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The impact of reduced ownership control on the M&A currency decision

Empirical study of the payment method choice in corporate acquisitions

Caspar Seip Blakstad & Håkon Nordberg

Supervisor: Karin S. Thorburn

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NORWEGIAN SCHOOL OF ECONOMICS

Abstract

This thesis seeks to expand the knowledge on key determinants for the payment method choice in corporate takeovers. Specifically, we examine the importance of ownership control for the financing choice. While most previous studies have taken a static acquirer-focused approach when investigating the importance of corporate control, we also take the target's ownership characteristics into account to measure the real impact on acquiring shareholders. We expect acquiring shareholders that face serious dilution of influence to have a reluctance for equity-financed acquisitions. We empirically test this using a comprehensive, global sample of 1,909 acquisitions announced between 2008 and 2014. Our sample consists of public companies, that were matched with extensive and detailed pre-deal ownership structures to test for the importance of maintaining corporate control after the acquisition.

We propose a segmentation of control - into absolute and relative component parts - and introduce two new variables to measure them in the payment method equation. The variables seek to capture a more dynamic mechanism of control concerns than previously accounted for. Our findings suggest that acquiring shareholders do care about maintaining control, both *relative* and *absolute* control, as both our proposed dynamic ownership variables significantly reduce the probability of observing stock-financed acquisitions. These findings prove robust after controlling for numerous deal-, acquirer- and target specific characteristics proven by related studies to affect the payment method choice. We find weaker evidence for the importance of control concerns for the *fraction* of shares offered in the consideration. The latter finding suggests that bidding shareholders will stay clear of diluting payment methods altogether if they are faced with the threat of losing control, but that maintaining corporate control is a weaker determinant of stock usage at the *margin*. Previous studies have proven an effect of ownership structures, but our findings suggest that the *real* dilution of influence acquiring shareholders will experience has an effect on the choice of offering shares at the outset. Further, we find supporting evidence for the importance of *information asymmetries*, *cash availability* and *acquirer capital structure*. On the other hand, we do not find evidence supporting the importance of *target financials* or the *investment opportunities hypothesis* in our empirical analysis.

Keywords: Mergers and acquisitions, Method of payment, Corporate governance, Ownership structure, Corporate control, Corporate finance

Contents

Preface

With this thesis we complete our Masters of Science in Economics & Business Administration at the Norwegian School of Economics (NHH).

Majoring in Financial Economics, we wanted our thesis to: 1) demand a variety of financial, statistical and econometric skills to reflect our interests and academic background, and 2) be interesting and potentially relevant for others. A bottom-up empirical study of the complex M&A-field requires a broad set of what we have learned at NHH, and thus satisfying the former criteria. Given the vast amount of M&As that are being conducted in today's business landscape, we found the market for corporate control to be the most intriguing real-life case-study for numerous of the corporate finance theories we have studied. Regarding the latter criteria on relevance, we wish to extend our deepest gratitude to our supervisor Karin Thorburn. Our angle and research question emerged through productive discussions with her, where she provided invaluable input on our hypotheses and helped to identify uncovered grounds in this vast research field.

Working with this thesis has been challenging, but yet highly rewarding. After over 2000 lines of Stata programming codes we reached the final data set of 1,909 deals with detailed and unique information on shareholders, company financials and other deal characteristics. Combining multiple data sources and constructing the logical structures for the new variables introduced, represented the two most demanding programming challenges. For us, this was an interesting indication (in light of the current curriculum debate at NHH) that perhaps the best way to learn effective programming is on a learning-by-doing basis. Further, it was fascinating to see how the depth of our analysis continued to grow with new possibilities in the data, as well as in the literature.

In addition to Karin Thorburn, who generously has shared on her M&A and corporate finance expertise, we also wish to thank Eric de Bodt from the University of Lille. He provided us with the historical ownership database that was absolutely key for answering our research question on the importance of corporate control for the M&A currency decision.

Bergen, December 19, 2016

Caspar Seip Blakstad

Håkon Nordberg

1 Introduction

In 2015, global merger & acquisition (M&A) deal value spiked to 4.7 trillion USD - a new all-time high and $\sim$12% of global GDP (Thomson et al. (2016)). Given its tremendous size, it is only natural that the market for corporate control has been one of the main focus areas for financial academics. However, most M&A research has traditionally been focused on pricing and market reactions (Rappaport & Sirower (1999)), while the M&A payment decision has received less attention in comparison. We begin this section by providing three (non-exhaustive) arguments for why it is important to understand the payment method choice and its determinants.

When structuring the acquisition, the bidder is faced with the choice between stock and cash as the main ingredients of the deal consideration. But since the bidder is unlikely to have sufficient internal funds to finance a cash bid, the choice (from a bidder-perspective) is really between debt and equity financing. Since the M&A financing decision is a matter of public record, it serves as an ideal case example of how firms prefer to finance major investments (Amihud et al. (1990)). Thus, a deeper understanding of the M&A payment method choice can also improve the insights of more general corporate finance issues (e.g. corporate governance, agency costs, capital structure), outside the M&A-sphere.

Secondly, the chosen form of consideration can have significant effects on shareholder wealth. Travlos (1987) found significant differences in announcement returns depending on the method of payment. Similar to a seasoned equity offering, a stock-financed acquisition may signal to the market that the firm's equity is overvalued. Thus, on average, a stock-financed deal is met with significantly negative announcement returns, in contrary to cash offers. This finding provides a motivation to understand why acquirers may still prefer equity-financed deals, despite the negative effects on shareholder wealth. It should be added that this traditional view on return effects from stock-financed acquisitions was recently expanded by Golubov et al. (2015). They found that the payment decision did not explain the bidder stock price reaction after controlling for the equity issue component. However, there is convincing evidence that stock-financed acquisitions experience lower average announcement returns compared to cash deals. Even though the reason may solely be the similarities to an equity offering, we still regard the implications for shareholder wealth as an important motivation for the study.

Thirdly, the M&A currency decision naturally has serious financial, operational and corporate control implications for the parties involved. Maybe the most important implication, as Rappaport & Sirower (1999) argue, is the degree of post-deal risk sharing in the underlying synergy potential. In a cash-deal, the entire risk of not materializing the expected synergies is on the hands of the bidder-shareholders. A stock-deal, on the other side, implies some degree of risk-sharing in the post-deal performance. This fact highlights that the price paid in an acquisition is only one aspect of the puzzle. For decision makers and other agents, the structuring of the consideration is equally crucial to understand.

Given its importance, the payment method choice has indeed received growing interest over the years. Obviously, each M&A negotiation is complicated and has its own unique characteristics. But corporate finance academics

have found several aspects related to the deal and parties involved that, on average, affect the cash vs. stock decision. Among the most well-established hypothesises are the importance of asymmetric information, taxation effects and debt-financing constraints. In addition, the corporate control hypothesis is one of the most frequently highlighted determinants in M&A literature.

The M&A currency decision has vast ownership implications. From an acquiring shareholder's perspective, the payment decision is a choice between the significant risks involved in a cash deal (i.e. debt distress costs and materializing of synergies), against a potentially serious dilution of power and influence. For the target shareholder it is the tradeoff between liquidating the investment and remaining in the company.

Given the size of the transactions that is being conducted in the M&A landscape, a corporate acquisition can have enormous impacts in terms of displacement of ownership. And one thing is certain; in a share exchange deal, the acquiring shareholders will always have to yield power in the boardroom.

This takes us over to the thesis' main research question: What is the impact from such reduced influence on the payment method choice in corporate acquisitions?

We assume that certain shareholder types value control. Thus, we expect to find a reluctance for stock-financed takeovers following the potential of reductions in power, influence and voting rights. As we will see, this hypothesis is in the spirit of the findings in other related studies, but we seek to expand and improve the approach in measuring the impact.

While previous M&A studies mostly have focused on various static ownership variables, we specifically address the dynamic effects from reduced ownership influence through an acquisition. With this approach, we seek to expand the understanding of the importance of marinating corporate control for the payment method choice. Subordinately, we are curious to see whether our analysis will support previous literature on other determinants for the M&A currency decision.

We answer the above by:

(1) Taking advantage of a final sample constituting of 1,909 deals from Zephyr. A sizeable sample size is crucial for an empirical study like ours.

(2) Utilizing a comprehensive ownership database with historical ownership structures. Our chosen database has not, to our knowledge, been used in a study of the payment method choice in acquisitions before.

(3) Controlling for a significant amount of acquirer and target financial characteristics that increase the explanatory power and reduce the potential biases related to omitted variables.

(4) Introducing new variables on corporate control that captures mechanisms previously not controlled for in the M&A literature.

The thesis is structured as follows. Section 2 introduces relevant literature on the M&A currency decision, with a clear focus on literature addressing corporate control concerns. Section 3 examines the data sources and explains the data handling. We derive our experimental design in section 4. Section 5 introduces, and gives the empirical and theoretical foundation for the inclusion of the various financial and deal control variables. Next, we provide descriptive statistics of the sample in section 6. We construct the statistical models applied in section 7, while we present and interpret the results in section 8. We address the robustness of the results in section 9, and conclude the study in section 10.

2 Literature review

What drives the M&A currency decision? This research question has received growing academic interest ever since the takeover waves of the 1980s. Given its importance, corporate finance academics have sought to determine which firm and deal characteristics that can explain the M&A financing decision. In this review we will focus on studies that have sought to establish the relation between payment method and corporate control and governance concerns. Naturally, there are numerous other important determinants that help explain the choice of stock or cash in addition to corporate control motives. Literature specifically addressing and explaining other determinants that we use as control variables (information asymmetry, investment opportunities, and debt financing constraints, among others) will mainly be cited in the *Variables* section.

