Capital Structure in the Context of M&A: Target Leverage and the Post-Acquisition Speed of Adjustment

Lisa Sophie Marquordt
(152421165)

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professor Diana Bonfim

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Abstract

Mergers and acquisitions (M&As) often significantly alter a company's capital structure, leading to changes in the optimal leverage ratio for each firm. Previous research has shown that firms generally have leverage targets and attempt to return to their optimal capital structure following an acquisition. However, there is still debate over the speed at which this adjustment occurs. This paper aims to examine the impact of both the acquiring and target firms on the post-acquisition speed of adjustment (SOA) toward the optimal leverage ratio. The study calculates the target leverage for a sample of majority acquisitions in the US between 1994 and 2014 and divides the sample into four subsamples based on the leverage deviation of the acquiring and target firms. The results show that the SOA varies among the subsamples, with faster adjustment for overleveraged acquirers and slower adjustment for underleveraged acquirers. The study also finds that the SOA is higher for overleveraged firms acquiring underleveraged target firms and lower for underleveraged firms acquiring underleveraged targets. The findings suggest that underleveraged firms that are acquired by overleveraged firms may benefit from improved access to capital markets, while underleveraged firms acquired by underleveraged firms may not experience a substantial decrease in the cost of debt and therefore have a lower SOA. Overall, the results indicate that firms manage their capital structure differently depending on their own and their target's leverage deviation and highlight the importance of considering both firms in capital structure analysis in the context of mergers and acquisitions.

Keywords: mergers and acquisitions, capital structure, target leverage, speed of adjustment (SOA), acquiring firms, target firms

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Resumo

As fusões e aquisições (M&A) podem afetar a estrutura de capital das empresas, o que pode levar a mudanças na sua alavancagem ótima. Estudos anteriores sugerem que as empresas geralmente têm metas de alavancagem e tentam voltar ao seu capital ótimo depois de uma aquisição. Este estudo examina o impacto nas empresas adquirentes e alvo da velocidade de ajuste pós-aquisição (SOA) em direção à alavancagem ótima. É calculada a alavancagem alvo para uma amostra de aquisições maioritárias nos EUA entre 1994 e 2014 e divide-se a amostra em quatro subgrupos com base no desvio da alavancagem das empresas adquirentes e alvo. Os resultados mostram que a SOA varia entre subgrupos, com um ajuste mais rápido para compradores com excesso de alavancagem e um ajuste mais lento para compradores com déficit de alavancagem. O estudo também conclui que a SOA é mais alta para empresas com excesso de alavancagem que adquirem empresas alvo com falta de alavancagem e mais baixa para empresas com falta de alavancagem que adquirem empresas alvo com falta de alavancagem. Estes resultados sugerem que as empresas com sobrealavancagem adquiridas por empresas com sobrealavancagem podem ter melhor acesso aos mercados de capital, enquanto as empresas com subalavancagem adquiridas por empresas com subalavancagem podem não sofrer uma queda significativa no custo da dívida e, portanto, ter uma SOA mais baixa. Em geral, os resultados indicam que as empresas gerenciam sua estrutura de capital de forma diferente, dependendo da sua própria e do desvio de alavancagem de seu alvo.

Palavras-chave: fusões e aquisições, estrutura de capital, alavancagem alvo, velocidade de ajustamento (SOA), empresas adquirentes, empresas alvo

Título: Estrutura de Capital no Contexto de F&A: Alavancagem do alvo e a velocidade de ajustamento pós-aquisição

Autora: Lisa Sophie Marquordt

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Abbreviations

Abbreviation	Description
A	Acquirer
BDR	Book Debt Ratio
BV	Book Value
CEO	Chief Executive Officer
CF	Cash Flow
COGS	Cost of goods sold
CPI	Consumer Price Index
DEP	Depreciation
DUM	Dummy Variable
EBIT	Earnings Before Interest and Taxes
LBO	Leveraged Buyout
Ln	Natural Logarithm
M&A	Mergers and Acquisitions
MB	Market to Book Ratio
MDR	Market Debt Ratio
MV	Market Value
OLS	Ordinary Least Squares
OO	Acquiror – Overleveraged, Target – Overleveraged
OU	Acquiror – Overleveraged, Target – Underleveraged
OverLev	Overleveraged
PP&E	Property, Plant and Equipment
R&D	Research & Development (also R&D)
SG&A	Selling and Administrative Expenses
SIC	Standard Industry Code
SOA	Speed of Adjustment
T	Target
TA	Total Assets
UnderLev	Underleveraged
UO	Acquiror – Underleveraged, Target – Overleveraged
US	United States of America
UU	Acquiror – Underleveraged, Target – Underleveraged

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1. Introduction

The concept of target leverage describes the optimal level of debt that a firm should carry to maximize its value. Balancing the costs and benefits of debt is important because excessive leverage can lead to financial distress and bankruptcy, while too little leverage can result in missed opportunities for growth and value creation.

Surveying CEOs about capital structure decisions, Graham and Harvey (2001) found that 81% of firms have a target debt ratio or a target debt range. Having an optimal target leverage allows firms to better manage their capital structure and optimize their cost of capital. However, it is important for firms to regularly review and adjust their leverage targets and absolute leverage as circumstances and goals change, to ensure the target leverage remains appropriate and beneficial. Determining the optimal capital structure is based on several factors depending on the individual circumstances of each firm that affect the mix of debt and equity that the firm uses to finance its operations and investments.

Much of past research on capital structure has focused on the determinants and factors influencing capital structure decisions (Fama & French, 2002; Frank & Goyal, 2003; Hovakimian et al., 2001; Lemmon et al., 2008; Rajan & Zingales, 1995). Common findings on the determinants of capital structure include firm characteristics such as profitability, investment and growth opportunities, firm size, the proportion of tangible and intangible assets, and research and development expenses which change over time as the firm progresses and management makes different decisions. This leads to deviations from the optimal capital structure which are costly for firms. Thus, firms that have a target leverage will try to adjust their capital structure, which is costly as well. The speed of adjustment (SOA) measures the balance between the costs of deviating from the optimal capital structure and the costs of capital structure adjustments.

One example of events influencing capital structure decisions are mergers and acquisitions (M&A). When a firm acquires another firm, it typically takes on the target firm's debt, which will likely increase the overall level of debt. This can change the ratio of debt to equity and the firm`s cost of capital and risk profile. After a firm transaction, acquirers need to adjust their capital structure and set a new optimal leverage target that considers the acquired firm. Firms that target a certain leverage ratio will want to offset the effect of the acquisition on their capital structure and adjust toward the optimal leverage. Mergers and acquisitions can supply target and acquiring firms alike with additional resources and expertise to adjust to changes in the market and industry. Especially target firms can benefit from easier access to capital markets

through their acquirer, allowing for more financial flexibility, and the possibility of decreasing the cost of capital structure adjustments. Therefore, the SOA toward the optimal leverage ratio varies for each firm after a transaction.

Previous research has focused on either acquiring or target firms in studying the SOA after firm transactions. But as targets and their acquirers make capital structure decisions individually before an acquisition and jointly after it, both should be studied when researching the SOA in the context of M&A. Deviations from the optimal target leverage have been found to influence the SOA, with overleveraged firms adjusting faster than underleveraged firms, for example (Flannery et al., 2022; Harford et al., 2009).

Thus, this paper studies acquiring and target firms that were part of a majority acquisition in the US between 1995 and 2014 to determine their target leverage and the SOA after the transaction. Firms are sorted into four groups based on their leverage deviation in the year before the acquisition. Following Flannery and Rangan (2006), a partial adjustment model is then used to determine the SOA for the whole sample and each of the four subsamples.

While firms seem to have a target leverage, only profitability and depreciation are determinants of leverage for the full sample and all of the subsamples. Additionally, the adjustment speeds found for the whole sample and the four subsamples are substantially higher than what previous literature has found (e.g. Elsas & Florysiak, 2011; Lemmon et al., 2008). The SOA of 71.78% implies that firms adjust toward their target leverage in less than one year after the acquisition. The adjustment speeds for the four subsamples are higher (lower) for subsamples with overleveraged (underleveraged) acquirers. Additionally, the subsample of overleveraged acquirers and underleveraged targets has the highest SOA, while the subsample of underleveraged acquirers and targets has the lowest SOA. Because the adjustment speeds found in this paper differ from the findings of previous studies, robustness checks were conducted. The high SOA can in part be explained by the exclusion of an independent variable measuring fixed assets due to missing data and the inclusion of fixed effects. Although the model seems to fit subsamples with underleveraged acquirers and the whole sample well, it could be improved by controlling for the industry and the type of payment.

The paper is structured as follows: Chapter 2 will give an overview of previous literature and findings. Chapter 3 explains the data, chapter 4 the methodology used, and chapter 5 presents and discusses the results. Following the analysis of the results, chapter 6 discusses robustness checks. Lastly, chapter 7 discusses limitations and further research, and chapter 8 concludes.

2. Literature Review

In the field of empirical corporate finance, a vast amount of research has been focused on the capital structure of firms, which varies greatly across firms, across industries, and within firms across time. The determinants of capital structure have been the subject of extensive research. Firm characteristics such as size and age, profitability, asset tangibility, the ratio of market assets to book assets, risk of bankruptcy, volatility of earnings, research and development activity, dividend payments, the marginal tax rate, and leases among others have been studied as the main determinants of capital structure.

Besides the given characteristics of firms, two main theories seek to explain capital structure decisions. First, the pecking order theory by Myers and Majluf (1984) states that information asymmetries increase the cost of financing, and thus, firms follow a financing hierarchy, preferring internal over external funds and only issuing equity as a last resort. Second, Modigliani and Miller's (1958) irrelevance proposition states that in the presence of perfect markets, the capital structure does not affect firm value, and thus, firms should be indifferent regarding their level of leverage. Building on this theory but along with taking the cost and benefit of equity and debt financing into consideration, according to the static trade-off theory, a firm determines its capital structure by balancing the costs of financial distress and agency conflicts with the benefits of the tax shield of debt. The dynamic trade-off theory on the other hand places greater importance on market imperfections by considering deviations from the target leverage ratios with a reversion back to the optimal capital structure.

To evaluate whether firms do have target leverage ratios, many studies have looked at the SOA towards target debt levels after deviations have occurred. These deviations from target capital structures can be either caused by shock to firms' cash flows and stock prices throughout time or by management decisions. Rajan and Zingales (1995) and Titman and Wessels (1988), among others, have found a negative relationship between firm profitability and leverage ratios, which holds for different measurements of both variables. Similarly, Welch (2004) found a negative relation between stock returns and leverage. Both, higher profitability, and higher stock returns increase the denominator of debt ratios and thus decrease leverage levels, resulting in shifts away from the optimal leverage ratio.

Besides shocks to the firms' financials, management decisions influence capital structure as well. In theory, managers should act in the interest of shareholders and seek to maximize total firm or equity value. This is supported by research on market timing, which found that managers like to issue equity when they believe their stock is overvalued to take advantage of market

mispricing (e.g. Baker & Wurgler, 2002). But agency conflicts can influence capital structure decisions due to the different interests of creditors and shareholders which ultimately affect the capital structure.

If firms do have target capital structures, deviations from target leverage ratios should be reversed. Following this intuition, many studies have looked at the SOA after changes in firms' capital structure have occurred. In line with the trade-off theory, the SOA balances adjustment costs with the cost of deviations from the optimal capital ratio.

As the results from these studies vary greatly, the concept of target capital structure and reversion is subject to criticism. On the one hand, research has found slow adjustment speeds, questioning if firms and their management actively adjust their capital structure towards a target ratio. Taking partial adjustment into consideration, Huang and Ritter (2005) find that firms do adjust toward target leverage ratios, but very slowly at less than 12% yearly (Huang & Ritter, 2005, Table 7), as the effect of security issues on capital structure is persistent. Using OLS estimation models without fixed effects, Kayhan and Titman (2007, Table 4) and Fama and French (2002, Table 4) also conclude that the SOA toward target leverage is slow at 10% and 7–17% respectively. Even more drastically, Iliev and Welch (2010) suggest that firms' leverage ratios are reverting towards the mean and not a target leverage ratio at SOAs below zero. But in a later study, Huang & Ritter (2009) find a slightly faster SOA of 17–23.3% (Table 8) by using a long differencing estimator. Lemmon et al. (2008) compare different methods and find that while target leverage is time-invariant, their results are similar to previous studies. Using pooled OLS, the SOA is around 13–17% for their sample, similar to Fama and French (2002). But by including firm fixed effects in their regressions, they find faster adjustment speeds toward target leverage of 36 – 39%. This is in line with Flannery and Rangan (2006), who use a mean differencing estimator and find adjustment speeds around 34.4%. In support of faster adjustment speeds, Elsas and Florysiak (2011) also find higher rates around 26 – 27%. While the results of studies on adjustment speeds vary, most have found similar results within their studies comparing the SOA of book and market leverage. For example, Kayhan and Titman (2007) observe a difference of 0.38 percentage points in adjustment speeds between market (10.22%) and book (10.6%) leverage, Elsas and Florysiak (2011) find SOAs of 27% and 26% respectively, and Flannery and Rangan (2006) 35.5% and 34.2% correspondingly.

Some studies observing low adjustment speeds argue that in the presence of financial constraints it is too costly for firms to adjust toward target leverage ratios quickly. Firm transactions in the form of mergers and acquisitions can lower financial constraints and improve access to capital, resulting in faster adjustment toward target leverage. Especially target firms

can improve their financing through acquisitions by gaining easier access to capital markets as part of a bigger organization. Analyzing a sample of European target firms, Erel et al. (2015) observe that following an acquisition, targets decrease their cash holdings and increase the number of investments, indicating a reduction in financial constraints.

