dummy whether a company belongs to the lowest leverage deficit quartile. If the assumption of the value enhancement of overleverage holds true, the *Leverage Deficit* variable as well as the *Overleveraged Firm* dummy should have a positive impact on the market reaction in this empirical setting. Although the predicted coefficient for the *Leverage Deficit* variable in Model (1) seems to confirm the positive relationship towards the cumulative abnormal returns, the corresponding p-value of 0.410 indicates a high variation and therefore a statistical insignificance of the result. The estimate for the *Overleveraged Firm* dummy in Model (2) on the other hand is significant at the 5% level and displays that the overleverage of an acquiring firm has a negative effect on the market reaction around the announcement date. While the statistically insignificant estimate for the *Leverage Deficit* variable is not sufficient to support the value enhancement assumption, the significant result of the *Overleveraged Firm* dummy even contradicts the theory, that the exceeding of the optimal debt level of a company results in an improved quality of acquisitions and therefore causes a better market reaction.

Uysal's (2011) reasoning that the leverage of an acquiring firm could have a value-enhancing effect on its corporate acquisitions is plausible and similar to the concept of the mitigation of the agency costs of free-cash flow due to possible self-enrichment of the management with funds at their discretion (Jensen & Meckling, 1976). Since debt levels above the leverage target would result in less funds available at the hands of a company's management, it would be enforced to select the most promising projects with the best outcome for the shareholders (Jensen, 1986). Nevertheless, a firm's overleverage might also have other consequences that could have a negative impact on its acquisitions and provide suggestions why the results of this study are not able to prove the value-enhancement of the leverage deficit. With the successful acquisition of a company the complex post-merger integration period begins for the acquiring company. This part of the merger is very important and requires extensive efforts within the target and the acquiring firm. However, overleveraged companies may face difficulties to

finance these measures as internal funds are already largely exhausted and additional debtors would be reluctant to offer further capital (Harrison, Hart, & Oler, 2014). Moreover, the pressure on the management caused by the increased distress risk in a company exceeding its target leverage might also have undesirable consequences for the shareholders. As the management is trying to mitigate the financial risk generated by the overleverage it could pursue projects with lower risk but also reduced returns for stockholders (Harrison, Hart, & Oler, 2014). These factors could cause the market participants to question the success of acquisitions done by firms with a higher leverage deficit and therefore result in negative abnormal market returns.

6. Conclusion

Throughout this thesis the goal was to determine whether the positive deviation of an acquiring firm from its optimal leverage ratio has a beneficial effect on the value of its acquisition target. In order to investigate this hypothesis, the target debt ratio was estimated annually for each of the 74,424 firm-year observations in the dataset, which was then used to identify the individual leverage deficit. Thereupon, the deviation from the target capital structure was employed to measure its influence on the quality of the 10,084 acquisitions that were announced in the sample period ranging from 1990 to 2019.

Predicting the optimal capital structure resulted in estimates for the target leverage determinants which are mostly consistent with the findings of the trade-off literate. Whereas the coefficients obtained from analyzing the value-enhancement effect of the leverage deficit are either statistically insignificant or even contradicting the proposition. Consequently, the analysis of this dataset provides no findings in support of the hypothesis that an increased leverage deficit leads to an improved acquisition quality of a firm.

Since the market reaction around the announcement date is used as an indicator of the acquisition's quality it would be interesting to investigate whether another measure based for example on the performance of the combined entity after the merger would yield similar results. Although the existing literature has found evidence for the mitigating effect of debt on agency costs, in the context of firm acquisitions, other characteristics of higher leverage could influence the success of a merger and should therefore be considered in capital structure decisions of firms with acquisition intentions.

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Appendix: Variable Definition

Panel A: Firm Characteristics

Variable	Definition
Av. Market Leverage	Three-year moving average of Market Leverage.
Book Debt	Total Assets - (Total Assets - total liabilities (item LT) + deferred taxes and investment tax credit (item TXDITC) - preferred stock (if available item PSTKL, otherwise item PSTKRV, otherwise item PSTK)).
EBITDA/TA	Operating income before depreciation (item OIBDP) / total assets (item AT).
Leverage Deficit	Market Leverage - predicted value from target capital structure regression of Equation (1).
Market Leverage	Book Debt / Market Value.
Market Value	Total liabilities (item LT) - deferred taxes and investment tax credit (item TXDITC) + preferred stock (if available item PSTKL, otherwise item PSTKRV, otherwise item PSTK) + common shares outstanding (item CSHO) * stock price (item PRCC_F).
Market-to-Book	Market Value / Total Assets.
Overleveraged Firm	1, if firm-year observation belongs to the fourth leverage deficit quartile, else 0.
R&D Dummy	1, if CCM reports positive research and development expense (item XSGA), else 0.
R&D/TA	Research and development expense (item XRD) / Total Assets.
Sales	Natural logarithm of net sales (item SALE), inflation-adjusted to the base year 1990.
Selling Exp./Sales	Selling, general and administrative expense (item XSGA) / sales (item SALE).
Stock Return	Annual stock return calculated with the closing price of the company (item PRCC_F).
Tangible Assets/TA	Net property, plant and equipment (item PPENT) / Total Assets.
Total Assets	Total assets and liabilities of a company (item AT).
Underleveraged Firm	1, if firm-year observation belongs to the first leverage deficit quartile, else 0.

Data retrieved from the CRSP/Compustat Merged (CCM) annual database.

Appendix: Variable Definition - continued

Panel B: Deal Characteristics	
Variable	Definition
All Acquisitions	All domestic acquisitions provided by the SDC's M&A database as merger, acquisition of majority interest, acquisition of assets, or acquisition of certain assets.
All Cash	1, if the consideration structure is cash only, else 0.
All Stock	1, if the consideration structure is stock only, else 0.
Combo	1, if All Cash & All Stock = 0, else 0.
Firm Acquisition	All domestic acquisitions provided by the SDC's M&A database as merger or acquisition of majority interest.
Private Target	1, if the target public status is private, else 0.
Public Target	1, if the target public status is public, else 0.

Data retrieved from the Securities Data Corporation's (SDC) M&A database.