The first studies that theoretically addressed corporate control motives in relation to the M&A financing decision were Harris & Raviv (1988) and Stulz (1988). The theory developed by Stulz (1988) has been especially important for later research on the effect of corporate control concerns. His model shows that the fraction of managerial voting rights is key to understand how firms choose to finance investments in general. The hypothesis is that management's desire for control will lead to a preference for debt-financing, rather than issuing diluting equity. The risk of losing control rises when their fraction of the voting shares falls, as will occur in a stock-financed acquisition. Harris & Raviv (1988) focus on similar control concerns in relation to capital structure decisions, but argue that increased debt levels may also reduce management's control over the firm. This is due to higher bankruptcy risks and the claim debt owners have on future cash flows. Consequently, the tradeoff between control (voting rights) and the above implications from gearing, makes the effect on the financing choice ambiguous. This called for empirical studies on their relative importance.

Rather than investigating general ownership dilution, most empirical research on the importance of maintaining corporate control for the M&A currency decision has followed Stulz (1988) and focused on managerial ownership. Amihud et al. (1990) was one of the first empirical studies that tested an early version of the Stulz (1988) theory on the effect of managerial ownership on the payment method choice. With a final sample of 209 U.S. acquisitions completed between 1981 and 1983 involving public targets, the authors find supporting evidence for (aspects of) the Stulz (1988) hypothesis. Specifically, they find a significantly negative relation between the probability of stock-financing and the fraction of managerial ownership in the acquiring firm. In addition to management's desire to prevent dilution of control, the authors relate this result to asymmetric information. Managers in the acquiring firm with assumed inside information will be reluctant to pay with stock when they believe their shares are undervalued, because they would have to share the post-deal revaluation gains with target shareholders.

Martin (1996) complements the above findings on managerial ownership, in addition to testing several other hypothesizes on payment determinants. His final sample consists of 846 U.S. domestic acquisitions, of public and private targets, completed between 1978 and 1988. In spirit of Stulz (1988), Martin (1996) finds a significantly negative relation between bidder-firm managerial ownership and the likelihood of stock-financing. But in contrast to Amihud et al. (1990), he finds a nonlinear relationship. The result is appealing; bidder-management only cares

about the form of consideration when they are in a vulnerable control-position. The probability of stock-financing is only negatively affected by management's shareholdings when their ownership is in the intermediate range of 5% to 25%. For high (unconcerned about dilution) and low ownership stakes (limited influence on the choice) outside this range he finds that management ownership is not significantly related to the payment method choice. While the majority of later studies support these findings, Zhang (2001) is one of few studies that fails to find any evidence supporting the managerial ownership hypothesis. According to Swieringa & Schauten (2007) this could be due to the generally low managerial ownership stakes in Zhang (2001)'s relatively small sample of listed companies.

Another acquirer-ownership characteristic Martin (1996) controls for is the presence of institutional owners and blockholders. The argument is from Jensen (1991) that these active investors are better suited to undertake costly monitoring of management. This monitoring may involve the structuring of corporate acquisitions. In particular, the potential to prevent managers from choosing stock-financed deals that on average exhibits negative abnormal announcement returns (Travlos (1987)), with associated negative wealth effects for the acquiring shareholders (in addition to dilution threats). Indeed, Martin (1996) finds that the probability of stock financing a deal is significantly lower when institutional shareholdings and blockholdings are higher. On the other side, Karampatsas et al. (2014) do not find supporting evidence for the effect of large and active shareholders on the method of payment.

Ghosh & Ruland (1998) extend the Martin (1996) analysis by also studying the effect of target management's shareholdings on the exchange medium. With a sample of mergers between U.S. public firms in the 1980s, they test the hypothesis that targets with substantial management shareholdings will prefer a stock-dominated consideration in order to maintain influence in the combined entity. Indeed, they find strong supporting evidence for this suggestion. Moreover, they find that target management job retention is significantly higher in stock-financed acquisitions, and argue that this result is the main explanation for the preference towards stock. Interestingly, the authors find that high target management ownership is a more important determinant for the method of payment than bidder-management ownership. Most studies on control considerations tend to focus on acquirer-characteristics, so this result is important to bear in mind.

Faccio & Masulis (2005) investigate which bidder, target and deal characteristics that affect the method of payment in European M&As. With a large sample of 3667 European takeover bids announced between 1997 and 2000, the study assesses the tradeoff between corporate control motives and debt financing constraints. The desire to maintain control is expected to increase the probability of cash-financing, while limited debt capacity will increase the need for a share exchange. The explicit focus on this important tradeoff is in the spirit of Stulz (1988) and Harris & Raviv (1988). While most previous literature has focused on U.S. acquisitions, this study highlights some advantages of studying the European M&A arena. Most notably, European corporations are characterized by having more concentrated ownership structures than U.S. firms (Faccio and Lang 2002). This makes European acquisitions ideal to test the control hypothesis, because one can expect to observe stronger effects when ownership is concentrated. Unlike most other empirical studies that examine the importance of control motives, this study

does not strictly link the hypothesis to managerial ownership, but to the strength (i.e. voting control) of the controlling shareholder. This approach makes the study especially relevant for our thesis, since we also investigate a wider scope of different ownership measures.

After performing both Tobit and ordered Probit regressions the study concludes that the corporate control motive is a significant negative driver for the probability of stock-financing when the dominant bidder-shareholder is in the 20% to 60% ownership range. Although the study investigates different types of owners, this finding supports the conclusion in Martin (1996); that fear of dilution only seems to matter when the acquiring shareholder is in a vulnerable control-position. In regards to the debt-financing constraints side of the tradeoff, the authors find that all their chosen financial control variables are significant and robust determinants. This is in line with Martin (1996), but the results are stronger and more robust than previous studies. Thus, Faccio & Masulis (2005) provide strong evidence in favor of the tradeoff between corporate control motives and debt financing constraints.

Swieringa & Schauten (2007) follow the same methodology as Faccio & Masulis (2005) on a sample of Dutch M&As completed between 1996 and 2005. Their findings strongly support the nonlinear relation between the fraction of closely held shares and payment method. Bidders in which the dominant shareholder is in the 20% to 60% ownership range are significantly less likely to offer stock as consideration because of corporate control concerns (Faccio & Masulis (2005)). However, Swieringa & Schauten (2007) fail to find supporting evidence for the above control vs. financial-constraints tradeoff as none of their financial variables have a significant impact on the payment method choice.

Despite this, it seems that the consensus view in the literature is that debt financing constraints play an important role in the financing choice. Karampatsas et al. (2014) find that the acquirer's credit rating is positively related to the use of cash as the main consideration. They argue that a higher credit rating, or even the existence of a credit rating, raises the bidder's borrowing capacity through better access to public debt markets.

Returning to the dilution hypothesis, Faccio & Masulis (2005) make a solid effort to capture the real effect on corporate control following a stock-financed acquisition. They argue that acquiring shareholders are more vulnerable to losing control when they are acquiring a big target with a dominant shareholder, and calculate the post-deal ownership stake for the biggest target shareholder. Acquiring shareholders are expected to dislike the prospects of creating a new blockholder in the combined company, and will thus be reluctant to offer shares in the presence of this threat. Controlling for this impact expands the focus of prior literature by incorporating a more dynamic mechanism in the structuring of the deal. However, the authors do not establish significance for their dynamic loss of control variable. It should be noted that their study includes unlisted and private targets, and that the authors thus need to make some simplifying assumptions about the ownership structure for these types of targets due to lack of ownership data. In our opinion this inclusion is both a strength and a weakness of the analysis. We agree that private and subsidiary targets are likely to be characterized by concentrated ownership structures, which they assume to be 100% controlled by one shareholder, and thus carry bigger risk of creating a substantial owner in the merged company. However, the analysis is based on rough assumptions, and will most

likely be biased because of the relatively big impact from these target-types. One motivation for our thesis is to fill a gap by accurately incorporating the target's ownership structure into the payment method equation.

Overall, there seems to be an academic agreement that corporate control concerns definitely play a role in the M&A payment choice, as well as in capital structure decisions in general. However, there is still uncertainty regarding the importance of corporate control and which variables to apply in the regression models. While the earlier studies (Martin (1996), Amihud et al. (1990), Ghosh & Ruland (1998)) established an effect from managerial ownership, later studies (such as Faccio & Masulis (2005)) have introduced other ownership variables in the mix of determinants. Also, most studies have focused on static pre-deal acquirer ownership characterises, which might *indicate* whether the shareholders (incl. the management team) are vulnerable to dilution. But to our knowledge, no studies focus on the *actual* dilution effects of the deal. We argue that this impact is critical to account for when estimating the reluctance to pay with equity. In contrast to previous studies, we seek to *measure* the actual impact on control that will occur in an equity deal. Thus, we hope that our study may have the potential to expand the literature addressing the payment method choice.

3 Data

In order to develop a model explaining the M&A currency decision, with a particular focus on control motives, we needed to gather data from three separate databases. First, we demanded detailed information on a broad set of M&A deals. Next, these deals had to be paired with comprehensive historical ownership and financial data, for both parties involved. Here, we will first present each data source before explaining the process of combining them into a complete sample.

3.1 The M&A data

We utilize the *Zephyr* database constructed by Bureau Van Dijk (BVD) in this study. For a deal to be included in our raw M&A-sample the deals had to satisfy the following criteria:

(1) We required the deal to be classified as an *acquisition*.[1] This includes any transaction where the *acquirer* ends up with 50% or more of the equity of the *target*. By definition, the stake acquired can be small as long as the acquirer ends up with the controlling stake in the target. This classification requirement effectively excludes other various corporate control transactions such as *merger of equals*,[2] *buy outs/ins* and *minority stakes*, among others. The rationale for the deal type requirement is to isolate the effect in an acquisition, and not complicate the sample with other various transaction forms. This is in line with most other M&A payment method studies, such as Karampatsas et al. (2014).
(2) We required that the deal was announced between 1.1.2008 and 31.12.2014. The relevant time interval was effectively defined by the *ownership database*. We needed pre-deal ownership data on the companies involved, thus we lag the M&A time-interval relative to the *ownership database*.
(3) We required that the deal is classified as *completed*, *completed-assumed* or *announced*. We exclude *rumoured* deals.
(4) We required that the deal has a recorded *deal value* and *payment method segmentation*. Both requirements are obviously key to this study. *Zephyr* requires solid information on deal payment in order to include it, so a substantial number of deals disappear in this step.
(5) Finally, we did not impose any geographical restrictions on the deals included. We argue that the importance of reduced control applies to all firms and shareholders, independent of home country.