Following this, more recent studies have looked at leverage ratios and the SOA in the context of M&A. Flannery et al. (2022) study a sample of European target firms pre- and post-acquisition. They compute target leverage and determine over- and underleveraged firms, finding that firms with deviations from their target capital structure – especially overleveraged firms – have a higher probability of being acquired. This can be explained by a reduction in financial frictions through acquisitions, supporting findings from Erel et al. (2015). Flannery et al. (2022) find that after acquisitions, target firms quickly move towards their optimal leverage ratio, with overleveraged firms closing deviations by year three and underleveraged firms a little later. Examining acquiring firms, Uysal (2011) studied how a firm's leverage deficit affects acquisitions in terms of transaction likelihood, method of payment, and premiums paid for targets. Firms with a higher leverage deficit are less likely to make an acquisition, especially overleveraged firms. They also pay lower premiums and pay less with cash. Harford et al. (2009) also study the method of payment in acquisitions dependent on deviations from the leverage target and show that over-leveraged bidders are more likely to pay with equity rather than debt. These cash transactions increase leverage, but overleveraged bidders reduce this effect by more than 75% within 5 years after the transaction.

Overall, most research seems to confirm the existence of leverage targets, although no consensus has been reached regarding the SOA after deviations from the optimal capital structure.

Firm acquisitions and mergers present an interesting opportunity to study the concept of target leverage and adjustment speeds, due to the sudden changes in leverage, affecting the leverage ratios of acquirers and targets alike. This is relevant as tools like LBOs (leveraged buyouts) are frequently used in firm transactions. But past research on M&A and target leverage has mostly focused on either target or acquiring firms. Although target firms have been the subject of fewer studies than acquiring firms, researchers have found different adjustment speeds and behaviors for over- and underleveraged firms. Analyzing the leverage deviation of targets and acquirers allows the study the determinants of the SOA and the effect of the leverage deviation regarding the SOA. Therefore, this study is looking at both, target and acquiring firms.

3. Data

The sample was constructed from all firm transactions in the US that were effective between 1994 and 2014 that are included in the Refinitiv Eikon Dealscreener data. The sample includes all completed deals where a majority stake (>50%) in the target was acquired to ensure the balance sheets of the acquirer and target are consolidated after the transaction. The time frame was chosen to ensure a period of five years of data before and after the transaction, to calculate the target leverage before, and the SOA after the acquisition.

Accounting data for acquiring as well as target firms were retrieved from Compustat Industrial Annual – Capital IQ, which limits the sample to public firms in the US, excluding cross-border deals. Following the majority of papers in the field of corporate finance, financial firms (SIC 6000-6999) and regulated utilities (SIC 4900-4999) were excluded due to special factors like high leverage and connections to the state that could distort the analysis. Because the calculation of the target leverage includes lagged variables, firms with less than two consecutive years of data were also excluded from the sample. Annual observations are based on fiscal years rather than calendar years to ensure coherent data.

To model the target debt ratio, the approach of Flannery and Rangan (2006) is followed, who use a set of firm characteristics ($X_{i,t}$) that are widely used in capital structure research. The computations for these variables and their expected effect on leverage are described in Table 1. Variables are calculated as ratios of total assets to make them comparable across firms. The only variable with nominal values is the natural logarithm of total assets which is displayed in 1989 dollars.

Table 2 shows summary statistics for the whole sample; acquirer and target firms. The median book debt ratio (BDR) for the whole sample is 21.8%. For the whole sample, the median EBIT is 7.7% of total assets. Target firms have a lower EBIT over total assets of 6.7%. This is in accordance with the matter that target firms are usually smaller and younger than their acquirers. They are still building their business and therefore not as profiTable as their acquirer counterparts, who have a higher median EBIT of 8.2%. The median market-to-book ratio is 1.3 for the whole sample, with a slightly lower ratio for targets and a slightly higher ratio for acquirers. This is not surprising as acquirers are buying a majority in target firms, thus making use of their higher investment opportunities. Depreciation expenses make up 4.1% of total assets for all firms, with higher depreciation expenses for targets and lower depreciation expenses for acquirers. This is in line with the lower EBIT of target firms, as depreciation can be deducted from revenues as an expense. The natural logarithm of total assets is below the

whole sample for target firms and above for acquirers. As acquirers buy a majority stake in the target firms, it is not surprising that they are bigger in terms of total assets than the firms they acquire. R&D expenses are 1.2% of total assets for the whole sample and target firms and 1.1% for acquirers.

Table 1 – Independent Variables
Vector $X_{i,t}$ of firm characteristics at time *t* for firm i and their expected correlation with the leverage ratio of firm i.

Variable	Calculation	Description/ Effect on Leverage
EBIT_TA	EBIT (Compustat items [18]+[15]+ [16]) / total assets (Compustat item [6])	Profitability in terms of earnings per asset dollar impacts leverage as high retained earnings could be used to decrease leverage and high leverage could indicate a firm's ability to meet debt payments out of the firm's positive cash flow.
MB	Book liabilities (Compustat items [9]+[34]+[10]) + market value of equity (Compustat items [199]*[25])) / total assets (Compustat item [6])	A high market-to-book ratio of assets indicates larger future growth opportunities that the firm seeks to protect by limiting leverage, thus indicating a negative relationship between MB and leverage.
DEP_TA	Depreciation (Compustat item [14]) / total assets (Compustat item [6])	Higher depreciation is an indicator of higher fixed assets, which can be used as collateral for debt, thus contributing to higher leverage.
LnTA	Ln ((Compustat item [6]*1,000,000) / CPI[1] in 1989)	Larger firms tend to have higher sales and thus can hold more debt due to better access to external capital that comes with greater diversification. Thus, firm size is expected to be positively related to leverage.
R&D_TA	R&D expenses (Compustat item [46]) / total assets (Compustat item [6])	Firms with higher research and development expenses are expected to have more intangible assets and higher growth opportunities. This reduces the debt capacity of firms, resulting in lower leverage.
R&D_DUM	Variable = 1 if a firm did not report R&D expenses	33% of the sample did not report R&D expenses.

[1] The Consumer Price Index in 1989 was 124 (*Consumer Price Index, 1913- | Federal Reserve Bank of Minneapolis*).

Lastly, the variable of interest, the median BDR is 21.8% for the whole sample. As target firms are expected to be younger, smaller, and have a lower EBIT to repay debt they have a lower BDR of 18.3%. In contrast, acquiring firms have a higher median BDR of 23.3%.

Table 2 – Summary Statistics (whole sample, target, acquirer)
The sample includes all Compustat firms that were either targets or acquirers in a majority acquisition between 1995 and 2014 with complete data for two or more consecutive years between 1990 and 2019. In total, the sample consists of 2,150 firms and 14,872 firm years. Panel A shows statistics for the whole sample, panel B for target firms only, and panel C for acquirer firms only. All variables are winsorized at the 1st and 99th percentiles.

	Mean	Median	Std. Dev.	Min	Max	N
Panel A: whole sample						
BDR	0.250	0.218	0.224	0	1.196	24100
EBIT_TA	0.025	0.077	0.237	-1.530	0.378	23717
MB	1.809	1.300	1.645	0.348	11.712	24029
DEP_TA	0.048	0.041	0.035	0.003	0.234	24085
lnTA	15.370	15.380	2.297	9.548	20.382	24135
RD_TA	0.058	0.012	0.106	0	0.734	24135
RD_DUM	0.333	0	0.471	0	1	24175
Panel B: Target firms						
BDR	0.234	0.183	0.242	0	1.196	9258
EBIT_TA	-0.006	0.067	0.281	-1.530	0.378	9055
MB	1.872	1.272	1.821	0.348	11.712	9220
DEP_TA	0.051	0.043	0.038	0.003	0.234	9246
lnTA	14.124	14.030	1.987	9.548	20.382	9279
RD_TA	0.072	0.012	0.126	0	0.734	9279
RD_DUM	0.349	0	0.477	0	1	9303
Panel C: Acquirer firms						
BDR	0.260	0.233	0.212	0	1.196	14842
EBIT_TA	0.045	0.082	0.203	-1.530	0.378	14662
MB	1.770	1.318	1.525	0.348	11.712	14809
DEP_TA	0.047	0.039	0.032	0.003	0.234	14839
lnTA	16.148	16.240	2.129	9.548	20.382	14856
RD_TA	0.049	0.011	0.090	0	0.734	14856
RD_DUM	0.323	0	0.468	0	1	14872

4. Methodology

Based on previous studies, firms should not revert to their mean leverage but rather toward a target leverage. This should hold for different leverage deviations of target firms and their acquirers. Additionally, previous research (Erel et al., 2015; Flannery et al., 2022; Harford et al., 2009; Uysal, 2011) suggested that firms – acquirers and targets alike – have different adjustment speeds based on their absolute leverage and the leverage deviation before the acquisition. Thus, different combinations of targets and acquirers should influence the SOA. Given the different findings on the leverage deviation and the speed of adjustment for target and acquiring firms, this paper aims to analyze target and acquiring firms together. How does the pre-acquisition leverage deviation of target and acquiring firms impact the post-acquisition SOA? And how does the SOA toward the target leverage post-acquisition differ for various combinations of over- and underleveraged firms following a strategic acquisition?

To investigate the impact of target and firm leverage before the acquisition on the SOA after the acquisition the methodology of Flannery and Rangan (2006) is followed to first compute the target leverage and then the SOA. Their model allows for time-varying target debt ratios for each firm as it depends on firm characteristics as explanatory variables. Additionally, the model recognizes that firms might not close leverage deviations quickly and thus incorporates partial adjustment toward target leverage.

4.1. Target Leverage

To evaluate the firm's explicit effort to move toward a target leverage and to minimize the impact of market fluctuations, book values are used to measure leverage. The book debt ratio is calculated by dividing the sum of the long-term and short-term debt (Compustat items 9 and 34, respectively) by the total assets (Compustat item 6) of each firm *i* at time *t*.

$$BDR_{i,t} = \frac{long\ term\ debt_{i,t} + short\ term\ debt_{i,t}}{total\ assets_{i,t}} \quad (1)$$

As the target debt ratio might vary across firms and across time, Flannery and Rangan (2006) model the target leverage as,

$$BDR^{*}_{i,t+1} = \beta X_{i,t} \quad (2)$$

where $BDR^{*}_{i,t+1}$ is the targeted debt ratio of firm *i* at *t+1*, which is determined by $X_{i,t}$, a vector of firm characteristics (see Table 1) in the previous year *t*.

To account for the difference in leverage adjustments before and after the mergers, the target leverage is computed using available data for each firm in the years before the merger was completed. The year of the merger (year 0) is excluded from the analysis for two reasons. First, many acquiring companies consolidate the financial reporting only from the date of the merger (purchase accounting method). Thus, accounting measures for the year of the merger cannot be compared across firms or industries. Second, firms incur one-time merger costs in the year of the merger, further complicating comparisons with other years (Healy et al., 1992).

After predicting the target leverage for each firm *i*, at time *t*, the leverage deviation *LevDev* of firm *i* in the year before the acquisition is computed by calculating the difference between the actual book debt ratio $BDR_{i,t}$, and the predicted target debt ratio $BDR^{*}_{i,t}$ of firm *i* in the year before the merger.

$$LevDev_{i,t} = BDR_{i,t} - BDR^{*}_{i,t} \quad (3)$$

A firm is overleveraged if the leverage deviation is positive, and underleveraged if it is negative. Target and bidder firms are then sorted into four subsamples based on their leverage deviation in the year before the acquisition to analyze the impact of both target and bidder leverage on the SOA and post-transaction profitability. OO contains overleveraged acquirers and targets, OU overleveraged acquirers and underleveraged targets, UU underleveraged acquirers and targets, and UO underleveraged acquirers and overleveraged targets (see Table 3).

Table 3 – Subsamples
Four groups are formed based on the acquirer's and target's leverage deviation.

OO Acquirer – Overleveraged Target – Overleveraged	*OU* Acquirer – Overleveraged Target – Underleveraged
UU Acquirer – Underleveraged Target – Underleveraged	*UO* Acquirer – Underleveraged Target – Overleveraged

4.2. Partial Adjustment to Target Leverage

One assumption of the dynamic tradeoff theory is the presence of market imperfections like adjustment costs of leverage, which may prevent firms from immediately reverting to their target leverage after changes in the capital structure. The SOA is a measure of the tradeoff between adjustment costs and the cost of deviating from optimal leverage. Flannery and Rangan (2006) used a (partial) adjustment model to find the firm's adjustment speed toward its target leverage within each period, in this case, years. Following their methodology, the standard partial adjustment model is given by

$$BDR_{i,t+1} - BDR_{i,t} = \lambda \left(BDR^{*}_{i,t+1} - BDR_{i,t}\right) + \delta_{i,t+1} \,, \qquad (4)$$

where λ denotes the proportion of the gap between the actual and target leverage a typical firm closes each year. Substituting (2) into (4) and rearranging gives

$$BDR_{i,t+1} = (\lambda\beta)\, X_{i,t} + (1-\lambda) BDR_{i,t} + \delta_{i,t+1} \,. \qquad (5)$$

Equation (5) implies that firms actively take action to move toward their target leverage [2]. "The specification further implies that

(1) The firm's actual debt ratio eventually converges to its target debt ratio, $\beta X_{i,t}$.
(2) The long-run impact of $X_{i,t}$ on the capital ratio is given by its estimated coefficient, divided by λ.
(3) All firms have the same adjustment speed (λ)" (Flannery & Rangan, 2006, p. 427).

5. Results and Discussion

5.1. Target Leverage and Leverage Deviation

For the analysis of the impact of the target and acquirer firms' leverage on the SOA, the target leverage was computed for all firms. The results for the whole sample (Table 4, column (1)) confirm the expected effect of $X_{i,t}$ on leverage. Nevertheless, only the profitability measure EBIT and depreciation expenses are significant for the whole sample. The scaled EBIT is as expected negatively related to leverage indicating that firms use earnings to pay down debt, reducing leverage. Scaled depreciation on the other hand is positively related to the target

[2] In contrast, the MDR reflects actions taken by managers and changes in the firm's stock price (Flannery & Rangan, 2006).

leverage, indicating that firms with higher depreciation expenses have higher fixed assets which can be used as collateral increasing target leverage.

Columns (2) and (3) of Table 4 show the results for target and acquiring firms respectively. Both the scaled EBIT and depreciation are significant, having the same relationship with target leverage as in the whole sample. Thus, while the regression results seem to confirm the existence of a target leverage, only profitability and depreciation are determinants of leverage for firms in all samples.