After conducting these steps, we were left with a raw M&A sample of 63,729 deals. *Zephyr* meets our initial data requirements, and since most other M&A studies applies the *SDC database* we offer a less common data-approach to the field.

[1] See Zephyr user guide on Deal Classification.
[2] A deal classified as a merger in Zephyr is by definition a share swap between equals.

3.2 The ownership data

Obtaining a solid ownership database with wide company coverage was of vital importance to this study. To answer the hypothesis on the importance of control and dilution motives we needed the ownership database to satisfy the following criteria:

(1) **Historical** ownership data. We demand full coverage of the ownership structure for both the acquirer and the target, *prior to the announcement of the acquisition*. The Bureau Van Dijk (BVD) ownership database (hereafter referred to as the *ownership database*) we apply contains historical annual ownership data from 2007 to 2012, thus defining the relevant time interval for the analysis.
(2) **Wide coverage** of global companies. Only a small minority of the covered companies can be expected to have engaged in M&A activity during the relevant time period. Thus, we needed a *big* database to cover an acceptable number of M&A-engaged companies. The *ownership database* contains 71,494 unique companies, thus comfortably satisfying this criteria.
(3) **Thorough** ownership structure data. In order to draw sound conclusions on the main research question, we needed information on the type of ownership in addition to the percentage stake held. The applied database is thoroughly constructed by BVD, using a variety of different sources to obtain reliable ownership information. In the following we will outline the key elements of the of the *ownership database*, and how we choose to utilize the information.

The ownership database seeks to track control relations, rather than patrimonial relations. Thus, the links connecting companies and shareholders are based on recorded *percentage voting rights*, excluding non-voting shares. This construction principle is ideal for our purpose as we define control as *voting rights* in line with other M&A studies.

There are two types of ownership relations in the database, established by direct and indirect links. A direct link is recorded when the shareholder is one level above the subject company. Indirect links allow for relations that are not direct and can involve numerous other entities between company and shareholder. Figure 1 below illustrates these two types of ownership. Note that the direct relation can only occur in one way, whereas the indirect relations can be formed in numerous complicated structures.

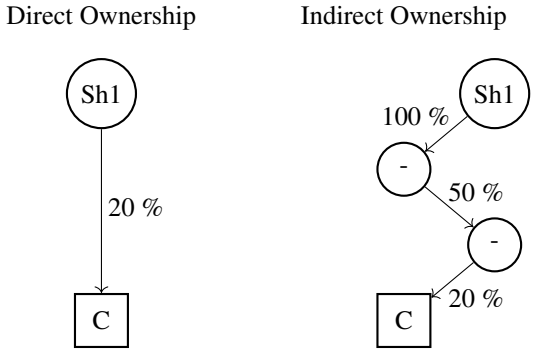


Figure 1: The two types of ownership in the *ownership database*

We will only consider the direct ownership in our analysis, based on the following economical arguments (in Appendix A.4 we provide the arguments on why this approach is also ideal from a data perspective):

(i) The shareholder's proximity to the company can only be known by using direct relations. This is because the database only reports the binary segmentation and thus an indirect relation could be any kind of path as illustrated above. Certainty about shareholder proximity is crucial when evaluating the effects of corporate control. We argue that the 1-level vicinity is beneficial since the shareholders must have the opportunity to be active in exercising corporate control.

(ii) We do not risk eliminating parts of the ownership structure for a company since the sum of the direct links for a firm must sum up to 100%.

Based on the above we now believe we have ownership data that optimally serves our research question.

3.3 Financial data

We needed quality historical financial data in order to have relevant control variables in the analysis. We limit our study to *public* companies since full ownership data for private firms is rare.[3] We extract financial data from the *Worldscope* database. The database is regarded to offer extensive and solid financial information on a wide range of global companies, thus meeting our requirements.

3.4 Constructing the data set

The starting point of the sample selection is the 63,729 deals from *Zephyr*. First, a deal is only included if we have the ownership structure of the acquirer at the time of the deal. We require that the ownership data must precede the announcement date to prevent the impact of the deal itself. We match each deal with the latest preceding annual ownership structure of the acquirer. However, we do not allow for an ownership match that is longer than two years prior to the deal. With these criteria, 26,540 out of the 63,729 initial deals could be matched with complete ownership structure on the acquirers.

Next, given our focus on ownership dynamics, we also require the deal to have full coverage on the ownership structure of the target. This step is where we deviate from the majority of other M&A studies. Enforcing the same matching criteria as above, we are left with 3,530 deals with complete ownership information on *both* the acquirer and the target company.

Prior to extracting financial variables from *Worldscope*, we needed to validate the data quality in order to not match deals that would be filtered away later. The data analysis showed an overall high quality with one small

[3] After matching deals with ownership data, we had a sample where approximately 95.9% of the bidders and 95.6% of the targets were public. See Appendix A.11.

exception; total *Deal Value* sometimes deviated from the sum of the different payment methods.[4] To make valid conclusions we needed precise information on the payment method, and especially in relation to total deal value. To investigate this further we calculated the following metric for each deal (*i*) and evaluated the mean for the entire sample:

$$Percentage\ deviation_i = \frac{Sum\ of\ payments\ methods_i\ -\ Deal\ Value_i}{Deal\ Value_i} * 100$$

$$\overline{Percentage\ deviation} = 8.12\%$$

We expected the average percentage deviation to be negative based on the hypothesis that it seemed more likely to have missing information on segments of the consideration, than the consideration itself. However, we found a positive mean percentage deviation of 8%. This deviation proved robust following a thorough assessment of possible pitfalls in the underlying data, including the removal of earnout components.

A plausible scenario is that the two variables may be recorded at different points in time with deal characteristics changing in between. We adapted to this imperfection by setting a threshold for what kind of percentage deviation we could accept and still be able to draw solid conclusions on the payment choice. We chose a 10 percent threshold and removed the data points with larger absolute deviation. This quality-assurance step excluded 860 deals in which we were not comfortable with the logical relation between the total deal value and the sum of payment methods. Following this exclusion, we were left with 2,670 remaining deals with significantly higher data quality.

Next, we needed a foundation of 22 financial variables for both acquirer and target on the remaining 2670 deals. As with the ownership requirements, requiring full financial data coverage on the target is different from most other M&A studies. However, as the *variables* section will justify, we think a complete target coverage enhances the strength of the analysis. This approach meant that we needed to extract a total of 117,480[5] financial data points from *Worldscope*. In addition, each point required an individual time lag relative to the deal time based on the characteristic of the variable. As a rule of thumb, we extracted fiscal year-end data prior to the announcement date for balance sheet items, and shorter lags for market data.[6] 756 deals were excluded in the extraction process due to insufficient financial coverage, leaving us with 1,911 deals.

Finally, in line with other M&A studies we excluded 2 deals with earnout components due to the uncertainty regarding this payment method. The insignificant number of earnouts in our sample is supported by Cain et al. (2011) who provide evidence that earnouts are rare in public deals.

The 1,909 public-to-public deals constituting the final sample exhibit the required characteristics of full coverage on financials and ownership for both acquirer and target. In addition, all deals have a trustworthy relation between the total method of payment and total deal value.

[4] Se Appendix A.3 for information on the different payment methods in the consideration, and how we classify the different segments.
[5] 2,670 deals * 2 parties * 22 financial variables = 117,480.
[6] See Appendix A.2 for full information.

4 Experimental Design

4.1 What we want to measure

We seek to test the hypothesis on the reluctance for stock payment when acquiring shareholders are faced with the prospects of reduced influence through an equity-financed acquisition. We uncovered in the review of the literature that Faccio & Masulis (2005) is the study with the most extensive effort to capture the effects of reduced control on the payment decision, and thus the study that is closest to ours. The authors logically argue that acquiring shareholders are most vulnerable to loss of control when the acquisition is a significant addition to the acquirer, and when the target has a concentrated ownership structure. They control for the reluctance to create a substantial blockholder in the combined firm with the CONTROL LOSS variable,[7] which measures the post-deal ownership stake for the biggest target-shareholder in the combined firm in the hypothetical case of a 100% stock-deal.

Our opinion is that this approach is incomplete and does not account for the real threat to acquiring shareholders. First, the variable does not account for the ownership structure of the acquiring firm. The potential impact that they account for may or may not be relevant, it all depends on how strong the acquiring shareholders are. Second, they only account for *one* target shareholder, when the real impact on acquiring shareholders will be the combined force that enters the new ownership structure. Third, the variable does not account for shareholder *types*. Not all acquiring shareholder types will care about dilution, and not all target shareholder types will impose a corporate control threat. Fourth, the authors assume that their unlisted targets are 100% controlled by one shareholder. If these targets are actually owned by several shareholders who do not act in unity, the variable is wrongly specified. Overall, we believe that measuring reduced control for an entire ownership structure with only one variable is inadequate.

We seek to address these weaknesses in our experimental design. The issue tree in Figure 2 summarizes our approach to the research question:

[7] The variable is a product of (1) Deal Value over the estimated value of the combined firm and (2) the target's controlling share block. For unlisted and subsidiary targets, the control block is assumed to be 100%. Swieringa & Schauten (2007) also deploy this variable in their study of Dutch M&As.

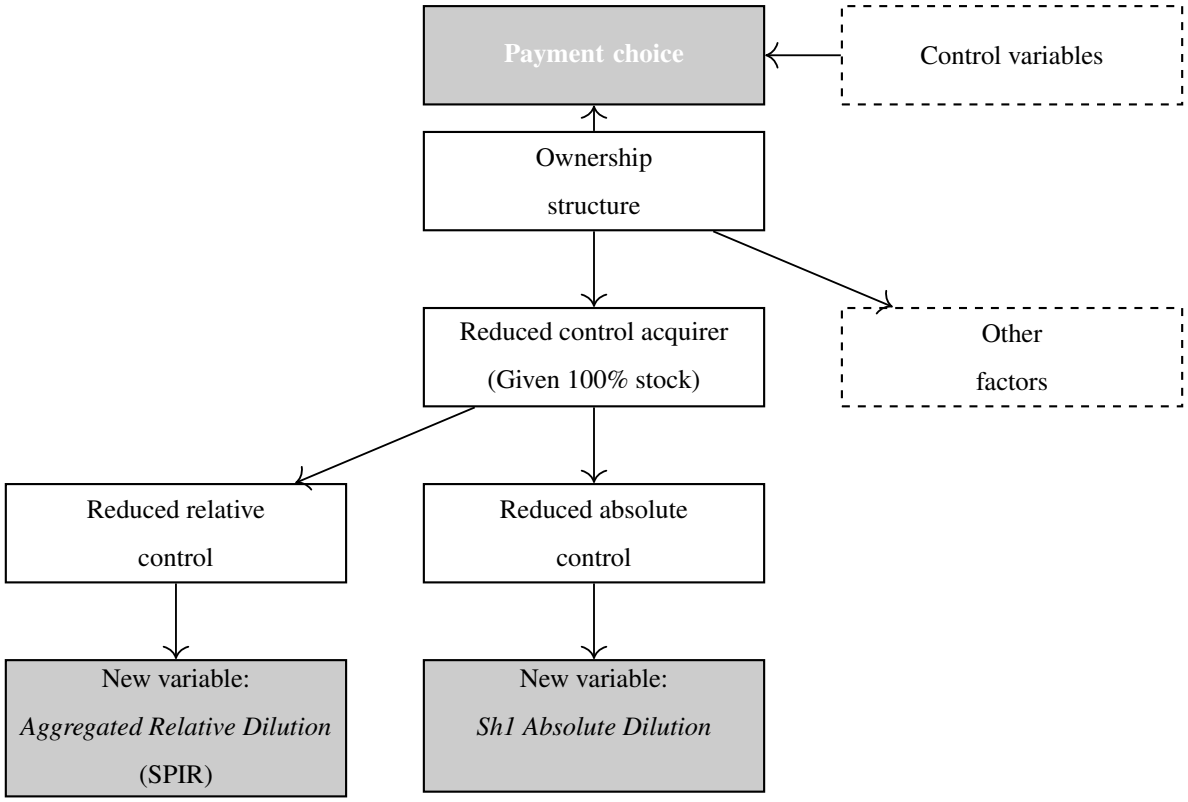


Figure 2: Issue tree on our research approach

In a broad sense, we want to investigate the effect of the ownership structure on the payment choice whilst including a sufficient amount of control variables. Ownership structure involves several characteristics, but the reluctance to experience reduced ownership control is the effect that we want to highlight in this thesis. In light of the above arguments, we introduce a segmentation of reduced control that is new to the field. We propose that reduced control should be segmented into both *absolute* terms and *relative* terms. The first aspect of corporate control is a shareholder's *absolute* percentage of voting rights, ignoring the interaction with other shareholders. We argue that by only focusing on the absolute stake held, one omits a vital part of the puzzle: *relative control*. *Relative control* is one shareholder's control position accounting for the remaining ownership structure of the company. The value of our proposed segmentation is that the two aspects of control may be independent of each other; one can by high while the other is low, and vice versa.[8] In addition, both control terms should matter for a shareholder's *real* influence.

We are interested in the reduction in these two segments of control, and thus we need to introduce two new variables in order to measure it. The proposed variables will have two important characteristics in common. They both represent the potential dilution in a 100% stock deal and they will only measure the effect on the acquiring shareholders that both *value* and *can exercise* control. We want to measure the reluctance to lose control which makes it most relevant to examine the potential outcome that creates the largest displacement in ownership control. In Appendix A.9 we can also see that 100% stock payment is common when the payment method is deployed,

[8]Consider a dominant shareholder with 10% ownership. This shareholder might have high relative control in a fragmented ownership structure. Consider also the opposite case, where the second largest shareholder has 20% ownership but is dominated by the largest shareholder.

and acquirers opening for stock negotiations are likely to have taken the possible implications of this scenario into account. The result will be two experimental and hypothetical variables that are comparable across deals. [9]

4.2 How we measure reduced absolute control

The absolute control component is easily quantified as the actual voting stake held by a certain shareholder. Hence, the reduction in *absolute* control through an acquisition is the percentage points reduction in voting rights. We impose two criteria for the variable: 1) the variable should represent the post-deal situation and account for the implications of the deal, and 2) we want to measure the effect for one specific shareholder. We argue that looking at aggregated reduction in absolute control is misleading since the number of shareholders the dilution is spread over may vary extensively. We propose the following $Sh1\ Absolute\ Dilution$ variable:

$$Absolute\ Dilution\ =\ (percentage\ voting\ rights\ pre\ deal)\ -\ (percentage\ voting\ rights\ post\ deal)^{10}$$

$$Sh1\ Absolute\ Dilution\ =\ absolute\ dilution\ for\ the\ largest\ acquirer\ shareholder$$

We see that criteria 1) is satisfied since the variable measures the post-deal impact. Condition 2) is met by measuring the reduction in absolute control for the largest acquirer shareholder. This shareholder will experience the largest control reduction in percentage points. It is also likely that the largest shareholder both *value* and *can* exercise control. Thus, measuring the effect for this shareholder should be sufficient to capture the overall shareholder reluctance to lose absolute control. As illustrated in the issue tree, the *Sh1 Absolute Dilution* measures the absolute component part of reduced control.

4.3 How we measure reduced relative control

4.3.1 The problem of measuring reduced relative control

Compared to absolute control, the relative control component is much more complex to measure. Ideally each shareholder should be evaluated in relation to all others, both before and after the deal. This could be modelled using several binary variables, but we want to quantify the ownership dynamics in a much more unified way.

To obtain a measure on the reduced relative control we propose a new variable. We impose the following criteria for the variable: 1) it should measure the reduction in relative control, 2) it must measure the reduction across several shareholders, 3) the reduction in relative control for dominating shareholders should be weighted more than minor shareholders, and 4) it should only measure the effect on the shareholders that both *value* and *can exercise* control.

[9] In section 9 *Assessment of robustness*, we will elaborate on why this assumption is also ideal from an econometric point of veiw.
[10] Se Appendix A.2 for details on the information and formulas used to calculate the post-deal ownership percentages.

4.3.2 The solution to measuring reduced relative control

Due to the complicated and subtle nature of relative control we need to find a proxy for this type of control reduction. We introduce a new variable denoted SPIR (Sum Percentage Increase in Rank) that will serve as this proxy. The variable describes the reduction in relative control for a group of shareholders we define as the *control core.* The *control core* is a subset of shareholders defined by condition 4) that both *value* and *can exercise* control. In order for shareholders to be included the control core they must be of a certain size and type. We assume that a shareholder must hold minimum 10% of the voting rights in order to have significant corporate influence, thus we set this as the threshold for the core.[11] Not all shareholders can be expected to exercise corporate control even though they have (%) influence. We have excluded certain shareholder types that are likely to be passive investors. The excluded owners are either aggregated shareholder groups regarded as unable to interfere in corporate decisions, or more passive investor types like *Banks* and *Pension Funds* who most likely will not interfere. We refer to Appendix A.1.2 for a comprehensive list of the shareholder types included/excluded from the control core. We will now construct the variable, for each deal consider the following:

$$A = \{Acquirer\ control\ core\} = \{the\ subset\ of\ acquirer\ shareholders\ that\ have\ a\ certain\ size\ and\ type\}$$
$$T = \{Target\ control\ core\} = \{the\ subset\ of\ target\ shareholders\ that\ have\ a\ certain\ size\ and\ type\}$$
$$C = \{Combined\ control\ core\} = A \cup T$$

$$n = |A| = number\ of\ shareholders\ in\ A$$

$$i = one\ shareholder\ in\ A,\ i = 1, 2, 3...n$$

$$R_i^{PRE} = the\ rank\ of\ i\ in\ A\ using\ pre\ deal\ ownership,\ 1\ if\ largest\ in\ percentage$$

$$R_i^{POST} = the\ rank\ of\ i\ in\ C\ using\ post\ deal\ ownership,\ 1\ if\ largest\ in\ percentage$$[12]

$$SPIR = \sum_{i=1}^{n} \frac{R_i^{POST} - R_i^{PRE}}{R_i^{PRE}}$$

Since we have imposed a minimum of 10% ownership to be in the control core, there will be a maximum of 10 entities in the target and acquirer control core. The minimum SPIR would be zero given that all the entities in the acquirer core keep their rank in the combined control core. The theoretical maximum would arise in the unlikely event that we have 10 entities in each core and all target entities preceded the acquirer entities in the combined core. Thus we can define a closed *theoretical* interval upon the SPIR is well defined.

[11] In the *Assessment of robustness* section we will evaluate the results for different thresholds.

[12] Se Appendix A.2 for details on the information and formulas used to calculate the post-deal ownership percentages.

$$SPIR_{min} = \frac{1-1}{1} + \frac{2-2}{2} + \ ... \ + \ \frac{10-10}{10} \ = \ 0$$

$$SPIR_{max} = \frac{11-1}{1} + \frac{12-2}{2} + \ ... \ + \ \frac{20-10}{10} \ \approx \ 29.3$$

$$SPIR \ \sim \ [0, 29.3]$$

We see that our proposed variable satisfies condition 1) because a higher value means that more relative control was lost. The variable increases for each additional entity that experiences control loss, and satisfies condition 2). We wanted the loss of control for dominant shareholders to be weighted more than minor ones in condition 3), which is accomplished since each entity contribution to the SPIR is relative to its initial rank. Condition 4) is satisfied because the control core only consists of shareholders of a certain type and size.