While EBIT and depreciation have the same relationship with leverage as in the whole sample in column (1), the effect is lower for target firms and higher for acquiring firms. This means that a higher EBIT is accompanied by lower target leverage for acquirers than for target firms, suggesting that acquirers are better at paying off debt with retained earnings. This could be due to the higher profitability of acquirers compared to target firms (see Table 2). Similarly, higher depreciation expenses are associated with higher target leverage for acquiring firms than for targets.

Besides EBIT and depreciation, the natural logarithm of total assets as a measure of firm size is significant and positive for both subsamples (Table 4, columns (2) and (3)). As expected, the variable is positively correlated with target leverage. This suggests that due to their size, creditworthiness, and reputation, larger businesses may be able to borrow money at lower interest rates and have access to more funding options, such as credit and loans, which results in a higher target leverage. The firm size has more importance for the optimal leverage of target firms and less importance for acquiring firms. As target firms are smaller than acquiring firms (see Table 2), a 1% increase in total assets could be more impactful in determining the optimal leverage for target firms that are still actively growing and might need more capital than for acquiring firms that are bigger and more mature.

Only acquiring firms have a significant coefficient for R&D expenses, which are negatively correlated with target leverage. As acquiring firms are expected to be more mature than target firms with established business models, the negative coefficient for R&D expenses indicates that firms with a line of business which is more research-intensive have higher intangible and fewer tangible assets, which reduces the target leverage ratio.

Overall, the regression model to determine target leverage seems to fit the subsample of acquiring firms best as almost all chosen variables are significant although at different levels. Besides this, the model seems to fit target firms better than the sample of all firms. Nevertheless,

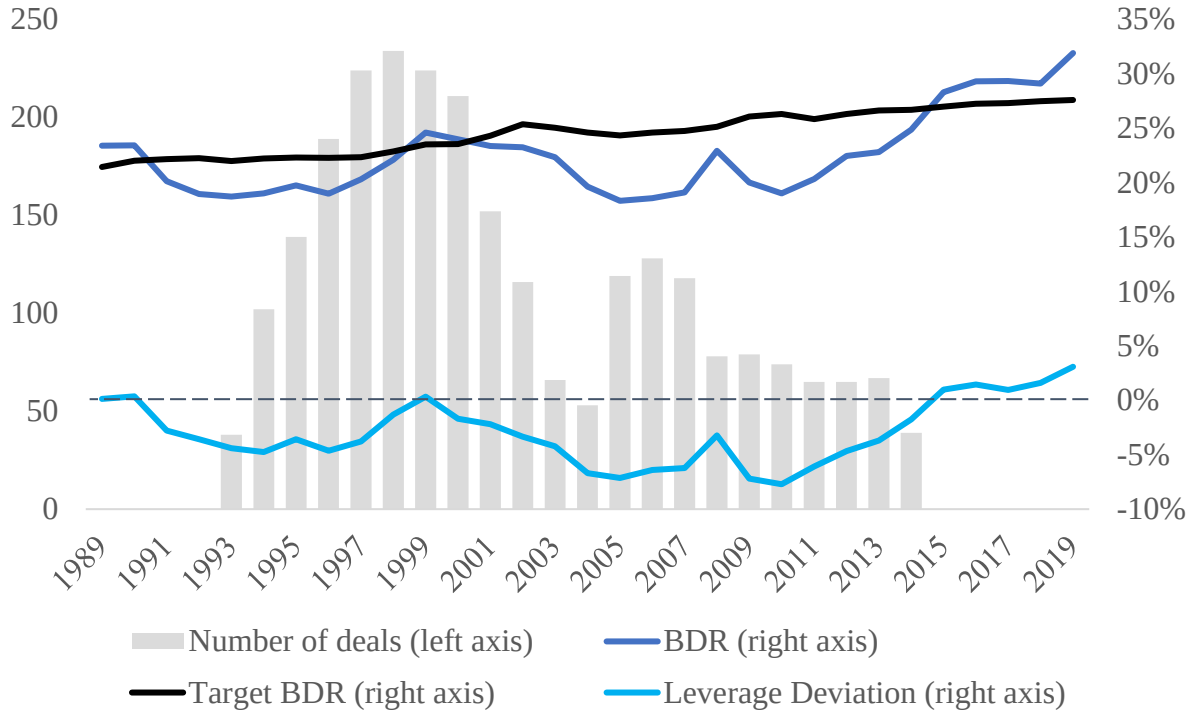
the regression results confirm that firms in this sample have a target leverage which lays the foundation for the analysis of the SOA in the following chapter.

Table 4 – Target Leverage
Estimation of the target leverage ($BDR^{*}_{i,t+1}$) using a set of lagged firm characteristics ($X_{i,t}$) (see Table 2). The sample includes 1,292 target and 772 acquirer firms, 2,064 firms in total. ***, **, and * denote significance at the 1%, 5%, and 10% levels respectively, and standard errors are presented in parenthesis below.

	(1)	(2)	(3)
	Whole sample	Target firms	Acquirer firms
EBIT_TA	-0.0859 ***	-0.0762 ***	-0.1063 ***
	(-4.85)	*(-3.53)*	*(-3.56)*
MB	-0.0026	-0.0017	-0.0031
	(-1.56)	*(-0.73)*	*(-1.32)*
DEP_TA	0.5638 ***	0.5443 ***	0.6080 ***
	(4.34)	*(3.19)*	*(3.14)*
lnTA	0.0172	0.0232 ***	0.0119 ***
	(5.14)	*(4.1)*	*(3)*
RD_TA	-0.0167	0.0675	-0.1649 *
	(-0.29)	*(0.95)*	*(-1.75)*
RD_DUM	0.0198	-0.0016	0.0387 *
	(1.36)	*(-0.08)*	*(1.83)*
Constant	-0.0456	-0.1205	0.0292
	(-0.88)	*(-1.45)*	*(0.44)*
FE	Yes	Yes	Yes
N (companies)	2064	1292	772
N (observations)	16,375	8,885	7,490
R-sq (within)	0.032	0.034	0.036

Based on the absolute and the target leverage, the leverage deviation for all firms in the sample was computed (see equation (3)). Over the analyzed period, the yearly median actual leverage and median target leverage vary greatly but exhibit an overall increase over the years as seen in Figure 1. The actual yearly median BDR is the lowest at 18.3% in 2005 and reaches a maximum at the end of the sample in 2019 (31.9%). As expected, the predicted BDR is less volatile with the lowest value in 1989 (21.4%) and the highest value in 2019 (27.6%). As the actual leverage varies more greatly than the predicted leverage, the median leverage deviation varies similarly to the actual leverage (see Figure 1), with its minimum in 2010 (-7.7%) and maximum in 2019 (3.1%). In almost three-quarters of the years, the median firm is underleveraged, with the target leverage ratio exceeding the actual leverage ratio.

Figure 1 – BDR, Target BDR, Leverage Deviation and Number of M&A Deals between 1989 and 2019
Number of M&A deals, median BDR, median target BDR and the median leverage deviation from 1989 to 2019.



The actual leverage ratio peaked at the height of the dot com bubble in 1999 and with it, the leverage deviation decreased to almost 0%. After the crisis in the early 2000s, the leverage deviation increased again until the financial crisis in 2008, when the leverage peaked, and the leverage deviation dropped below -4% for the first time in years. After the financial crisis, leverage quickly dropped back down but has almost continuously increased since 2010 which could be due to the low-interest rates in the US after the financial crisis in 2009. Due to the rise in leverage, the on average underleveraged firms became overleveraged in 2015 which lasts until the end of the sample period in 2019. The number of M&A deals in the sample peaked in 1998 and was substantially lower after 2000, staying at a mostly constant level from 2008 to 2013.

After determining the target leverage and leverage deviation, 1,143 firms are underleveraged and 782 are overleveraged in the year before the acquisition. Based on the leverage deviation, firms were sorted into four subsamples as described in section 2.

The distribution of firms is as follows:

- **OO:** 104 firms (Acquiror – Overleveraged, Target – Overleveraged)
- **OU:** 75 firms (Acquiror – Overleveraged, Target – Underleveraged)
- **UU:** 193 firms (Acquiror – Underleveraged, Target – Underleveraged)
- **UO:** 101 firms (Acquiror – Underleveraged, Target – Overleveraged).

Previous research has found that acquiring firms are less likely to make an acquisition if they are overleveraged (Uysal, 2011). Additionally, target firms have a higher probability of being acquired if they are overleveraged (Flannery et al., 2022). Thus, UO should be the largest subsample, and OU should have the smallest sample size. While UU is the largest with 193 firms in the sample, OU as expected is the smallest subsample with 75 firms.

Table 5 shows summary statistics for the whole sample and each subsample. OO, OU, and UO have a higher median BDR than the whole sample. While UO has a higher BDR, the difference is more pronounced for OO and OU, where the acquirer is overleveraged. Both subsamples also have a lower median EBIT scaled by total assets, while UU and UO have a higher median EBIT. In support of the higher BDR, OO, OU, and UO have a lower median market-to-book ratio and UU has a higher market-to-book ratio than the whole sample. Median scaled depreciation is lower than the whole sample for OO and OU, while UU is only slightly lower, and UO is slightly higher.

The natural logarithm of total assets as a measure of firm size is quite similar for all subsamples and the whole sample. OO, OU, and UO are larger than the whole sample, but by less than one percentage point, while OU is marginally smaller. Lastly, most firms in OO (67%) and UO (53%) either did not report R&D expenses or reported them as zero, thus the median scaled R&D expenses for these subsamples are zero, and mean values are below the whole sample. OU has median and mean R&D expenses below the whole sample, and UU is above the whole sample. This again supports the lower BDR of UU compared to the whole sample and the other subsamples, as higher R&D expenses indicate more intangible assets and more intellectual property which is more difficult to use as collateral than fixed assets, thus being negatively related to leverage. Overall, the BDR of OO and OU is higher than the BDR of UU and UO. In combination with the fact that acquirers are bigger than targets, this suggests that the leverage deviation of the acquirer has a greater effect than the leverage deviation of the target in determining the leverage deviation of the respective subsample.

Table 5 – Summary Statistics by Sample

Panel A shows statistics for the whole sample, panel B for OO (overleveraged acquirer and target), panel C for OU (overleveraged acquirer and underleveraged target), panel D for UU (underleveraged acquirer and target), and panel E for UO (underleveraged acquirer and overleveraged target). All variables are winsorized at the 1st and 99th percentiles.

	Mean	Median	Std. Dev.	Min	Max	N
Panel A: whole sample						
BDR	0.250	0.218	0.224	0	1.196	24100
EBIT_TA	0.025	0.077	0.237	-1.530	0.378	23717
MB	1.809	1.300	1.645	0.348	11.712	24029
DEP_TA	0.048	0.041	0.035	0.003	0.234	24085
lnTA	15.370	15.380	2.297	9.548	20.382	24135
RD_TA	0.058	0.012	0.106	0	0.734	24135
RD_DUM	0.333	0	0.471	0	1.000	24175
Panel B: OO						
BDR	0.398	0.374	0.226	0	1.196	2544
EBIT_TA	0.036	0.075	0.207	-1.530	0.378	2537
MB	1.476	1.138	1.248	0.348	11.712	2532
DEP_TA	0.047	0.038	0.036	0.003	0.234	2544
lnTA	15.835	15.912	2.289	9.548	20.382	2547
RD_TA	0.020	0	0.063	0	0.734	2547
RD_DUM	0.500	0	0.500	0	1	2553
Panel C: OU						
BDR	0.302	0.283	0.237	0	1.196	1894
EBIT_TA	0.022	0.073	0.233	-1.530	0.378	1870
MB	1.680	1.244	1.486	0.348	11.712	1891
DEP_TA	0.046	0.038	0.033	0.003	0.234	1894
lnTA	15.221	15.312	2.295	9.548	20.382	1895
RD_TA	0.053	0.007	0.108	0	0.734	1895
RD_DUM	0.352	0	0.478	0	1	1900
Panel D: UU						
BDR	0.178	0.157	0.167	0	1.196	5579
EBIT_TA	0.042	0.088	0.221	-1.530	0.378	5516
MB	1.864	1.429	1.537	0.348	11.712	5568
DEP_TA	0.047	0.040	0.035	0.003	0.234	5573
lnTA	15.631	15.696	2.343	9.548	20.382	5581
RD_TA	0.061	0.027	0.094	0	0.734	5581
RD_DUM	0.266	0	0.442	0	1	5583
Panel E: UO						
BDR	0.262	0.237	0.203	0	1.196	3080
EBIT_TA	0.044	0.086	0.225	-1.530	0.378	3054
MB	1.608	1.213	1.395	0.348	11.712	3069
DEP_TA	0.049	0.042	0.033	0.003	0.234	3081
lnTA	15.650	15.901	2.331	9.548	20.382	3084
RD_TA	0.032	0	0.078	0	0.734	3084
RD_DUM	0.378	0	0.485	0	1	3089

5.2. Speed of Adjustment (SOA)

After determining the leverage deviation and the distribution of the subsamples, the SOA for the whole sample and the four subsamples was computed (see Table 6). For the whole sample the SOA is 71.87%, which corresponds to an estimated half-life[3] of the full sample's leverage deviation of about half a year (0.55 years). The adjustment speeds for the four subsamples vary between 53.11% (UU) and 77.80% (OU) and are thus substantially higher than what previous literature has found. For example, fast adjustment speeds were found by Lemmon et al. (2008) who use a model with firm fixed effects resulting in a SOA of 36-39%, and by Elsas and Florysiak (2011), who found a SOA of 27% using the BDR. The higher adjustment speed could be explained by the sample of firms that are all involved in mergers and acquisitions, which represents a substantial shock to the capital structure of these firms, implying sizeable changes both in their actual leverage and their target leverage. These sudden changes could in turn speed up the adjustment toward the optimal capital structure. Because the SOA is higher than what previous literature has found, various robustness checks were conducted, which will be discussed in the next section.