Notice that if there is no disturbance in relative control the SPIR value will be zero. Usually the target is a relative small addition to the acquirer and this means that the target shareholders will be relatively small in the combined control core, resulting in a SPIR of zero. Because of this, the SPIR variable has similarities with an interaction term. The variable gives a numerical value that proxies the reduction in relative control, given that there is a disturbance. Let us consider a plausible specific example to get some familiarity with the metric before we apply it.[13] Define a control core in the acquirer consisting of 4 entities. Let us assume that in a 100% stock deal one of the control core entities from the target becomes the second largest shareholder. This entails a reduced rank for all acquirer shareholders except for the largest one. The SPIR in this case would be approximately 1.1. We expect most of the sample values to be in the lower range of the theoretical closed interval, because of the inherent characteristics of an acquisition mentioned above. However, the absolute value of this metric is not of the same importance as the fact that an increased value represents a larger relative loss of control for one or several entities. As can be seen from the table in Appendix A.1.4, a one unit marginal increase in SPIR represents a shareholder that doubles its rank. The largest shareholder becoming the second largest and so forth. See Appendix A.1 for a comprehensive example of the application of *SPIR* and the different individual marginal effects.

The variable SPIR satisfies all the proposed criteria and can serve as the proxy for the reduction in relative control. As can be seen from the issue tree in Figure 2, the variable is renamed *Aggregated Relative Dilution*.

[13] We will cover this specific example rigorously in Appendix A.1.1

4.4 Criteria to test the hypothesis

We will use the two variables above to test the hypothesis on the reluctance for stock payment when acquiring shareholders are faced with reduced influence. We have segmented ownership dilution into two component parts that can be independent of each other. This means that we do not need to establish significance for both variables in order to conclude on the hypothesis of the importance of reduced control. However, the conclusions reached on the importance of *total* reduction in shareholder control, both absolute and relative, will be much stronger if both variables are proven to have a clear effect on the payment method choice. Thus, in the following we are interested to evaluate both the individual effects, as well as the dilution components in relation to one another.

5 Variables

In addition to the above constructed variables, we need to control for a sufficient amount of other proven determinants in the regression models to empirically test our hypothesis. In this section we will introduce the chosen control variables, and establish the theoretical and empirical foundation for inclusion. The variables are grouped according to which hypothesis they belong under. Thus, the argumentation will be divided into; (1) the rationale for the hypothesis, and (2) how the chosen variable controls for that hypothesis. We stress that some variables are likely to capture additional effects outside its main hypothesis. For detailed construction and sources, we refer to the variable description in Appendix A.2.

5.1 Investment opportunities hypothesis

In the spirit of Martin (1996) and Faccio & Masulis (2005) we proxy for bidder-firm investments in growth opportunities. We apply the ratio of the market value of the firm over the book value of the firm, denoted *Acquirer M/B*, prior to the bid-announcement.

Several factors imply that bidders with substantial investment opportunities embedded in the valuation will have a preference to finance investments with equity. First, Martin (1996) argues that firms with *good* investments opportunities[14] maximize firm value by choosing equity financing. Since equity only has a residual claim on the cash flows, it is assumed that equity-financing (as opposed to debt) leaves more room to pursue investment opportunities. Next, Faccio & Masulis (2005) argue that high market-to-book firms are often characterized by high levels of tax-deductible R&D expenditures and low current earnings. These bidder characteristics are likely to reduce the need for higher debt tax shield, which lowers the attractiveness for cash (i.e debt) financing.

Given the above arguments we expect a higher *Acquirer M/B* ratio to raise the probability of observing stock as the medium of exchange.

5.2 Asymmetric information

The importance of the degree of asymmetric information for the M&A exchange medium was first introduced and developed by Hansen (1987) and Eckbo et al. (1990). To a large extent, both these important papers argue that we are looking at two-sided information asymmetries in the structuring of an M&A deal. When the bidder has significant private information on its true value, target decision makers are predicted to have a preference for cash. Likewise, the bidder's preference for stock will increase with the degree of asymmetry on target valuation, because the bidder will demand that the target participate in the post-merger revaluation risks. Hence, the payment negotiation can be characterized as a bargaining process with two-sided asymmetric information. The degree of information asymmetries are proven by several later studies to have an impact on the exchange medium, but given

[14] *Good* investment opportunities is critical. As Martin (1996) points out, firms with poor investment opportunities maximize firm value with high leverage ratios to discipline managers.

the subtle nature of the asymmetry, the effect can be challenging to control for. In this paper we initially deploy three variables to control for information asymmetries.

5.2.1 Relative deal size

On the basis of the above outlined two-sided asymmetric information issues, Eckbo et al. (1990) developed an elegant model where the outcome is an optimal mix of the two payment ingredients. However, we will initially follow the prediction by Hansen (1987) that the bidder will prefer stock when the asymmetry on target assets is high. As Hansen (1987) and Martin (1996) argue, the larger addition the acquisition is to bidder value, the more severe will the implications of information asymmetry on target valuation be. Hence, a relatively larger deal is expected to raise the probability of stock financing due to information asymmetry. Thus, in line with Martin (1996) and Faccio & Masulis (2005) we deploy *Relative Deal Value* as the deal value divided by the estimated value of the combined firm. In the cases with cross-listings we apply the market value of the acquiring firm, not the market capitalisation of the security. We argue that it is the combined company that performs the acquisition, not the individual security.

In addition to the effects from asymmetric information on target valuation, we stress that *Relative Deal Value* is likely to capture additional effects on the currency decision. Arguably the most important effect of the variable, is the financing implications of acquiring a relatively bigger target. As Faccio & Masulis (2005) argue, a relatively bigger acquisition will have a bigger impact on the overall financing condition of the acquirer. Obtaining the necessary amount of debt- (or cash) financing for a big target may be challenging, which may enforce equity-financing.

Both the asymmetric information argument and the impact on the financial condition of the acquirer (and the difficulty in raising enough cash/debt) indicate that we should expect a higher *Relative Deal Value* to raise the probability of stock-financed takeovers.

5.2.2 Cross-Industry deals

Next, following Faccio & Masulis (2005) and in the spirit of Eckbo et al. (2016), we proxy for information asymmetry on bidder stock by controlling for whether the parties operate in the same industry. Faccio & Masulis (2005) argue that if the deal is between parties in the same industry, the target stakeholders can be expected to be better informed on the revenue and earnings prospects of the stock they may accept as consideration. We deploy the dummy variable *Intra-Industry* that takes the value of 1 when the parties have the same 3-digit SIC-code. Because of the reduction of asymmetry on the true value of the shares, we expect seller demand for bidder-stock to increase in an intra-industry deal.

5.2.3 Risk sharing hypothesis

In addition to relative deal size, Martin (1996) also controls for the investment opportunities in the target in relation to the risk sharing hypothesis. He argues that if the target's value is mostly in future growth opportunities, the

information asymmetry on the target's true value will be higher. Hence, the acquirer will prefer that the target accept stock as consideration to share in the risks of actually materializing the growth opportunities. This is in contrast to an asset-heavy target where the true value is more straight-forward to measure. We follow Martin (1996) and deploy *Target M/B* to control for this effect. The variable is constructed on the firm level (including debt) as is the acquirer counterpart variable.

5.2.4 Risk sharing combined

Martin (1996) explores the risk sharing hypothesis further in his study by deploying interaction variables. He applies the *Q-ratio* notation in his study, equivalent to the *market-to-book* ratio.[15] His extended hypothesis is that the interaction or dynamics between the acquirer's Q and target's Q-ratio should be expected to have an implication for the method of payment. We follow Martin (1996) and denote firms with a *M/B* above 1 as *High-Q* firms, and firms with *M/B* below 1 as *Low-Q* firms. The rationale for the variables follows the individual *M/B* variables, but only accounts for the possibility that the interaction between acquirer and target *Q-ratios* can have an effect as well. Indeed, Martin (1996) finds higher frequency of stock-financed deals when both parties have *High-Q-ratios*. In contrast to Martin (1996), who deploys the variables in a separate analysis, we include these interaction variables as control variables in the main regression models.

5.3 Debt capacity

As we stated in the introduction, bidders choosing cash as the consideration are likely to rely heavily on debt financing. Thus, the borrowing capacity of the bidder is likely to play an important role in the M&A currency decision. It can be argued that bidders with limited or insufficient borrowing capacity do not really have a choice of payment method. Since Faccio & Masulis (2005) explicitly address the tradeoff on control vs. debt financing constraints we will mostly follow this paper on the borrowing capacity variables.

5.3.1 Collateral

We follow Faccio & Masulis (2005) and apply the variable *Acquirer Collateral* as an indicator of borrowing capacity. The variable is constructed as the ratio of net PPE scaled by total book value of assets at year-end prior to the announcement date. Since creditors can seize tangible assets as collateral, we expect asset-heavy bidders to have a higher borrowing capacity. Thus, we expect a higher *Acquirer Collateral* ratio to raise the probability of observing cash in the deal consideration.

5.3.2 Bidder size

Next, Faccio & Masulis (2005) argue that big firms by nature are characterized by higher borrowing capacity than small firms. Most notably, this is due to better access to public debt markets. Small firms must rely on conventional

[15] Tobin's Q usually describes the market value of capital over its replacement cost, here applied as market value of equity over book value of equity.

banking for credit, while sizeable firms also can issue debt in the bond market. Moreover, Faccio & Masulis (2005) argue that big firms are likely to be more diversified, which implies less cash-flow risks and thus lower expected bankruptcy costs. We follow Faccio & Masulis (2005) and proxy for these effects with *Total Assets*, which is the natural logarithm of the book value of total assets, at year-end prior to the announcement year.[16] We deploy the log of the asset size as we expect an increasing, but marginally decreasing effect on the borrowing capacity from increased firm size. The effect of increased size is likely to be biggest for small firms (given a certain threshold size for access to bond markets, for instance).

5.3.3 Financial leverage

Various measures have been applied in earlier studies to control for the effect of bidders' financial leverage. Martin (1996) uses an appealing industry-adjusted financial leverage ratio, but gets an unstable sign. We also constructed an industry adjusted financial leverage ratio for unused debt capacity, but ended up dropping the variable due to multicollinearity issues.[17] 9Faccio & Masulis (2005) include the deal value in the leverage ratio to control for the acquirer's effective post-deal leverage ratio if the deal is debt-financed. We found the deal-value adjusted leverage ratio to be too highly correlated with *Relative Deal Value* for inclusion. Because of the importance of *Relative Deal Value* for a payment method study, we excluded deal value from our *Financial Leverage* ratio. Hence, we follow Chemmanur et al. (2009) and Ismail & Krause (2010) in their pre-deal *Financial Leverage* ratio, constructed as total interest-bearing debt to the book value of total assets prior to the acquisition. Since Faccio & Masulis (2005) find a higher *financial leverage* to increase the probability of stock due to debt constraints, while both Chemmanur et al. (2009) and Harford et al. (2009) find the opposite effect, we are uncertain about the expected sign. In favour of a positive sign, it can be argued that highly levered firms should be expected to struggle in obtaining additional debt-financing. Against this, it can be argued that firms characterized by high leverage ratios have "revealed" a tendency to prefer debt-financing, and that the nature of their operations allow for higher debt levels to start with, especially since the variable does not control for the industry-normal debt capacity.

5.3.4 Target balance sheet characteristics

We argue that the nature of target assets and target debt levels will effectively be a part of the acquirer's evaluated debt capacity. As any other investment, and even more so in M&As, the creditor will evaluate the quality of the investment. Thus, the financial health of the target, in addition to the tangibility of target assets, will be evaluated alongside the acquirer. Hence we apply *Target Collateral* and *Target Financial Leverage* to control for these likely effects. This inclusion is in spirit of Hansen (1987), who argues that target firm leverage affects the method of payment.

[16] In the text, we will refer to the log of total assets as *Total Assets*.

[17] See Appendix A.7 and the multicollinearity assessment in the *Robustness* section 9

5.4 Cash availability hypothesis

Closely related to borrowing capacity is the cash availability hypothesis from Martin (1996). The hypothesis follows Myers (1984)'s well-known theory of the pecking-order of finance. The theory justifies that firms prefer to finance investments by internally generated funds over external borrowing, and lastly with external equity. Complementing the above, Jensen (1986) concludes that firms with high free cash flow levels will tend to finance (good and poor) investments with cash. Apart from Faccio & Masulis (2005), most M&A currency papers control for various bidder cash variables. We apply two variables to control for free cash flow and liquid assets that can explain the bidder's opportunity and likelihood of choosing cash as the consideration.

5.4.1 Cash balance

In line with Martin (1996) we choose to relate the most liquid assets on the balance sheet of the acquirer to the value of the investment. Thus we deploy *Acquirer Cash To Value*, constructed as cash and equivalents over deal value. We expect bidders with large amounts of cash relative to the deal value to have a preference to finance the acquisition with internal funds, as Myers (1984) predict. Other papers, such as Harford et al. (2009), use cash ratios not related to deal value. However, we prefer the *Cash To Value* variable, as it is not given that firms with substantial cash reserves prefer to finance investments with cash. In particular, Pinkowitz et al. (2013) find that cash-rich firms are 23% less likely to finance acquisitions with cash. This finding makes the expected sign on general cash variables somewhat uncertain.

5.4.2 Free cash flow

We proxy for bidder's free cash flow by following Zhang (2001) and Swieringa & Schauten (2007) by applying the *Dividend Payout Ratio*. These studies argue that a higher share of net income distributed to shareholders is a relevant signal for higher free cash flow. An alternative could have been a dividend dummy as applied by Eckbo et al. (2016), but we choose to utilize all the data and apply a continuous variable. Following the argumentation of Jensen (1986), and given that *Dividend Payout Ratio* indeed is a good proxy for the free cash flow level, we expect a higher ratio to be associated with a greater probability of observing cash-financed deals.

5.5 Ownership structure and entity type

In addition to the variables constructed in the *Experimental design* section, we need to control for other aspects of the ownership structure of the firms. Most of the economic and empirical rationale for inclusion is from the *Literature review*. After an assessment of multicolinnearity issues, we end up applying four additional ownership variables. Moreover, we also control for whether the acquisition is of an industrial target.

5.5.1 Acquirer control characteristics

First, we apply *Controlling Shareholder 20-60* that is equal to 1 when the controlling shareholder of the acquirer is in the intermediate ownership range of 20% to 60% prior to the acquisition. This is based on the conclusions reached by Martin (1996) and especially Faccio & Masulis (2005), that this is the relevant ownership range for dilution vulnerability.

Next, given the empirically shown importance of managerial ownership (Martin (1996)), we apply *Mngmt Ownership Presence*. This dummy takes the value of 1 when bidder-management is reported to be one of the five biggest shareholders. Since management is likely to exercise their influence as one unit, we aggregate the holdings of each member of the management team to generate *aggregated managerial holdings*. We expect a lower probability of stock-financed acquisitions if management's shareholdings is in the top-5 interval, due to their ability to influence the deal and the assumed fear of a diluting stock deal.

5.5.2 Target ownership characteristics

Eckbo et al. (2016) logically argue that financial sponsors, such as private equity (PE) firms, will have a clear preference to liquidate their investments. As we work with listed targets, none of our targets will be fully controlled by private equity owners. However, we argue that deals involving targets with significant private equity owners will have a higher probability for cash payment, due to the PE-shareholder's preference for cash. Thus we include *Target PE owned* that takes the value of 1 when a private equity owner is recorded as one of the three biggest shareholders.

We also utilize the *independence indicator* from the ownership database. The *Target Independence* variable measures the degree of concentrated ownership in the target, ranked from 1 to 4. A value of 1 indicates fragmented ownership, while 4 indicates highly concentrated ownership with respect to certain shareholder types.

5.5.3 Entity type

Finally, we control for expected fixed effects related to the acquisition of an *Industrial Target* with a dummy variable. Industrial companies constitute $\sim$80% of the targets, while banks and financial companies constitute the majority of the remaining $\sim$20% targets in the sample.

5.6 Geographical deal characteristics

5.6.1 Cross-border deals

Whether or not the deal is cross-border may have significant implications on the chosen method of payment. A share exchange is more complicated than a cash payment to begin with, and even more so in a cross-border deal. Based on various complications with stock-payment, we expect foreign sellers to prefer a cash-dominated

consideration, and we argue that this is important to control for in the model. Further, Faccio & Masulis (2005) argue that investors have a home bias in their investment decisions, which is proved by several studies, and which also imply an aversion for foreign stock. Based on the above, and in line with the findings in Faccio & Masulis (2005), we expect seller demand for foreign stock to be lower in a cross-border deal, and deploy the dummy *Cross-Border* to control for this effect.

5.6.2 Geographical regions

We expect to find differences in the method of payment between the continents in our global sample. This may be due to different regulatory environments, traditions and so forth. We control for these expected fixed effects by deploying *Region* dummies according to the target's home country.

Now that all the explanatory variables are constructed and introduced, we next turn to a formal description of the sample.

6 Descriptive statistics

In this section we will describe the sample of the 1,909 M&A-deals. Specifically we will outline the geographical and time distribution of the deals, the payment method distribution for different subsamples, ownership concentration across regions, as well as an initial description of the explanatory variables. We will present the characteristics of the sample in light of the research question being tested.

6.1 High-level descriptive (deal status, annual and geographical distribution)

Since we have not filtered on the status (completed vs. announced) of the deal, we are strictly speaking analysing a sample of bids.[18] This approach is in line with the majority of other M&A payment method studies. If a bid is recorded with details on the the payment method, the bid is relevant for inclusion because the structure (including consideration and implicit dilution) is acceptable to the bidder. However, the sample is dominated by completed deals. 1636 (86%) of the deals in the sample are completed, which appears reasonable and in line with Burch et al. (2012) and Gaspar et al. (2005) who report completion rates of 82% and 85%, respectively.

In Figure 7 in Appendix A.10 we present the number of announced deals for each year in the sample. We observe that the deal frequency in the sample increases from 2008 until 2010, and then drops steadily from 341 deals in 2010 to 222 announced deals in 2014. This time trend is roughly in line with the observed global M&A-trend following the financial crisis. After the initial shock in in 2008, worldwide deal activity recovered in 2010, before falling back through 2011-2013 (Imaa (2015)). We do not observe the big recovery in 2014 in our sample, but this is likely to be because the ”2014-deals” only can match with 1 year of ownership data. Overall the annual distribution of the sample seems representative for global M&A-activity in the post-crisis period. Hence, it appears that also the ownership database seems to be unbiased in terms of annual coverage.

Table 1 presents the country distribution of bidders and target in the sample of deals. We have not imposed any geographical restrictions on the sample selection. Thus, there was a possibility that the sample could be biased towards a specific region, for instance due to limited ownership coverage in certain regions.

[18] Throughout the paper we will refer to the bidder as *acquirer* and *bidder* interchangeably, and the bid as *deal* and *bid* interchangeably.