The results for the four subsamples in columns (1) to (4) displayed in Table 6 vary to different degrees from the result for the whole sample in column (0), which confirms that the SOA is different for a varying leverage deviation of target and acquiring firms. The results for OO and OU, that have overleveraged acquirers in common, are above the whole sample and the results for UU and UO, having underleveraged acquirers in common, are below the whole sample. The lower adjustment speeds for subsamples with underleveraged acquirers are in line with Harford et al. (2009), who find that underleveraged acquirers adjust slower toward target leverage than overleveraged firms. This shows that the SOA is faster for subsamples with overleveraged acquirers and slower for subsamples with underleveraged acquirers. Additionally, from the year of the acquisition, year 0, until the end of year 5, the type of leverage deviation of the subsamples (underleveraged) is the same as the leverage deviation of the acquiring firms in year -1 (see Table 8), which suggests that acquiring firms are determining the SOA of the subsamples more than their targets.

Nevertheless, there are differences between these subsamples as well. The faster adjustment speed of UO in comparison with UU could be explained by the higher SOA that Flannery et al. (2022) found for overleveraged targets. But this effect cannot be observed when comparing OO

[3] The half-life is computed as log(0.5)/log(1 - SOA).

and OU, where the latter has a faster adjustment speed., which reduces the post-acquisition SOA.

Table 6 – Regression Results
Results of the regression to determine the SOA based on the lagged BDR and a vector of lagged firm characteristics ($X_{i,t}$) (see equation (5)). The first row contains the SOA, which is calculated by subtracting the coefficient for BDR from one. Column (0) shows results for the whole sample, column (2) for OO (overleveraged acquirer and target), column (3) for OU (overleveraged acquirer and underleveraged target), column (4) for UU (underleveraged acquirer and target), and column (4) for UO (underleveraged acquirer and overleveraged target). ***, **, and * denote significance at the 1%, 5%, and 10% levels respectively, and standard errors are presented in parenthesis below.

	(0)	(1)	(2)	(3)	(4)
	Whole sample	**OO**	**OU**	**UU**	**UO**
SOA	**71.78%**	**73.00%**	**77.80%**	**53.11%**	**64.32%**
BDR	0.2822 ***	0.2700 **	0.2220 **	0.4689 ***	0.3568 ***
	(0.046)	*(0.111)*	*(0.093)*	*(0.061)*	*(0.07)*
EBIT_TA	-0.0236	-0.0645	-0.0654	-0.0449 **	0.0014
	(0.041)	*(0.151)*	*(0.076)*	*(0.024)*	*(0.049)*
MB	-0.0138 **	0.0064	-0.0531 ***	-0.0010	0.0053
	(0.007)	*(0.03)*	*(0.015)*	*(0.004)*	*(0.017)*
DEP_TA	0.0865	-1.1582	0.2470	-0.2635	0.8224
	(0.235)	*(1.086)*	*(0.729)*	*(0.204)*	*(0.536)*
lnTA	0.0062	-0.0479	0.0345	0.0192	0.0064
	(0.013)	*(0.048)*	*(0.03)*	*(0.021)*	*(0.028)*
RD_TA	-0.1943	-1.2859 **	-0.0319	0.0368	-0.5113
	(0.141)	*(0.538)*	*(0.254)*	*(0.153)*	*(0.36)*
RD_DUM	0.0071	-0.0590	0.0899 ***	-0.0023	-0.0689
	(0.029)	*(0.202)*	*(0.015)*	*(0.009)*	*(0.079)*
Constant	0.1391	1.2163	-0.2112	-0.1860	0.0589
	(0.236)	*(0.895)*	*(0.506)*	*(0.351)*	*(0.483)*
FE	Yes	Yes	Yes	Yes	Yes
N (companies)	771	98	68	181	98
N (observations)	3206	407	276	780	432
R-sq (within)	0.1091	0.0841	0.1472	0.2446	0.156

Nevertheless, the highest (lowest) adjustment speed for OU (UU) indicates that for firms in these subsamples the cost of deviating from the optimal leverage ratio is higher (lower) than the cost of capital structure adjustments. Thus, underleveraged targets could benefit from easier access to capital markets via their overleveraged acquirers. Underleveraged targets that were acquired by underleveraged firms on the other hand might be faced with fewer improvements

regarding access to capital as their new parent firms do not have high leverage themselves. OU has the highest SOA, which is contrary to the intuition that the subsample with only overleveraged firms has the highest SOA (Flannery et al., 2022; Harford et al., 2009). But as the financial statements of both firms in OU are consolidated after the acquisition, the fast adjustment speed could be explained by the target's negative leverage deviation partially offsetting the positive deviation of the acquirer. Comparing the leverage deviation of each subsample, those with both over- and underleveraged firms have indeed the lowest leverage deviation in the year before the acquisition, and OU has the lowest deviation from target leverage (see Table 8, Appendix). On the other hand, the lowest leverage deviation in combination with the highest SOA stands in contrast to Flannery and Rangan (2006), who find that firms with a greater negative leverage deviation have faster adjustment speeds than more moderately underleveraged firms. Additionally, OU is the only subsample with a positive correlation between the R&D dummy and $BDR_{i,t+1}$. This could indicate that firms in OU that reported no R&D expenses have higher leverage in the next period, which corresponds with the findings for the whole sample. No R&D expenses suggest that firms have fewer intangible assets, which implies that these firms have more tangible assets which can be used as collateral to increase the firm's leverage the next year, increasing the target leverage. As OU is on average slightly underleveraged (see Table 8, Appendix), a higher target leverage increases the leverage deviation and with it the SOA as firms are more flexible to adjust their capital structure.

UU has the lowest SOA, which matches the previously mentioned findings that underleveraged targets and underleveraged acquires adjust their leverage slower than their overleveraged counterparts (Flannery et al., 2022; Harford et al., 2009). Looking back at the summary statistics, UU has the lowest BDR and the highest profitability and market-to-book ratio (see Table 5). Flannery and Rangan (2006) find lower adjustment speeds for firms with lower absolute leverage suggesting that deviations are more costly for highly leveraged firms, which is in line with the low leverage and low SOA for UU. On the other hand, UU is underleveraged in the year before the acquisition (see Table 8, Appendix) with the highest leverage deviation, which is in contrast to Flannery & Rangan (2006), who find faster adjustment speeds for higher leverage deviations. The highest EBIT out of all the subsamples is in accordance with the lowest BDR as retained earnings can be used to pay down debt. Additionally, the highest market-to-book ratio indicated that firms in UU have more investment opportunities, further confirming the low absolute BDR. The coefficient for scaled EBIT is negative, which conforms with the entire sample.

OO has the second-highest SOA out of all the subsamples. It is also the only subsample that has a significant coefficient for R&D expenses, which is negative. Thus, for overleveraged firms acquiring overleveraged firms, higher R&D expenses are associated with lower target leverage, suggesting that these firms have higher intangible assets which are more difficult to use as collateral. This could also explain the lower SOA of OO compared to OU.
Finally, UO has the second lowest SOA out of all the subsamples. Besides the BDR, none of the independent variables seem to be determinants of target leverage, suggesting that underleveraged firms buying overleveraged firms determine their leverage adjustments only based on the previous year's BDR.

Although most of the firm characteristics that were found to determine leverage are not significant in this sample, all coefficients for the lagged BDR and thus the SOA are significant at the 5%-level and UO and UU are significant at the 1%-level. This suggests that the firms in the samples adjust their leverage each year. Summarizing the discussed findings for the subsamples, the different adjustment speeds could be explained by the leverage deviation of the acquirers and targets on the one hand, and the correlation of the significant variables with the target leverage on the other hand.
Following the findings of previous research, the SOA for all subsamples seems to be determined to a greater degree by the leverage deviation of the acquirers than the targets. OO and OU (UU and UO) have overleveraged (underleveraged) acquirers in common and have a higher (lower) SOA than the overall sample. The differences between OO and OU and between UU and UO can be explained by the relationship of the independent variables with the target leverage and the SOA. While OO has a higher SOA than the overall sample, it does not have the highest adjustment speed. This could be explained by the negative coefficient for R&D expenses which is higher than for the overall sample, counteracting the impact of overleveraged firms found in previous literature by decreasing the target leverage, leading to a lower SOA in comparison with OU. OU on the other hand has only independent variables that have the same effect on target leverage as expected (see Table 1). While the coefficient for the market-to-book ratio is negative, lowering target leverage for firms with higher investment opportunities, the dummy for no R&D expenses is positive and greater than the coefficient for the market-to-book ratio, increasing the target leverage. Because OU has more firms without R&D expenses than subsample OO, these results could explain the higher SOA. UO has a lower SOA than the whole sample but higher than UU, the only subsample with a negative coefficient for the scaled EBIT.

UU is the only subsample with a significant coefficient for EBIT and has the highest median scaled EBIT out of all subsamples, therefore profitability could explain the very low SOA.

6. Robustness Checks

As the results for the SOA are substantially higher than what previous research has found, extensive robustness checks were conducted to analyze the impact of variations in the methodology and data on the SOA.

6.1. Including Fixed Assets

As tangible assets can be used as collateral for loans - increasing a firm's debt capacity - they are considered a determinant of capital structure. But the accounting data gathered from Refinitiv Eikon is missing many observations for PP&E. Therefore, the measure of fixed assets scaled by total assets was excluded from the base specification to ensure sufficient observations for the analysis of all the subsamples. To analyze the effect of this decision, the SOA was estimated including fixed assets in the regression. Only OO, OU, and UO are significant at 1%, the SOA of the whole sample and OU are not significant (see Table 10, Appendix). The latter could be due to the small sample size of 5 firms compared to 20 and more firms for the other subsamples. The other subsamples have a lower SOA when including fixed assets as an independent variable. In line with higher adjustment speeds in the base specification for subsamples with overleveraged acquirers, OO has a higher SOA than subsamples with underleveraged acquirers. Additionally, UU still has the lowest SOA of 47.07%. Although the inclusion of fixed assets reduces the SOA and brings it closer to adjustment speeds found in earlier studies, the significant adjustment speeds are still higher than the findings of previous literature.

6.2. Market Debt Ratio

In line with previous literature (Elsas & Florysiak, 2011; Flannery & Rangan, 2006; Kayhan & Titman, 2007), the SOA is estimated using the MDR instead of the BDR. While the BDR captures explicit efforts by the firm to move toward a leverage target, the MDR reflects movements in the firm's stock price and actions taken by management. Previous research has found mostly similar adjustment speeds for the BDR and the MDR, which is confirmed by the SOA of 69.84% for the whole sample, which is only 1.95 percentage points lower than the SOA using the BDR (see Table 11, Appendix). Interestingly, the SOA of the subsamples is reversed when computing it with the MDR. OO and OU include overleveraged acquirers have a lower

adjustment speed than the whole sample, with OU having the lowest SOA. In contrast to findings for the base specification, UU, which has underleveraged acquirers, has the highest SOA. UO which also has underleveraged acquirers has only a slightly lower SOA than the whole sample. All results for the adjustment speeds are significant at 1%. The different findings for the subsamples could be an interesting topic of future research as it is contrary to findings of previous literature and hasn't been studied in the context of the acquirer and target firm's leverage.

6.3. Subsamples for Firm Size

Although the natural logarithm of total assets is already included in the base specification for the SOA, differences in firm sizes can impact capital structure and a firm's ability to quickly move toward a leverage target. Bigger firms might have easier access to capital markets than smaller firms due to more assets or higher earnings. Thus, the sample is split into two subsamples, divided by firms below the median firm size measured by total assets, and firms equal to or above the median firm size. For the subsample of big firms, all adjustment speeds are significant at 1% (see Table 13, Appendix). The whole sample has a slightly higher adjustment speed than the base specification, but the results for the subsamples differ from the base specification. OO with overleveraged acquirers and targets has the lowest adjustment speed and UO with underleveraged acquirers and overleveraged targets has the highest SOA. Additionally, subsamples with overleveraged (underleveraged) acquirers have a lower (higher) SOA than the whole sample, which is contrary to the findings for the base specification. The subsample of smaller firms contains fewer significant findings than the subsample for bigger firms (see Table 12, Appendix). The whole sample has an adjustment speed of 84.01% which is substantially higher than the base specification. Contrary to big firms, UO with underleveraged acquirers and overleveraged targets has the lowest SOA, and UU the highest SOA, which is opposed to the base specification in which UU has the lowest adjustment speed. Overall, including an independent variable for firm size was important as target leverage and adjustment speeds seem to vary for firms of different sizes based on total assets.

6.4. Subsamples for Industry

The base specification for the SOA in Flannery and Rangan (2006) includes the industry median debt ratio to control for effects due to differences in industries that are not captured by other explanatory variables. As the firms in the sample of this analysis stay within their industries throughout the analyzed period, they exhibit no variation over time and thus the industry median

BDR could not be included in the base specification alongside fixed effects. Thus, three different subsamples were analyzed regarding the industry: manufacturing (SIC 2000-3999), services (SIC 7000-8999), and a subsample of acquirers and target firms that are in the same industry. The manufacturing industry involves the production of physical goods, which often requires the use of specialized equipment and machinery that require technical expertise. Thus, this results on average in higher fixed assets, higher cyclicality than other industries due to production cycles, and higher dependency on suppliers making firms more vulnerable to fluctuations in markets. The service industry on the other hand does not require heavy machinery and generally focuses more on providing services or producing digital and intangible products. Thus, the service industry has on average lower fixed assets and is less vulnerable to market fluctuations. Lastly, to analyze the effect of diversifying versus related acquisitions in line with Erel et al. (2015), a subsample of target and acquirer firms that operate in the same industry based on SIC codes is analyzed. Related acquisitions could make the post-merger integration process more efficient and could reduce financial constraints for the acquired target to a greater extent after the acquisition.

The whole manufacturing subsample has a SOA that is slightly higher than the base specification and only OO and UU have significant results for the SOA (see Table 14, Appendix). While UU with both underleveraged acquirers and targets has a very similar adjustment speed to the same subsample in the base specification, OO exhibits a substantially lower SOA. The whole sample of the services industry has a higher adjustment speed than the base specification (see Table 15, Appendix). Only UU has a significant SOA that is slightly lower than the SOA of the same subsample in the base specification. Lastly, analyzing only firms that are in the same industry as their targets leads to significant results for the subsamples that are close to the respective adjustment speeds of the base specification (see Table 16, Appendix). Thus, while the industry seems to be important for the SOA, related or diversifying acquisitions do not seem to play a significant role in determining the SOA after an acquisition.

6.5. Economic Cycle

As the analyzed period spans 30 years, the US economy experienced different phases of economic expansion and contraction. While the period was chosen to exclude the Covid-19 pandemic, it includes the dot com bubble from 1998 to 2000 and the financial crisis of 2008/09 during which the actual leverage and the leverage deviation peaked (see Figure 1). Thus, years of economic expansion defined as two consecutive quarters of real GDP growth (Quarterly GDP - OECD Data) were included as dummy variables to measure the impact of the economy on the

SOA. Although all findings for the SOA are significant, the dummy for economic expansion included in the regression is only significant for OO and not for the other samples. Additionally, the differences in the adjustment speeds compared to the base specifications are small, suggesting that the economic cycle does not play a great role in determining the SOA (see Table 17, Appendix). This is surprising as the absolute leverage peaks during crises, which also results in a sudden decrease in the leverage deviation (see Figure 1). These fluctuations should impact the SOA as previous research has found that absolute leverage is a determinant of adjustment speeds (Flannery & Rangan, 2006). A possible explanation for little impact of the economic cycle on the SOA could be the use of the BDR instead of the MDR. The latter measures movements in the stock price of the firm and is therefore more directly impacted by shocks to financial markets than the BDR and therefore might react more to the economic cycle.

6.6. Time Split

Most literature researching the SOA was based on data from the 90s to the early 2000s. To analyze the effect of more recent data on the SOA, the sample was split in half, into an early subsample from 1989 to 2004 and a late subsample from 2005 to 2019. The split seeks to analyze if the underlying data and years show different results and if adjustment speeds show a trend over time. The SOA for the earlier subsample is indeed lower (see Table 18, Appendix). than the adjustment speed of the later subsample (see Table 19, Appendix)., which suggests that the lower SOA found in earlier studies could be due to the data used. Nevertheless, with 68.51%, the SOA of the earlier years is still substantially higher than the findings of studies from the 2000s. Additionally, this finding does not hold for the subsamples as the adjustment speeds for OO and UU are higher for the early sample than for the late sample. Only UO has very similar adjustment speeds regarding the whole sample for the early and late samples. Thus, the use of more recent data can at most explain a small part of the higher adjustment speeds found in this paper.

6.7. No Fixed Effects

A number of past research did not include fixed effects and the high adjustment speeds found in the base specification could be due to more sophisticated empirical methods. Thus, a random-effects GLS regression with the same variables is implemented to analyze if the SOA is closer to past findings.

The estimated SOA for the whole sample is 10.84% (see Table 20, Appendix), which is significantly lower than the SOA of 71.78% found in the base specification. This is close to the

slow adjustment speeds found in studies from the 2000s that used OLS regressions without fixed effects (Fama & French, 2002; Huang & Ritter, 2009; Kayhan & Titman, 2007). The estimated adjustment speed is especially close to the SOA of 10.6% for book leverage found by Kayhan and Titman (2007), which could confirm that the model used in this study is correct and that the inclusion of firm and year fixed effects increases the SOA.

Without fixed effects, OO has a SOA close to zero, indicating that overleveraged firms which bought overleveraged targets do not adjust their leverage toward an optimal target ratio after an acquisition. This variation only had 20 firms in the analyzed subsample, but as the R^2 is higher than for the whole sample, the small sample size does not seem to diminish the significance of the result. Without fixed effects, the SOA of OU is significantly lower, similar to findings for the whole sample and OO. Nevertheless, in line with the trend of the base specification, OU still demonstrates the highest SOA out of all four subsamples. Additionally, all independent variables of OU are significant at 1%, except for the scaled depreciation, which is significant at 10%. The coefficients for the scaled EBIT and market-to-book ratio are positive, which is the opposite of their expected correlation with target leverage. This suggests that overleveraged acquirers buying underleveraged target firms that are very profiTable might have easier access to capital to invest in higher-yielding projects to increase their return on investment, which in turn increases the target leverage. The positive coefficient of the market-to-book ratio indicates that overleveraged acquirers buying underleveraged target firms have more profiTable investment opportunities that yield higher returns than the firm's cost of debt, which also increases target leverage. The effect of both, EBIT and investment opportunities could explain why the SOA for OU is higher than for the whole sample and the other subsamples. On the other hand, depreciation is negatively related to target leverage, suggesting that firms with higher depreciation expenses have lower fixed assets on their balance sheets, resulting in lower target leverage, and thus a lower SOA.

UU has a lower SOA which is closer to the whole sample. The subsample also has significant coefficients for the scaled EBIT and lnTA measuring firm size. Lastly, not including fixed effects in the regression also decreases the SOA of UO, with positive coefficients for firm size (lnTA), R&D expenses, and the dummy for no reported R&D activity.

Overall, the inclusion of fixed effects in the base specification could explain the higher results obtained in the base specification, especially for OU, which has the most significant variables out of all the tested variations and subsamples.

6.8. Type of Payment

As Harford et al. (2009) found that the type of payment in an acquisition influences the post-acquisition leverage, subsamples with acquisitions using only cash or stock as payment are analyzed to evaluate the effect on the SOA. Harford et al. (2009) find that the majority of large cash-only acquisitions are financed by issuing additional debt, increasing leverage. Thus, the form of payment in an acquisition could influence the SOA.

Firms that only use cash to pay for the transaction have lower adjustment speeds than firms that exclusively pay with equity in the whole sample (see Table 21 and Table 22, Appendix). As firms in the whole sample are on average underleveraged in the year before the acquisition (see Table 8, Appendix), cash transactions increase the absolute leverage, decreasing the leverage deviation. This in turn could explain the lower adjustment speed of cash-paying firms, as firms with a lower leverage deviation have less pressure to adjust toward the optimal level of leverage. Overleveraged firms buying overleveraged targets (OO) have a lower SOA paying with cash than paying with stock. For firms paying with cash, UU still has the lowest adjustment speed and OU the highest. For firms paying with stock, only the whole sample and OO and UU are significant at 1%. While UU has a very similar SOA to the base specification, OO possesses a much lower adjustment speed. Overall, the mixed findings for different payment methods could present an interesting avenue for further research.

6.9. Conclusion on Robustness

Table 7 provides an overview of the adjustment speeds found for the base specification (Panel A) and the robustness checks (Panel B). Although the SOA for the earlier half of the analyzed period is lower than that of the later period, the adjustment speeds are still higher than those speeds found in previous literature (Elsas & Florysiak, 2011; Flannery & Rangan, 2006; Lemmon et al., 2008). Additionally, the finding does not hold for the four subsamples. The exclusion of an independent variable for fixed assets and the inclusion of firm and time fixed effects on the other hand could in part account for the higher SOA found in this paper. The analysis of the MDR yielded similar results to the BDR for the whole, which is in line with previous literature (e.g. Elsas & Florysiak, 2011; Flannery & Rangan, 2006). Nevertheless, the four subsamples had different adjustment speeds when using the MDR than the base specification, which could be an area of further research. Firm size does seem to matter in determining the SOA, as results vary for smaller and bigger firms. Thus, including a measure of firm size as the natural logarithm of total assets is important and should therefore not be removed from the model. While the type of payment also seems to be relevant in determining

the SOA after an acquisition, it cannot explain the high adjustment speeds found in this paper. Although different industries have varying adjustment speeds, related acquisitions do not seem to be critical in determining the SOA.

Table 7 – Summary of Robustness Checks' SOA

Summary of adjustment speeds found for robustness checks. Column (0) shows results for the whole sample, column (2) for OO (overleveraged acquirer and target), column (3) for OU (overleveraged acquirer and underleveraged target), column (4) for UU (underleveraged acquirer and target), and column (4) for UO (underleveraged acquirer and overleveraged target). Panel A shows the SOA for the base specification. Panel B shows the SOA for the robustness checks. The last row shows the average SOA of the statistically significant findings. ***, **, and * denote significance at the 1%, 5%, and 10% levels respectively, and standard errors are presented in parenthesis below.

	(0)	(1)	(2)	(3)	(4)
	Whole sample	**OO**	**OU**	**UU**	**UO**
Panel A: Base Specification					
BDR	**71.78% *** **	**73.00% ** **	**77.80% ** **	**53.11% *** **	**64.32% *** **
	(0.046)	*(0.111)*	*(0.093)*	*(0.061)*	*(0.07)*
Panel B: Robustness Checks					
BDR with FA	74.38%	57.80% ***	66.59%	47.07% ***	55.46% ***
	(0.158)	*(0.125)*	*(0.226)*	*(0.13)*	*(0.132)*
MDR	69.84% ***	66.37% ***	63.70% ***	74.27% ***	68.34% ***
	(0.336)	*(0.363)*	*(0.257)*	*(0.317)*	*(0)*
BIG	74.80% ***	59.36% ***	70.94% ***	65.15% ***	79.32% ***
	(0.065)	*(0.14)*	*(0.073)*	*(0.072)*	*(0.076)*
SMALL	84.01% **	69.10% **	106.24%	72.61% ***	44.59% ***
	(0.079)	*(0.117)*	*(0.216)*	*(0.1)*	*(0.066)*
Manufacturing	73.44% ***	63.17% ***	97.35%	51.22% ***	76.43% *
	(0.066)	*(0.119)*	*(0.118)*	*(0.091)*	*(0.119)*
Services	81.70% **	72.74%	57.09% *	50.10% **	90.67%
	(0.091)	*(0.291)*	*(0.223)*	*(0.188)*	*(0.146)*
Same Industry	74.19% ***	75.69% *	76.36% **	49.32% ***	68.74% ***
	(0.076)	*(0.131)*	*(0.1)*	*(0.082)*	*(0.111)*
Economic Expansion	71.75% ***	73.15% **	77.70% **	52.97% ***	64.30% ***
	(0.046)	*(0.115)*	*(0.094)*	*(0.061)*	*(0.07)*
EARLY	68.51% ***	74.95% **	85.19%	57.69% ***	68.77% ***
	(0.052)	*(0.124)*	*(0.107)*	*(0.069)*	*(0.099)*
LATE	73.93% ***	38.86% ***	96.64%	46.16% ***	72.19% **
	(0.088)	*(0.088)*	*(0.09)*	*(0.091)*	*(0.122)*
No FE	10.84% ***	0.71% ***	46.74% ***	15.83% ***	19.02% ***
	(0.033)	*(0.071)*	*(0.048)*	*(0.047)*	*(0.067)*
CASH	66.65% ***	86.65%	71.92% **	51.42% ***	64.95% ***
	(0.056)	*(0.097)*	*(0.133)*	*(0.071)*	*(0.072)*
STOCK	76.69% ***	45.22% ***	100.22%	55.88% ***	59.16% *
	(0.073)	*(0.098)*	*(0.136)*	*(0.072)*	*(0.202)*
Average of sign. Robustness Checks	**68.86%**	**56.76%**	**66.35%**	**53.05%**	**61.77%**

Similarly, despite fluctuation in the absolute leverage ratio and the leverage deviation that are in line with times of economic crisis, times of economic expansion also do not seem to impact the SOA greatly.

The average SOA of all significant findings of the robustness checks is similar for the whole sample and UU and UO which have underleveraged acquirers in common. OO has the highest deviation from the base specification followed by OU. Because the average SOA of the robustness checks of the subsamples with overleveraged acquirers is so far below the SOA of the base specification, the regression model used might not suit all subsamples to the same degree. Overall, the model used to determine the SOA seems to fit the data well but could be enhanced by including fixed assets as a proportion of total assets and an industry measure.

7. Limitations and Further Research

One limitation of this empirical study is the sample size. While the sample has sufficient observations for the overall analysis, splitting it into four subsamples reduces the observations, which may not be representative of the entire population. This applies especially to OU, only including 75 firms. The limited sample size might affect the validity of the findings and restrict their generalizability and economic applicability to other contexts.

The sample size is limited by the methods used to collect data. Using Compustat Capital IQ to gather accounting data limits the sample to US public firms and transactions between firms. Collecting data from Compustat Capital IQ led to too few observations for PP&E, thus the base specification excluded the measure of fixed assets as an independent variable. The effect of this decision was tested in chapter 6.1. While the SOA was lower when the variable for fixed assets was included as an independent variable, the sample sizes for the subsamples are approximately 20 to 30 firms, with OU having only 5 firms in the sample. Additionally, the industry subsamples were selected based on SIC codes which broadly define 11 industries, while other literature used different industry definitions such as the Fama and French industry classification which is more detailed, defining 48 industries. SIC codes were chosen due to the sample size but this difference impacts the comparability of the results.

Another limitation of this study is the use of the partial adjustment model by Flannery and Rangan (2006) to estimate the SOA. While the paper is widely cited, there are many different methods for estimating the SOA and no consensus about the methodology has been reached among researchers. Additionally, the independent variables included in the model are also based on Flannery and Rangan (2006), but additional independent variables, as tested in the robustness

checks, could improve the accuracy of the model. The findings of this study thus need to be interpreted with the methodology in mind.

Overall, these limitations should be considered when interpreting the findings of this study. Future research may aim to address these limitations by using a larger sample size, employing more robust data collection methods such as different databases, and collecting data over a longer period for more transactions. Another area of further research could involve the analysis of different regions like Europe or Asia and the inclusion of private firms in the sample. This paper excluded the year of the acquisition in the analysis. But including the month of the acquisition could impact the results, as firms that have transactions at the beginning of the year might be already adjusting their capital structure by the end of the year. Likewise, firms that buy another firm at the end of the year might still be working on a successful transaction, only adjusting their leverage later in the following year. Lastly, transaction details could be used to further analyze the SOA after transactions. This could involve analyzing the SOA for the four subsamples OO, OU, UU, and UO while considering the deal attitude (hostile/friendly), the type of investor, and single versus multiple acquisitions within the analyzed time frame.

8. Conclusion

Mergers and acquisitions substantially change firm`s capital structures and impact the optimal leverage ratio. Thus, they present an interesting opportunity to study the concept of target leverage and the speed of adjustment (SOA) toward it. While past research has not reached a consensus over the adjustment speed, most have found that firms do indeed have leverage targets. Following an acquisition, firms will try to offset changes to their capital structure and revert to the optimal ratio of debt to equity. The speed at which they reach the optimal capital structure is dependent on firm characteristics and the leverage deviation before the acquisition (e.g. Flannery et al., 2022; Harford et al., 2009). As past research has mostly focused on either acquiring firms or target firms, this paper aimed to analyze the impact of both firms on the post-acquisition SOA.