Table 1: Geographical deal distribution on bidder and target

	No. Deals	%	Cum %		No. Deals	%	Cum %
Bidder country distribution				*Target country distribution*			
United States	389	20.4	20.4	United States	400	21.0	21.0
Japan	351	18.4	38.8	Japan	324	17.0	37.9
Canada	205	10.7	49.5	Canada	212	11.1	49.0
Australia	140	7.3	56.8	Australia	170	8.9	57.9
United Kingdom	106	5.6	62.4	United Kingdom	113	5.9	63.9
India	71	3.7	66.1	India	74	3.9	67.7
France	63	3.3	69.4	Korea	63	3.3	71.0
Korea	63	3.3	72.7	France	50	2.6	73.7
Germany	44	2.3	75.0	Germany	41	2.1	75.8
Russia	41	2.1	77.2	Malaysia	37	1.9	77.7
Malaysia	39	2.0	79.2	Russia	37	1.9	79.7
Sweden	36	1.9	81.1	Singapore	31	1.6	81.3
Taiwan	32	1.7	82.8	Taiwan	28	1.5	82.8
Singapore	30	1.6	84.3	Sweden	27	1.4	84.2
Brazil	24	1.3	85.6	Brazil	24	1.3	85.4
Poland	23	1.2	86.8	Israel	24	1.3	86.7
South Africa	23	1.2	88.0	Poland	23	1.2	87.9
Israel	21	1.1	89.1	South Africa	23	1.2	89.1
Spain	17	0.9	90.0	Norway	21	1.1	90.2
Netherlands	16	0.8	90.8	Denmark	16	0.8	91.0
Denmark	13	0.7	91.5	Cayman Islands	12	0.6	91.7
Norway	13	0.7	92.2	Indonesia	12	0.6	92.3
(...)	(...)	(...)		(...)	(...)	(...)	
Total	1,909	100.0		Total	1,909	100.0	
Bidder continental distribution				*Target continental distribution*			
Asia	638	33.4	33.4	Asia	590	31.6	31.6
North America	594	31.1	64.5	North America	590	31.6	63.2
Europe	436	22.8	87.4	Europe	405	21.7	84.9
Oceania	141	7.4	94.8	Oceania	171	9.2	94.1
Africa	57	3.0	97.7	Africa	64	3.4	97.5
South America	43	2.3	100.0	South America	46	2.5	100.0
Total	1,909	100.0		Total	1,909	100.0	

The country panel presents the 22 largest bidder and target countries by frequency. These 22 countries constitute ∼93% of the sample. 21.5% of deals in the sample are cross-border.

U.S. bidders constitute 20.4% of the sample, while 21% of the targets are U.S. firms. That U.S. firms are the largest group in the sample indicates that our final sample is representative for global M&A activity.[19] Note also that Japanese firms appear frequently in the sample, with 18.4% of the bidders and 17% of the target firms. Big countries such as Canada and Australia are situated in 3rd and 4th place, both in terms of bidder and target frequency. 5.6% of the deals involve UK bidders, which is highest among the European countries. This is line with Faccio & Masulis (2005), whose European M&A sample is dominated by UK bidders (65%). Aggregated by continents, the most frequent bidder-regions are Asia (33.4%) and North America (31.1%), followed by Europe (22.8%). Overall, it appears that the sample is reasonably distributed geographically relative to the size of the economies represented. As one exception we note that Chinese deals appears to be severely underrepresented in the sample, with only 9 bidders and 6 targets included.[20] We suspect that this is due to limited Chinese coverage in the ownership database.

[19] According to a *Mergermarket* report (Europe et al. (2015)), U.S. deals accounted for 46.2% of global M&A activity in 2015, the highest share since 2001.

[20] Only the 22 most frequent bidder and target nations are included in Table 1 which constitute 92% of the sample.

6.2 Method of payment distribution and average controlling shareholder

Table 2 presents a more detailed country overview with distribution of the different payment methods and average largest shareholder.

We define *all-stock* deals as deals only involving stock or convertible debt as the method of payment. *All-cash* deals are defined as non-diluting deals (see Appendix A.3). 417 (22%) of the deals in the sample were solely financed with stock, 938 (49%) did not involve any stock, while the remaining 29% of the sample deals used a combination of stock and cash in the consideration (*Mixed)*. Thus, 51% of the deals involve at least some stock financing. This is significantly higher than Faccio & Masulis (2005), who report 80% purely cash financed deals in their sample of European M&As. This substantial difference can be explained by the fact that their sample includes unlisted targets, expected to be cash-hungry sellers, while our sample only contains public targets. Indeed, for Faccio & Masulis (2005)'s subsample of listed targets, 60% of the deals are classified as all-cash. This is line with our European subsample where 62% of the deals were purely cash-financed.

In Figure 8 in Appendix A.10 we break down the distribution between the three payment method categories over the sample-period. We observe that the subsample of all-cash deals is trending around 50% of the sample, with a decrease in the most recent years. The proportion of all-stock deals is trending around 20%. This payment method distribution is roughly in line with the figures Gaughan (2007) presents in his extensive study of payment trends.[21] For the 2000-2005 period, Gaughan (2007) reports average all-cash and all-stock deals of 53% and 23%, respectively. Based on this, the proportions of the different payment forms in our sample seem representative.

In the outer-right column of Table 2 we present the average percentage voting rights for the largest shareholder in the bidder-firms. First, we note that the total sample mean of the dominant bidder shareholder's ownership is 21.5%. Interestingly, this is very close to Faccio & Masulis (2005) who report 22% in their European sample. We stress that our study has a slightly different definition of ownership than Faccio & Masulis (2005), as they apply the database developed by Faccio & Lang (2002). However, the overall approach of measuring control is quite similar, as they define control by the weakest link, relatively similar to our *direct ownership* measure.

[21] Gaughan (2007)'s figures are based on the *Mergerstat Review 2006*.

Table 2: Distribution of deal-types and average controlling shareholder ownership on bidder-country

	No. Deals	All Cash %	Mixed %	All Stock %	SH1 %
Bidder country					
United States	389	48.6	33.7	17.7	15.9
Japan	351	47.6	23.1	29.3	14.7
Canada	205	28.3	45.4	26.3	14.2
Australia	140	19.3	54.3	26.4	20.5
United Kingdom	106	46.2	29.2	24.5	18.8
India	71	47.9	23.9	28.2	30.4
France	63	84.1	7.9	7.9	34.6
Korea	63	44.4	34.9	20.6	20.4
Germany	44	79.5	6.8	13.6	33.9
Russia	41	65.9	17.1	17.1	50.1
Malaysia	39	76.9	12.8	10.3	37.3
Sweden	36	55.6	19.4	25.0	26.5
Taiwan	32	31.2	37.5	31.2	10.3
Singapore	30	73.3	16.7	10.0	23.9
Brazil	24	50.0	12.5	37.5	37.1
Poland	23	47.8	17.4	34.8	32.7
South Africa	23	56.5	21.7	21.7	25.7
Israel	21	81.0	9.5	9.5	34.3
Spain	17	76.5	17.6	5.9	37.5
Netherlands	16	75.0	12.5	12.5	24.9
Denmark	13	46.2	38.5	15.4	29.0
Norway	13	76.9	0.0	23.1	37.0
Other	149	63.8	23.5	12.8	30.4
Total	1,909	49.1	29.0	21.8	21.5
Continental Grouping					
Asia	638	51.9	23.4	24.8	20.1
North America	594	41.6	37.7	20.7	15.3
Europe	436	62.4	19.5	18.1	30.7
Oceania	141	19.1	54.6	26.2	20.4
Africa	57	66.7	19.3	14.0	30.3
South America	43	53.5	18.6	27.9	28.6
Total	1,909	49.1	29.0	21.8	21.5

*SH1 refers to the average holdings of the largest direct (1 level above the subject company) shareholder in the bidder firms prior to announcement of the deal. We define *stock* deals as deals only involving stock or convertible debt as the method of payment. *Cash* deals are defined as non-diluting deals, thus not involving any of the *stock* ingredients in the consideration. *Mixed* deals involve some, but less than 100% stock in the consideration. See Appendix A.3 for details on classification of the individual payment methods. The deals are grouped according the the bidders home-country. Average SH1 data are for bidders from the respective country.

There are striking differences between the average size of the controlling shareholder across countries and regions. Most notably, U.S. bidders have on average substantially less dominant shareholders (15.9%) than other regions, especially compared to Europe. This is in line with other studies, such as Gadhoum et al. (2005) who showed that public U.S. listed firms are characterized by relatively fragmented ownership. Japanese and Canadian bidders are also characterized by relatively small average controlling shareholders (14.7% and 14.2%, respectively). The subsample of European bidders on the other side, generally has more concentrated ownership structures, at least with respect to this parameter. On average, the controlling shareholder in Europe holds 30.7% of the voting rights, notably higher than the above regions and also higher than the figure reported in Faccio & Masulis (2005). That European firms are characterized as more concentrated than U.S. firms is in line with the Faccio & Lang (2002) study of ownership structures.

Overall, it appears that the most developed economies, and also the most frequent bidder-countries in our sample (U.S., Japan, Canada, Australia and UK), are characterized by fragmented ownership structures in which the average dominant shareholder holds less than 20% of the voting rights. Regions such as South America (29%) and Africa (30%) have bigger dominant shareholders on average in our sample.

At first glance we do not see any clear patterns in the payment methods across different ownership structures. We note that Canadian and Australian bidders are characterized by both low SH1 holdings (14% and 20%, respectively) as well as the lowest proportions of cash deals (28% and 19%, respectively) in the sample. However, U.S., Japanese, and UK bidders all have low levels of average SH1, but have around 50% all-cash deals. We note that bidders from Continental-Europe (Germany, France, Spain, Netherlands) seem to have a preference for cash-deals, with less than 25% of the deals in these countries involving stock in the consideration. This could be, among other reasons, due to many cross-border deals in these bidder-countries, at least compared to the U.S., for instance. But as mentioned above, these bidders also tend to be relatively closely held, on average. The tendency for cash being the preferred currency choice in continental-Europe is in line with what Faccio & Masulis (2005) find in their study.

6.3 Descriptive statistics on the explanatory variables

Table 3 presents mean and median values for the explanatory variables across the different payment method subsamples. We also present the differences in mean and median values between all-cash and all-stock, with corresponding statistical significance. This information allows us to comment on the key differences across the payment methods with respect to the different independent variables, but naturally not how they interact with each other. For descriptive statistics for the entire sample combined we refer to Appendix A.5.