Based on commonly found determinants of capital structure, the target leverage for acquiring and target firms that were part of a majority acquisition in the US between 1994 and 2014 was computed. The sample was then divided into four subsamples based on the leverage deviation of the acquiring and target firms. The SOA varies among these subsamples, with higher adjustment speeds for subsamples with overleveraged acquirers and slower adjustment speeds for subsamples with underleveraged acquirers. Overleveraged firms acquiring underleveraged

target firms have the highest post-acquisition SOA and underleveraged firms acquiring underleveraged targets have the lowest SOA after the acquisition. This suggests that underleveraged firms that were bought by overleveraged firms benefit from eased access to capital markets, which makes it less costly to adjust the capital structure. Underleveraged firms that were bought by underleveraged firms on the other hand might not decrease the target´s cost of debt substantially, lowering the SOA as the cost of adjusting the capital structure is still too high.

Because the adjustment speeds found in this study are substantially higher than what previous literature has found (e.g. Elsas & Florysiak, 2011; Lemmon et al., 2008), robustness checks were conducted to evaluate the model. The inclusion of fixed effects in the regression and the more recent data used to construct the sample of this study may partially explain the higher adjustment speeds found in this paper compared to previous studies. Although the model used in this study seems to fit subsamples with underleveraged acquirers and the whole sample well, it could be improved by including a measure of fixed assets as a determinant of capital structure on the one hand and by controlling for the firm's industry and the type of payment on the other hand.

Overall, the determinants and drivers of capital structure decisions are complex and multifaceted, and more research is needed to fully understand them. Nevertheless, studying the capital structure of both acquiring firms and target firms simultaneously rather than separately is necessary because both parties make capital structure decisions that affect each other. Studying the joint impact of the acquirer's and target's leverage deviation on the post-acquisition SOA adds to the insights into how capital structure decisions are made and how they are intertwined in the context of M&A. The different results for the SOA imply that firms manage their capital structure differently, depending on their own and their target`s absolute and target leverage ratio. This can help to better understand the drivers of capital structure decisions and the trade-offs that firms make between the costs of financial distress and agency conflicts and the benefits of the tax shield of debt. It can also help in understanding how mergers and acquisitions impact financial constraints, as the SOA varies not just for the target firm's leverage deviation but also for the acquiring firm's deviation from the optimal leverage ratio. Lastly, studying both firms can help to identify any potential synergies or conflicts that may arise as a result of the acquisition and how they may affect the capital structure of the combined firm.

Mergers and acquisitions have a significant impact on the capital structure and optimal leverage ratio of firms. Studying both acquiring and target firms is important in understanding the drivers of capital structure decisions and the impact of M&A on financial constraints.

Appendix

Table 8 – Leverage Deviation Around the Acquisition

The leverage deviation around the acquisition in year 0. Panel A shows the deviation of the base specification, panel B the deviation of the variations, and panel C the deviation for the groups.

	Years around the acquisition										
	- 5	**- 4**	**- 3**	**- 2**	**- 1**	**0**	**+ 1**	**+ 2**	**+ 3**	**+ 4**	**+ 5**
Panel A: Base specification											
BDR	-0.040	-0.051	-0.054	-0.064	-0.061	**-0.005**	0.018	0.015	0.001	-0.002	-0.013
Panel B: Variations											
BDR with FA	-0.175	-0.055	-0.044	-0.013	-0.031	**-0.036**	-0.049	-0.081	-0.082	-0.070	-0.075
MDR	-0.056	-0.066	-0.070	-0.074	-0.081	**-0.041**	-0.033	-0.029	-0.046	-0.053	-0.045
BIG	-0.035	-0.042	-0.048	-0.062	-0.064	**0.008**	0.036	0.021	0.007	0.001	-0.012
SMALL	-0.042	-0.058	-0.061	-0.067	-0.052	**-0.035**	-0.013	0.000	-0.026	-0.015	-0.016
Manufacturing	-0.034	-0.043	-0.052	-0.059	-0.064	**0.006**	0.039	0.041	0.030	0.021	0.004
Services	-0.101	-0.097	-0.089	-0.090	-0.103	**-0.020**	0.028	0.031	0.016	-0.020	0.022
Same Industry	-0.027	-0.042	-0.035	-0.035	-0.023	**0.018**	0.047	0.036	0.019	0.025	0.003
Econ. Expansion	-0.042	-0.047	-0.053	-0.059	-0.055	**0.001**	0.030	0.010	0.007	-0.006	0.000
EARLY	-0.045	-0.047	-0.046	-0.062	-0.059	**-0.025**	-0.006	-0.009	-0.024	-0.014	-0.034
LATE	-0.075	-0.082	-0.069	-0.074	-0.072	**-0.002**	0.008	0.009	-0.004	0.000	0.000
No FE	-0.047	-0.049	-0.054	-0.060	-0.061	**-0.011**	0.017	0.011	-0.002	-0.006	-0.009
CASH	-0.056	-0.057	-0.066	-0.072	-0.070	**0.008**	0.021	0.032	0.021	0.014	0.003
STOCK	-0.096	-0.094	-0.098	-0.101	-0.100	**-0.081**	-0.023	-0.046	-0.047	-0.047	-0.052
Panel C: Groups											
OO	0.082	0.080	0.108	0.141	0.177	**0.197**	0.183	0.159	0.130	0.109	0.145
OU	0.003	0.006	0.023	0.003	-0.002	**0.138**	0.131	0.099	0.122	0.116	0.103
UU	-0.124	-0.129	-0.145	-0.156	-0.164	**-0.103**	-0.084	-0.072	-0.062	-0.057	-0.044
UO	-0.016	-0.027	-0.019	-0.011	-0.008	**-0.023**	-0.007	-0.028	-0.026	-0.041	-0.045

Table 9 - Summary Statistics by Leverage Deviation for Target and Acquiring Firms
Summary statistics by subsample. Panel A shows statistics for the whole sample, panel B for overleveraged targets, panel C for underleveraged targets, panel D for overleveraged acquirers, and panel E for underleveraged acquirers. All variables are winsorized at the 1st and 99th percentiles.

	Mean	Median	Std. Dev.	Min	Max	N
Panel A: whole sample						
BDR	0.250	0.218	0.224	0.000	1.196	24100
EBIT_TA	0.025	0.077	0.237	-1.530	0.378	23717
MB	1.809	1.300	1.645	0.348	11.712	24029
DEP_TA	0.048	0.041	0.035	0.003	0.234	24085
lnTA	15.370	15.380	2.297	9.548	20.382	24135
RD_TA	0.058	0.012	0.106	0.000	0.734	24135
RD_DUM	0.333	0.000	0.471	0.000	1.000	24175
Panel B: overleveraged target firms						
BDR	0.466	0.394	0.235	0.166	1.196	474
EBIT_TA	-0.021	0.063	0.299	-1.530	0.350	471
MB	1.564	1.164	1.445	0.367	11.712	468
DEP_TA	0.058	0.047	0.043	0.003	0.234	474
lnTA	14.513	14.539	1.892	9.548	19.027	484
RD_TA	0.048	0	0.129	0	0.734	484
RD_DUM	0.503	1	0.500	0	1	495
Panel C: underleveraged target firms						
BDR	0.063	0.023	0.079	0	0.338	699
EBIT_TA	-0.044	0.059	0.329	-1.530	0.378	670
MB	2.040	1.415	1.966	0.348	11.712	693
DEP_TA	0.049	0.039	0.040	0.003	0.234	694
lnTA	13.902	13.732	1.795	9.548	20.382	699
RD_TA	0.113	0.060	0.157	0	0.734	699
RD_DUM	0.249	0	0.433	0	1	699
Panel D: overleveraged acquirer firms						
BDR	0.427	0.387	0.170	0.187	1.196	285
EBIT_TA	0.038	0.084	0.207	-1.327	0.378	285
MB	1.688	1.379	1.296	0.486	11.712	284
DEP_TA	0.046	0.036	0.034	0.005	0.234	286
lnTA	15.859	15.929	1.977	9.745	20.382	286
RD_TA	0.029	0	0.082	0	0.734	286
RD_DUM	0.460	0	0.499	0	1	287
Panel E: underleveraged acquirer firms						
BDR	0.109	0.107	0.091	0	0.340	444
EBIT_TA	0.067	0.105	0.207	-1.530	0.378	435
MB	2.087	1.610	1.681	0.348	11.712	444
DEP_TA	0.045	0.039	0.033	0.003	0.234	444
lnTA	15.950	15.919	2.155	9.548	20.382	444
RD_TA	0.059	0.020	0.096	0	0.734	444
RD_DUM	0.270	0	0.445	0	1	444

Table 10 – Fixed Assets

Results of the regression including fixed assets scaled by total assets to determine the SOA based on the lagged BDR and a vector of lagged firm characteristics ($X_{i,t}$) (see equation (5)). The first row contains the SOA, which is calculated by subtracting the coefficient for BDR from one. Column (0) shows results for the whole sample, column (2) for OO (overleveraged acquirer and target), column (3) for OU (overleveraged acquirer and underleveraged target), column (4) for UU (underleveraged acquirer and target), and column (4) for UO (underleveraged acquirer and overleveraged target). ***, **, and * denote significance at the 1%, 5% and 10% level respectively, and standard errors are presented in parenthesis below.

	(0)	(1)	(2)	(3)	(4)
	Whole sample	**OO**	**OU**	**UU**	**UO**
SOA	**74.38%**	**57.80%**	**66.59%**	**47.07%**	**55.46%**
BDR	0.2562	0.4220 ***	0.3341	0.5293 ***	0.4454 ***
	(0.158)	*(0.125)*	*(0.226)*	*(0.13)*	*(0.132)*
EBIT_TA	0.0304	-0.0854	0.3754	-0.1172	0.1335
	(0.073)	*(0.33)*	*(0.213)*	*(0.12)*	*(0.079)*
MB	0.0092	-0.0588	-0.0993	0.0222	-0.0270
	(0.015)	*(0.048)*	*(0.112)*	*(0.015)*	*(0.025)*
DEP_TA	1.1488 ***	-0.1000	-0.5612	1.2152	0.2292
	(0.372)	*(0.716)*	*(1.158)*	*(1.032)*	*(0.673)*
lnTA	0.0010	-0.1140	-0.2194	0.0119	0.0398
	(0.019)	*(0.093)*	*(0.118)*	*(0.066)*	*(0.076)*
RD_TA	-0.2706	-0.5989	-10.6688	0.2210	1.7749 **
	(0.461)	*(0.765)*	*(5.78)*	*(0.529)*	*(0.807)*
RD_DUM	0.0105	0.0000	0.0055	-0.0015	0.0000
	(0.021)	*omitted*	*(0.031)*	*(0.005)*	*omitted*
FA_TA	0.0190	-0.1485	1.1034	0.0459	-0.1452
	(0.059)	*(0.209)*	*(0.852)*	*(0.116)*	*(0.12)*
Constant	0.1420	2.4134	4.2623	-0.1821	-0.4555
	(0.338)	*(1.709)*	*(2.236)*	*(1.243)*	*(1.399)*
FE	Yes	Yes	Yes	Yes	Yes
N (companies)	293	20	5	28	26
N (observations)	1040	84	19	127	126
R-sq (within)	0.1133	0.2201	0.6064	0.4603	0.2417

Table 11 – MDR

Results of the regression using the MDR to determine the SOA based on the lagged MDR and a vector of lagged firm characteristics ($X_{i,t}$) (see equation (5)). The first row contains the SOA, which is calculated by subtracting the coefficient for BDR from one. Column (0) shows results for the whole sample, column (2) for OO (overleveraged acquirer and target), column (3) for OU (overleveraged acquirer and underleveraged target), column (4) for UU (underleveraged acquirer and target), and column (4) for UO (underleveraged acquirer and overleveraged target). ***, **, and * denote significance at the 1%, 5% and 10% level respectively, and standard errors are presented in parenthesis below.

	(0)	(1)	(2)	(3)	(4)
	Whole sample	**OO**	**OU**	**UU**	**UO**
SOA	**69.84%**	**66.37%**	**63.70%**	**74.27%**	**68.34%**
MDR	0.3016 ***	0.3363 ***	0.3630 ***	0.2573 ***	0.3166 ***
	(0.336)	*(0.363)*	*(0.257)*	*(0.317)*	*(0)*
EBIT_TA	-0.0404	-0.1088	-0.0228	-0.0275	-0.0877
	(-0.109)	*(-0.023)*	*(-0.027)*	*(-0.088)*	*(0)*
MB	0.0015	0.0232	0.0144	-0.0037	0.0205 *
	(0.023)	*(0.014)*	*(-0.004)*	*(0.02)*	*(0)*
DEP_TA	0.0027	-0.3676	1.4150 **	-0.5636 *	0.6444
	(-0.368)	*(1.415)*	*(-0.564)*	*(0.644)*	*(0)*
lnTA	0.0532 ***	0.0094	0.2032 ***	0.0396 *	0.0546 **
	(0.009)	*(0.203)*	*(0.04)*	*(0.055)*	*(0)*
RD_TA	-0.0837	0.1149	0.3649	0.0180	-0.3078
	(0.115)	*(0.365)*	*(0.018)*	*(-0.308)*	*(0)*
RD_DUM	-0.0216	-0.1441 *	0.0739 ***	0.0454 ***	-0.0496
	(-0.144)	*(0.074)*	*(0.045)*	*(-0.05)*	*(0)*
Constant	-0.6632 ***	0.2738	-3.1108 ***	-0.5023	-0.7367 *
	(0.274)	*(-3.111)*	*(-0.502)*	*(-0.737)*	*(0)*
FE	Yes	Yes	Yes	Yes	Yes
N (companies)	767	82	47	200	114
N (observations)	3197	341	187	881	481
R-sq (within)	0.1433	0.139	0.3846	0.1212	0.2121

Table 12 – Small Firms

Results of the regression to determine the SOA based on the lagged BDR and a vector of lagged firm characteristics ($X_{i,t}$) (see equation (5)) for a subsample of firms below the median firm size measured by total assets. The first row contains the SOA, which is calculated by subtracting the coefficient for BDR from one. Column (0) shows results for the whole sample, column (2) for OO (overleveraged acquirer and target), column (3) for OU (overleveraged acquirer and underleveraged target), column (4) for UU (underleveraged acquirer and target), and column (4) for UO (underleveraged acquirer and overleveraged target). ***, **, and * denote significance at the 1%, 5% and 10% level respectively, and standard errors are presented in parenthesis below.

	(0)	(1)	(2)	(3)	(4)
	Whole sample	**OO**	**OU**	**UU**	**UO**
SOA	**84.01%**	**69.10%**	**106.24%**	**72.61%**	**44.59%**
BDR	0.1599 **	0.3090 **	-0.0624	0.2739 ***	0.5541 ***
	(0.079)	*(0.117)*	*(0.216)*	*(0.1)*	*(0.066)*
EBIT_TA	-0.0898	-0.2214 *	-0.0124	0.0169	0.0016
	(0.073)	*(0.12)*	*(0.198)*	*(0.06)*	*(0.139)*
MB	-0.0278 *	-0.0255	-0.0244	0.0023	0.0021
	(0.014)	*(0.031)*	*(0.043)*	*(0.006)*	*(0.035)*
DEP_TA	0.0033	-1.4061	2.0367	0.2386	2.3329 **
	(0.484)	*(2.15)*	*(1.374)*	*(0.471)*	*(0.967)*
lnTA	-0.0239	-0.1063	0.1093	-0.0568	0.0312
	(0.038)	*(0.083)*	*(0.078)*	*(0.047)*	*(0.061)*
RD_TA	-0.5759 **	-1.6304	1.8843 ***	0.4767	-3.1501 ***
	(0.269)	*(4.57)*	*(0.689)*	*(0.636)*	*(0.494)*
RD_DUM	-0.0233	0.1317	0.0000	-0.0125	-0.0491
	(0.08)	*(0.26)*	*(omitted)*	*(0.028)*	*(0.067)*
Constant	0.7099	2.0124	-1.4563	0.9809	-0.4140
	(0.615)	*(1.311)*	*(1.18)*	*(0.745)*	*(0.988)*
FE	Yes	Yes	Yes	Yes	Yes
N (companies)	360	45	31	73	39
N (observations)	867	116	67	184	107
R-sq (within)	0.1206	0.2586	0.3907	0.1791	0.3968

Table 13 – Big Firms

Results of the regression to determine the SOA based on the lagged BDR and a vector of lagged firm characteristics ($X_{i,t}$) (see equation (5)) for a subsample of firms above or equal to the median firm size measured by total assets. The first row contains the SOA, which is calculated by subtracting the coefficient for BDR from one. Column (0) shows results for the whole sample, column (2) for OO (overleveraged acquirer and target), column (3) for OU (overleveraged acquirer and underleveraged target), column (4) for UU (underleveraged acquirer and target), and column (4) for UO (underleveraged acquirer and overleveraged target). ***, **, and * denote significance at the 1%, 5% and 10% level respectively, and standard errors are presented in parenthesis below.

	(0)	(1)	(2)	(3)	(4)
	Whole sample	**OO**	**OU**	**UU**	**UO**
SOA	**74.80%**	**59.36%**	**70.94%**	**65.15%**	**79.32%**
BDR	0.2520 ***	0.4064 ***	0.2906 ***	0.3485 ***	0.2068 ***
	(0.065)	*(0.14)*	*(0.073)*	*(0.072)*	*(0.076)*
EBIT_TA	0.0384	0.5435 ***	0.0400	-0.0489 *	-0.0329
	(0.053)	*(0.121)*	*(0.11)*	*(0.028)*	*(0.035)*
MB	-0.0090 *	-0.0255	-0.0298 *	0.0013	-0.0086
	(0.005)	*(0.03)*	*(0.016)*	*(0.004)*	*(0.013)*
DEP_TA	-0.1529	0.4675	-1.0869	-0.3557	-0.3090
	(0.219)	*(0.966)*	*(0.72)*	*(0.216)*	*(0.463)*
lnTA	0.0143	-0.0259	-0.0007	0.0339	0.0179
	(0.013)	*(0.047)*	*(0.033)*	*(0.025)*	*(0.029)*
RD_TA	0.0029	0.2259	-0.1048	-0.0340	-0.0865
	(0.137)	*(0.373)*	*(0.358)*	*(0.082)*	*(0.217)*
RD_DUM	0.0310	-0.6544 ***	0.0650 ***	0.0153 **	0.0000
	(0.044)	*(0.025)*	*(0.007)*	*(0.007)*	*(omitted)*
Constant	-0.0070	1.0296	0.3674	-0.4097	-0.0613
	(0.217)	*(0.82)*	*(0.558)*	*(0.437)*	*(0.48)*
FE	Yes	Yes	Yes	Yes	Yes
N (companies)	701	93	63	167	87
N (observations)	2339	291	209	596	325
R-sq (within)	0.088	0.4737	0.1858	0.1652	0.0855

Table 14 – Manufacturing Industry

Results of the regression to determine the SOA based on the lagged BDR and a vector of lagged firm characteristics ($X_{i,t}$) (see equation (5)) for a subsample of firms in the manufacturing industry (SIC 2000-3999). The first row contains the SOA, which is calculated by subtracting the coefficient for BDR from one. Column (0) shows results for the whole sample, column (2) for OO (overleveraged acquirer and target), column (3) for OU (overleveraged acquirer and underleveraged target), column (4) for UU (underleveraged acquirer and target), and column (4) for UO (underleveraged acquirer and overleveraged target). ***, **, and * denote significance at the 1%, 5% and 10% level respectively, and standard errors are presented in parenthesis below.

	(0)	(1)	(2)	(3)	(4)
	Whole sample	**OO**	**OU**	**UU**	**UO**
SOA	**73.44%**	**63.17%**	**97.35%**	**51.22%**	**76.43%**
BDR	0.2656 ***	0.3683 ***	0.0265	0.4878 ***	0.2357 *
	(0.066)	*(0.119)*	*(0.118)*	*(0.091)*	*(0.119)*
EBIT_TA	-0.0443 *	0.0355	-0.1232	-0.0467 *	-0.0239
	(0.026)	*(0.076)*	*(0.112)*	*(0.028)*	*(0.054)*
MB	-0.0114	0.0571 *	-0.0401 *	-0.0008	-0.0294
	(0.009)	*(0.031)*	*(0.023)*	*(0.004)*	*(0.028)*
DEP_TA	-0.2951	-0.6033	-1.9259 *	-0.3426	-0.5723
	(0.334)	*(0.941)*	*(0.977)*	*(0.652)*	*(0.988)*
lnTA	0.0124	-0.0311	0.0141	0.0094	-0.0055
	(0.013)	*(0.036)*	*(0.03)*	*(0.027)*	*(0.043)*
RD_TA	-0.2766 ***	-1.5646 ***	-0.2618	-0.0057	-0.5784
	(0.098)	*(0.304)*	*(0.216)*	*(0.146)*	*(0.458)*
RD_DUM	-0.0665	-0.0189	0.0000	0.0027	-0.2286 ***
	(0.044)	*(0.027)*	*omitted*	*(0.008)*	*(0.081)*
Constant	0.0725	0.7735	0.2670	-0.0295	0.4332
	(0.2)	*(0.59)*	*(0.497)*	*(0.46)*	*(0.739)*
FE	Yes	Yes	Yes	Yes	Yes
N (companies)	389	41	41	89	43
N (observations)	1690	178	171	394	200
R-sq (within)	0.1274	0.2178	0.2109	0.2361	0.2706

Table 15 – Services Industry

Results of the regression to determine the SOA based on the lagged BDR and a vector of lagged firm characteristics ($X_{i,t}$) (see equation (5)) for a subsample of firms in the service industry (SIC 7000-8999). The first row contains the SOA, which is calculated by subtracting the coefficient for BDR from one. Column (0) shows results for the whole sample, column (2) for OO (overleveraged acquirer and target), column (3) for OU (overleveraged acquirer and underleveraged target), column (4) for UU (underleveraged acquirer and target), and column (4) for UO (underleveraged acquirer and overleveraged target). ***, **, and * denote significance at the 1%, 5% and 10% level respectively, and standard errors are presented in parenthesis below.

	(0)	(1)	(2)	(3)	(4)
	Whole sample	**OO**	**OU**	**UU**	**UO**
SOA	**81.70%**	**72.74%**	**57.09%**	**50.10%**	**90.67%**
BDR	0.1830 **	0.2726	0.4291 *	0.4990 **	0.0933
	(0.091)	*(0.291)*	*(0.223)*	*(0.188)*	*(0.146)*
EBIT_TA	-0.0594	-0.1812	-0.0917	0.0120	0.9388 ***
	(0.044)	*(0.153)*	*(0.219)*	*(0.044)*	*(0.099)*
MB	-0.0229 **	-0.0684 **	0.0170	0.0026	-0.0988 **
	(0.009)	*(0.03)*	*(0.023)*	*(0.012)*	*(0.033)*
DEP_TA	0.2323	-3.7734 *	0.2645	-0.3683	-4.9155 **
	(0.266)	*(1.822)*	*(0.434)*	*(0.318)*	*(2.056)*
lnTA	-0.0533	-0.1682 **	0.0414	0.0087	-0.2034 ***
	(0.034)	*(0.064)*	*(0.029)*	*(0.039)*	*(0.066)*
RD_TA	0.2979	3.7376	0.6767	0.0347	5.6680 *
	(0.188)	*(4.887)*	*(0.528)*	*(0.427)*	*(2.815)*
RD_DUM	0.0720	0.0000	0.0000	0.0045	0.0000
	(0.047)	*omitted*	*omitted*	*(0.004)*	*omitted*
Constant	1.0797 *	3.4598 ***	-0.4554	-0.0403	3.7676 ***
	(0.57)	*(0.955)*	*(0.454)*	*(0.676)*	*(1.106)*
FE	Yes	Yes	Yes	Yes	Yes
N (companies)	181	20	9	28	12
N (observations)	699	82	38	110	42
R-sq (within)	0.1602	0.3455	0.405	0.1946	0.6511

Table 16 – Same Industry

Results of the regression to determine the SOA based on the lagged BDR and a vector of lagged firm characteristics ($X_{i,t}$) (see equation (5)) for a subsample of acquirers and targets in the same industry. The first row contains the SOA, which is calculated by subtracting the coefficient for BDR from one. Column (0) shows results for the whole sample, column (2) for OO (overleveraged acquirer and target), column (3) for OU (overleveraged acquirer and underleveraged target), column (4) for UU (underleveraged acquirer and target), and column (4) for UO (underleveraged acquirer and overleveraged target). ***, **, and * denote significance at the 1%, 5% and 10% level respectively, and standard errors are presented in parenthesis below.

	(0)	(1)	(2)	(3)	(4)
	Whole sample	**OO**	**OU**	**UU**	**UO**
SOA	**74.19%**	**75.69%**	**76.36%**	**49.32%**	**68.74%**
BDR	0.2581 ***	0.2431 *	0.2364 **	0.5068 ***	0.3126 ***
	(0.076)	*(0.131)*	*(0.1)*	*(0.082)*	*(0.111)*
EBIT_TA	-0.0633	-0.1463	0.0324	-0.0636 ***	0.0335
	(0.103)	*(0.243)*	*(0.097)*	*(0.023)*	*(0.067)*
MB	-0.0074	0.0117	-0.0495	0.0003	0.0041
	(0.012)	*(0.058)*	*(0.032)*	*(0.006)*	*(0.015)*
DEP_TA	-0.4544	-1.7551	0.7594	-0.3868	0.6162
	(0.567)	*(1.159)*	*(1.087)*	*(0.37)*	*(0.586)*
lnTA	0.0058	-0.0431	-0.0073	0.0364	0.0089
	(0.027)	*(0.057)*	*(0.039)*	*(0.03)*	*(0.036)*
RD_TA	-0.0560	-1.3982	0.5199	0.0077	-0.4510
	(0.225)	*(0.878)*	*(0.372)*	*(0.151)*	*(0.442)*
RD_DUM	0.0293	-0.0603	0.0848 ***	0.0037	0.0556
	(0.06)	*(0.312)*	*(0.017)*	*(0.004)*	*(0.065)*
Constant	0.1703	1.1712	0.4306	-0.4652	-0.0227
	(0.474)	*(1.069)*	*(0.67)*	*(0.508)*	*(0.607)*
FE	Yes	Yes	Yes	Yes	Yes
N (companies)	233	57	34	75	50
N (observations)	991	232	146	318	225
R-sq (within)	0.0815	0.0979	0.0877	0.2856	0.1354

Table 17 – Economic Expansion

Results of the regression to determine the SOA based on the lagged BDR and a vector of lagged firm characteristics ($X_{i,t}$) (see equation (5)) including a dummy for years of economic expansion. The first row contains the SOA, which is calculated by subtracting the coefficient for BDR from one. Column (0) shows results for the whole sample, column (2) for OO (overleveraged acquirer and target), column (3) for OU (overleveraged acquirer and underleveraged target), column (4) for UU (underleveraged acquirer and target), and column (4) for UO (underleveraged acquirer and overleveraged target). ***, **, and * denote significance at the 1%, 5% and 10% level respectively, and standard errors are presented in parenthesis below.

	(0)	(1)	(2)	(3)	(4)
	Whole sample	**OO**	**OU**	**UU**	**UO**
SOA	**71.75%**	**73.15%**	**77.70%**	**52.97%**	**64.30%**
BDR	0.2825 ***	0.2685 **	0.2230 **	0.4703 ***	0.3570 ***
	(0.046)	*(0.115)*	*(0.094)*	*(0.061)*	*(0.07)*
EBIT_TA	-0.0235	-0.0711	-0.0629	-0.0455 *	0.0011
	(0.041)	*(0.149)*	*(0.075)*	*(0.024)*	*(0.048)*
MB	-0.0140 **	0.0055	-0.0535 ***	-0.0009	0.0054
	(0.007)	*(0.03)*	*(0.016)*	*(0.004)*	*(0.017)*
DEP_TA	0.0833	-1.2166	0.2662	-0.2663	0.8183
	(0.235)	*(1.078)*	*(0.715)*	*(0.204)*	*(0.533)*
lnTA	0.0058	-0.0448	0.0342	0.0192	0.0059
	(0.013)	*(0.046)*	*(0.031)*	*(0.021)*	*(0.028)*
RD_TA	-0.1951	-1.3181 **	-0.0264	0.0366	-0.5151
	(0.141)	*(0.508)*	*(0.249)*	*(0.154)*	*(0.357)*
RD_DUM	0.0072	-0.0577	0.0943 ***	-0.0026	-0.0686
	(0.028)	*(0.194)*	*(0.014)*	*(0.009)*	*(0.079)*
Econ. Expansion	-0.0045	-0.0331 ***	0.0086	0.0028	-0.0027
	(0.004)	*(0.013)*	*(0.015)*	*(0.005)*	*(0.009)*
Constant	0.1492	1.1961	-0.2151	-0.1891	0.0687
	(0.236)	*(0.857)*	*(0.512)*	*(0.35)*	*(0.477)*
FE	Yes	Yes	Yes	Yes	Yes
N (companies)	771	98	68	181	98
N (observations)	3206	407	276	780	432
R-sq (within)	0.1094	0.096	0.1486	0.2449	0.1562

Table 18 – Early Sample

Results of the regression to determine the SOA based on the lagged BDR and a vector of lagged firm characteristics ($X_{i,t}$) (see equation (5)) for a subsample from 1989 to 2004. The first row contains the SOA, which is calculated by subtracting the coefficient for BDR from one. Column (0) shows results for the whole sample, column (2) for OO (overleveraged acquirer and target), column (3) for OU (overleveraged acquirer and underleveraged target), column (4) for UU (underleveraged acquirer and target), and column (4) for UO (underleveraged acquirer and overleveraged target). ***, **, and * denote significance at the 1%, 5% and 10% level respectively, and standard errors are presented in parenthesis below.

	(0)	(1)	(2)	(3)	(4)
	Whole sample	**OO**	**OU**	**UU**	**UO**
SOA	**68.51%**	**74.95%**	**85.19%**	**57.69%**	**68.77%**
BDR	0.3149 ***	0.2505 **	0.1481	0.4231 ***	0.3123 ***
	(0.052)	*(0.124)*	*(0.107)*	*(0.069)*	*(0.099)*
EBIT_TA	-0.0260	-0.1102	-0.2105	-0.0388	-0.0443
	(0.064)	*(0.219)*	*(0.229)*	*(0.03)*	*(0.078)*
MB	-0.0171 **	0.0158	-0.0148	-0.0058	-0.0269
	(0.007)	*(0.056)*	*(0.014)*	*(0.005)*	*(0.019)*
DEP_TA	0.0627	-1.0669	1.8484 ***	-0.5764 *	0.2847
	(0.262)	*(1.144)*	*(0.669)*	*(0.306)*	*(0.427)*
lnTA	-0.0140	-0.0513	-0.0342	-0.0116	-0.0340
	(0.023)	*(0.055)*	*(0.032)*	*(0.026)*	*(0.033)*
RD_TA	-0.1811	-1.5745 **	-0.2392	-0.1613 **	-0.9167 *
	(0.17)	*(0.743)*	*(0.305)*	*(0.072)*	*(0.551)*
RD_DUM	-0.0363	-0.1649	0.0000	-0.0172	-0.0598
	(0.031)	*(0.132)*	*omitted*	*(0.011)*	*(0.063)*
Constant	0.4766	1.2657	0.8016	0.3602	0.8057
	(0.388)	*(0.93)*	*(0.529)*	*(0.438)*	*(0.546)*
FE	Yes	Yes	Yes	Yes	Yes
N (companies)	539	73	43	109	81
N (observations)	1761	262	139	361	272
R-sq (within)	0.1355	0.1	0.4091	0.2218	0.1851

Table 19 – Late Sample

Results of the regression to determine the SOA based on the lagged BDR and a vector of lagged firm characteristics ($X_{i,t}$) (see equation (5)) for a subsample from 2005 to 2019. The first row contains the SOA, which is calculated by subtracting the coefficient for BDR from one. Column (0) shows results for the whole sample, column (2) for OO (overleveraged acquirer and target), column (3) for OU (overleveraged acquirer and underleveraged target), column (4) for UU (underleveraged acquirer and target), and column (4) for UO (underleveraged acquirer and overleveraged target). ***, **, and * denote significance at the 1%, 5% and 10% level respectively, and standard errors are presented in parenthesis below.

	(0)	(1)	(2)	(3)	(4)
	Whole sample	**OO**	**OU**	**UU**	**UO**
SOA	**73.93%**	**38.86%**	**96.64%**	**46.16%**	**72.19%**
BDR	0.2607 ***	0.6114 ***	0.0336	0.5384 ***	0.2781 **
	(0.088)	*(0.088)*	*(0.09)*	*(0.091)*	*(0.122)*
EBIT_TA	-0.0190	0.0822	0.1529 ***	-0.0744 *	0.0274
	(0.026)	*(0.07)*	*(0.051)*	*(0.042)*	*(0.044)*
MB	0.0025	-0.0145	0.0043	0.0306 **	0.0051
	(0.009)	*(0.012)*	*(0.052)*	*(0.013)*	*(0.021)*
DEP_TA	0.9756 **	-0.1852	1.1340	0.6672	1.8062
	(0.38)	*(0.502)*	*(1.295)*	*(0.538)*	*(1.524)*
lnTA	0.0149	-0.0076	0.0389	0.0251	0.0344
	(0.014)	*(0.04)*	*(0.074)*	*(0.023)*	*(0.049)*
RD_TA	-0.2019	-2.4748 *	-0.1620	0.1050	0.2525
	(0.144)	*(1.353)*	*(0.708)*	*(0.149)*	*(0.39)*
RD_DUM	0.0646 *	0.3934 ***	0.0609	-0.0005	0.0000
	(0.038)	*(0.024)*	*(0.043)*	*(0.007)*	*omitted*
Constant	-0.0958	0.1774	-0.3244	-0.4092	-0.4921
	(0.251)	*(0.706)*	*(1.342)*	*(0.413)*	*(0.889)*
FE	Yes	Yes	Yes	Yes	Yes
N (companies)	347	34	24	86	41
N (observations)	1533	149	103	385	195
R-sq (within)	0.1139	0.3781	0.0432	0.3299	0.1136

Table 20 – No Fixed Effects

Results of the regression without fixed effects to determine the SOA based on the lagged BDR and a vector of lagged firm characteristics ($X_{i,t}$) (see equation (5)). The first row contains the SOA, which is calculated by subtracting the coefficient for BDR from one. Column (0) shows results for the whole sample, column (2) for OO (overleveraged acquirer and target), column (3) for OU (overleveraged acquirer and underleveraged target), column (4) for UU (underleveraged acquirer and target), and column (4) for UO (underleveraged acquirer and overleveraged target). ***, **, and * denote significance at the 1%, 5% and 10% level respectively, and standard errors are presented in parenthesis below.

	(0)	(1)	(2)	(3)	(4)
	Whole sample	**OO**	**OU**	**UU**	**UO**
SOA	**10.84%**	**0.71%**	**46.74%**	**15.83%**	**19.02%**
BDR	0.8916 ***	0.9929 ***	0.5326 ***	0.8417 ***	0.8098 ***
	(0.033)	*(0.071)*	*(0.048)*	*(0.047)*	*(0.067)*
EBIT_TA	0.0001	0.1600	0.7123 ***	-0.0817 ***	0.0486
	(0.043)	*(0.282)*	*(0.092)*	*(0.03)*	*(0.077)*
MB	0.0108 *	-0.0114	0.0522 ***	0.0011	-0.0059
	(0.006)	*(0.028)*	*(0.014)*	*(0.008)*	*(0.018)*
DEP_TA	0.1582	0.2019	-0.4075 *	0.6774	0.2386
	(0.158)	*(0.384)*	*(0.237)*	*(0.428)*	*(0.218)*
lnTA	0.0031	-0.0058	-0.0595 ***	0.0122 ***	0.0124 **
	(0.002)	*(0.005)*	*(0.006)*	*(0.004)*	*(0.006)*
RD_TA	-0.0313	0.0074	-1.1100 ***	-0.1400	-0.0945
	(0.058)	*(0.482)*	*(0.24)*	*(0.165)*	*(0.162)*
RD_DUM	0.0004	-0.0158	0.0435 ***	-0.0155	-0.0243 *
	(0.008)	*(0.017)*	*(0.009)*	*(0.016)*	*(0.014)*
Constant	-0.0390	0.1169	1.2137 ***	-0.1843 **	-0.1513 *
	(0.033)	*(0.083)*	*(0.133)*	*(0.074)*	*(0.086)*
FE	No	No	No	No	No
N (companies)	323	20	5	28	26
N (observations)	1190	84	19	127	126
R-sq (within)	0.0939	0.1156	0.4363	0.4134	0.1756

Table 21 – Payment with Cash Only

Results of the regression to determine the SOA based on the lagged BDR and a vector of lagged firm characteristics ($X_{i,t}$) (see equation (5)) for a subsample of firms that only paid with cash for the transaction. The first row contains the SOA, which is calculated by subtracting the coefficient for BDR from one. Column (0) shows results for the whole sample, column (2) for OO (overleveraged acquirer and target), column (3) for OU (overleveraged acquirer and underleveraged target), column (4) for UU (underleveraged acquirer and target), and column (4) for UO (underleveraged acquirer and overleveraged target). ***, **, and * denote significance at the 1%, 5% and 10% level respectively, and standard errors are presented in parenthesis below.

	(0)	(1)	(2)	(3)	(4)
	Whole sample	**OO**	**OU**	**UU**	**UO**
SOA	**66.65%**	**86.65%**	**71.92%**	**51.42%**	**64.95%**
BDR	0.3335 ***	0.1335	0.2808 **	0.4858 ***	0.3505 ***
	(0.056)	*(0.097)*	*(0.133)*	*(0.071)*	*(0.072)*
EBIT_TA	-0.1962 **	-0.4098 ***	-0.0713	-0.0638	0.0406
	(0.078)	*(0.125)*	*(0.163)*	*(0.044)*	*(0.066)*
MB	0.0115	0.0645 *	-0.0565	0.0037	-0.0207
	(0.009)	*(0.033)*	*(0.044)*	*(0.012)*	*(0.024)*
DEP_TA	-0.4994	-1.6119	-1.6240 **	0.5732	0.9131
	(0.464)	*(1.077)*	*(0.755)*	*(0.72)*	*(1.244)*
lnTA	-0.0225	0.0119	-0.0061	-0.0149	-0.0061
	(0.016)	*(0.051)*	*(0.027)*	*(0.025)*	*(0.046)*
RD_TA	-0.1665	-0.2432	-0.2667	0.0410	-0.1817
	(0.228)	*(1.365)*	*(0.708)*	*(0.29)*	*(0.397)*
RD_DUM	-0.0032	0.0000	0.0630 ***	-0.0075	-0.1665 ***
	(0.03)	*omitted*	*(0.013)*	*(0.013)*	*(0.06)*
Constant	0.6194 **	0.2090	0.5421	0.3675	0.3163
	(0.308)	*(0.877)*	*(0.493)*	*(0.455)*	*(0.804)*
FE	Yes	Yes	Yes	Yes	Yes
N (companies)	357	44	42	95	49
N (observations)	1572	197	180	407	233
R-sq (within)	0.1621	0.3057	0.1645	0.251	0.2546

Table 22 – Payment with Stock Only

Results of the regression to determine the SOA based on the lagged BDR and a vector of lagged firm characteristics ($X_{i,t}$) (see equation (5)) for a subsample of firms that only paid with stock for the transaction. The first row contains the SOA, which is calculated by subtracting the coefficient for BDR from one. Column (0) shows results for the whole sample, column (2) for OO (overleveraged acquirer and target), column (3) for OU (overleveraged acquirer and underleveraged target), column (4) for UU (underleveraged acquirer and target), and column (4) for UO (underleveraged acquirer and overleveraged target). ***, **, and * denote significance at the 1%, 5% and 10% level respectively, and standard errors are presented in parenthesis below.

	(0)	(1)	(2)	(3)	(4)
	Whole sample	**OO**	**OU**	**UU**	**UO**
SOA	**76.69%**	**45.22%**	**100.22%**	**55.88%**	**59.16%**
BDR	0.2331 ***	0.5478 ***	-0.0022	0.4412 ***	0.4084 *
	(0.073)	*(0.098)*	*(0.136)*	*(0.072)*	*(0.202)*
EBIT_TA	0.0225	0.0870 *	-0.0183	-0.0525 **	0.0571
	(0.028)	*(0.046)*	*(0.088)*	*(0.023)*	*(0.127)*
MB	-0.0205 **	-0.0286 *	-0.0548 **	-0.0040	0.0173
	(0.01)	*(0.016)*	*(0.024)*	*(0.004)*	*(0.021)*
DEP_TA	0.2691	0.5987	1.6898	-0.6280	1.1187
	(0.355)	*(0.807)*	*(1.05)*	*(0.531)*	*(0.932)*
lnTA	0.0262 *	-0.1106 **	0.0815	0.0634 *	0.0082
	(0.014)	*(0.049)*	*(0.081)*	*(0.035)*	*(0.057)*
RD_TA	-0.1560	-3.7999 **	0.1907	0.2483	-0.8342
	(0.177)	*(1.653)*	*(0.2)*	*(0.276)*	*(0.607)*
RD_DUM	-0.0117	-0.2433	0.0000	0.0080 ***	0.0123
	(0.045)	*(0.171)*	*omitted*	*(0.001)*	*(0.107)*
Constant	-0.1759	2.2131 **	-0.9270	-0.9483	-0.0396
	(0.249)	*(0.857)*	*(1.275)*	*(0.602)*	*(0.982)*
FE	Yes	Yes	Yes	Yes	Yes
N (companies)	247	29	17	69	25
N (observations)	1037	102	69	309	111
R-sq (within)	0.1146	0.3686	0.3086	0.3031	0.1961

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