Table 3: Descriptive statistics on the explanatory variables on the three subsamples: All-Cash, Mixed, All-Stock

	(1) All Cash		(2) Mixed		(3) All Stock		(1)-(3)	(1)-(3)
VARIABLES	Mean	Median	Mean	Median	Mean	Median	Diff mean	Diff median
Sh1 Absolute Dilution	2.289	0.522	4.667	2.174	4.228	1.328	-1.939***	-0.806***
Aggregated Relative Dilution	0.024	0	0.043	0	0.045	0	-0.021	0
Relative Deal Value	0.099	0.041	0.255	0.223	0.230	0.189	-0.131***	-0.148***
Acquirer M/B	1.991	1.381	2.845	1.366	1.335	1.128	0.656	0.253***
Acquirer Collateral	0.247	0.189	0.339	0.290	0.322	0.275	- 0.075***	-0.086***
Acquirer Total Assets (MUSD)	44,257	3,657	17,189	1,168	27,319	1,015	16938	2642***
Acquirer Cash To Value	37.920	3.752	6.395	0.559	11.300	0.981	26.620***	2.771***
Acquirer Div Payout Ratio	1.465	0.209	0.225	0.020	0.243	0.045	1.222**	0.164***
Acquirer Leverage Ratio	0.230	0.211	0.207	0.174	0.195	0.150	0.035***	0.061***
Target Independence	2.070	1	1.774	1	1.914	1	0.156**	0***
Target M/B	1.984	1.312	1.782	1.128	1.759	0.978	0.225	0.334***
Target Collateral	0.271	0.180	0.356	0.270	0.322	0.248	-0.051***	-0.068***
Target Leverage Ratio	0.195	0.121	0.188	0.127	0.200	0.128	-0.005	-0.007
Mngmt Ownership Presence	0.026	0	0.007	0	0.002	0		
Cross-Border	0.332	0	0.103	0	0.103	0		
Intra-Industry	0.380	0	0.471	0	0.460	0		
Controlling Sh 20-60	0.194	0	0.157	0	0.177	0		
Target PE owned	0.024	0	0.023	0	0.026	0		
Acq High-Q - Tar High-Q	0.536	1	0.482	0	0.376	0		
Acq High-Q - Tar Low-Q	0.208	0	0.271	0	0.249	0		
Acq Low Q - Tar High-Q	0.107	0	0.087	0	0.098	0		
Target region Africa	0.050	0	0.020	0	0.014	0		
Target region Asia	0.312	0	0.260	0	0.367	0		
Target region Europe	0.033	0	0.014	0	0.022	0		
Target region North America	0.273	0	0.392	0	0.281	0		
Target region Oceania	0.052	0	0.143	0	0.103	0		
Target region South America	0.027	0	0.014	0	0.031	0		
Target Industrial	0.830	1	0.760	1	0.760	1		

The table reports the test statistic and significance level in the two sided tests for differences in means and medians. The tests consider the difference between *All Cash* and *All Stock*. A t-test with unequal variance is used for the mean and a non parametric Wilcoxon test is used for median. ***, ** and * indicate 1, 5 and 10 percent significance level, respectively.

First, there is a striking difference in *Relative Deal Value* between stock-financed deals and cash-deals. All-stock and mixed payment deals are on average much bigger in relative size than cash-financed deals. While the average relative deal value is 9.9% for cash-deals, the all-stock and mixed payment average relative deal size is 23% and 25.5%, respectively. This difference is not unexpected given the extant evidence suggesting that the effect from relatively bigger targets on the difficulty in raising sufficient debt (or cash) is important. Generally, we have bigger relative deals in our sample than Faccio & Masulis (2005), who report an average relative deal size of 9%. As noted above, we suggest that this difference is due to the fact that we only include public targets in the sample, and which are typically larger than privately held targets. However, the sample in Faccio & Masulis (2005) is also characterized by relatively larger stock-deals than cash-deals, so the samples are similar in this respect.

With respect to our main variables of interest, we are cautious in drawing conclusions based on the univariate comparison in Table 3. But we note that *Sh1 Absolute Dilution* is higher for the stock-financed deals than for cash-deals. This is not surprising, given that a larger deal will result in greater absolute dilution, all else equal. In the more sophisticated statistical models below, we will be able to draw conclusions on whether the variable holds explanatory power in *excess* of the relative size of the deal.

The *Aggregated Relative Dilution* variable is not statistically different across the different methods of payment in the sample. As we predicted in the *Experimental Design*, the median SPIR is 0 for all deal types, which indicates that the typical deal does not involve a displacement of the ownership structure compared to that of the acquirer before the deal announcement. We also note from Appendix A.5 that in the sub sample of acquisitions in which the variable is greater than 0, the (conditional) mean is 1.01. We are curious to see whether the variable has an explanatory power, on the margin, in the below models.

We further note from Table 3 that there generally are statistical significant differences between the average acquirer characteristics across the different payment methods. *Acquirer Cash To Value* stands out as substantially higher for all-cash deals than for the other deal types. Interestingly, the mean values for this variable is strikingly higher than the median values, indicating outliers where relatively big firms with substantial cash balances have acquired small targets. The difference between mean and median *Cash To Value* is especially big in the cash-financed subsample of deals, where the mean ratio is as high as 37.9, while the median is 3.7. This means that many cash-bidders actually have substantially more liquid assets on its books than the value of their targets. At least for parts of the cash-financed deals this could indicate that the need for debt-financing in order to complete the transaction is not very pressing. Further, the *Cash To Value* ratios in the stock-financed acquisitions are significantly lower than for the cash-deals, which supports intuition, theory and the fact that the stock-deals are relatively much bigger than the cash-deals.

Bidders in cash-deals tend to be bigger in terms of *Total Assets* (here presented in levels, not logs, due to interpretation). Given the higher borrowing capacity argument presented above, in addition to the fact that liquid assets naturally are included in *Total Assets*, this is as expected. As with *Cash To Value* we note that we have some very sizable firms in the sample, pulling the mean asset value significantly higher than the median values. For the whole

sample of bidders the mean of total assets is 25 billion USD, which appears to be a very high figure. However the median total assets of 1.5 billion USD seems more reasonable. Thus, we stress that there are some mega-bidders, especially banks (such as Deutsche Bank[22]), in the sample. We also note that the mean difference for *Total Assets* is not statistically significant between all-cash and all-stock deals (p-value of 10.8), while the median difference is statistically different at any reasonable significance level.

On the other bidder specific debt-related variables, we note that bidders in all-cash deals have significantly lower *Collateral* ratios than stock-bidders. This is surprising given the debt-capacity argumentation, and that cash-bidders have the lowest percentage of *Collateral* (24.7% and 18.9%, mean and median respectively) across the payment methods contradicts what Faccio & Masulis (2005) find in their sample. Moreover, bidders with lower pre-deal balance sheet gearing, measured by *Financial Leverage*, are more likely to include stock in the payment method. In our sample, bidders choosing all-stock has a median *Leverage Ratio* as low as 15%, cash-bidders have 21.2%, while mixed payment bidders are in between with a median leverage ratio of 17.4%. Both the characteristics of *Collateral* and *Financial Leverage* across the different payment methods *may* indicate that debt-financing constraints is not critical for the bidders in the sample, and that cash availability might be more important for the payment method choice, but we stress that it is still premature to conclude in any direction based on this descriptive analysis.

Of the other variables on bidder attributes, we see that bidders choosing stock are characterized by a significantly lower *Dividend Payout Ratio*. Bidders in stock-financed acquisitions have a median payout ratio of 2% and 4.5%, for mixed and all-stock respectively. This is markedly lower than for the all-cash bidders in the sample (median of 20.9%), indicating that the latter bidder-type may have higher levels of free cash flow that trigger cash-financed deals.

The *Acquirer M/B* is actually lowest for the all-stock bidders in the sample, with mean and median ratios of 1.33 and 1.29, respectively. Even though the bidders in the mixed payment subgroup have the highest mean ratio, this is not what we expected to see. However, the difference in mean M/B between all-cash and all-stock bidders is not statistically significant.

Turning to the target-specific financial variables, we see that targets in stock-deals have around 5% higher *Collateral* ratios than targets in cash-deals, on average. *Target M/B* is actually somewhat higher in cash-financed deals than for the other deal types, although the difference in mean is not statistically different. The difference in *Target Leverage Ratio* is small and insignificant across the sample, with mean gearing just below 20% and median of $\sim$12%. Finally, we note that targets in cash-deals tend to be more closely held measured by the *Independence Indicator*.

Turning to the binary variables we see that *Cross-Border* deals are much more frequent in cash-deals than in stock-deals. This is as expected. 33.2% of the cash-financed deals in the sample are cross border, notably higher

[22]Deutsche Bank is recorded with 2.8 trn USD in total assets in our data. Mega-bidders like Deutsche Bank are not excluded from the analysis since both our main variables of interest are relative variables, and the general ownership dynamics should be independent of absolute size.

than 10.3% of the stock-deals. This is line with the notion that stock payments overseas are more complicated to undertake. Further, equity is being used more frequently in the *Intra-Industry* deals of the sample. Around 46-47% of the stock-financed deals are between parties in the same industry, while 38% of the all-cash deals are classified as *Intra-Industry*. In 19.4% of the all-cash deals the largest bidder shareholder is in the 20-60% range, somewhat higher than for all-stock (17.7%) and mixed (15.7%). There are few bidders in the sample where management is one of the 5 biggest owners, but the frequency is highest for cash-bidders (2.6%). As expected in a sample of public targets, private equity owners are rare, and appear as one of the 3 biggest shareholders in 2.4% of the deals, with small differences across the payment methods.

Now that the description of the sample is concluded, we turn to more sophisticated statistical models to jointly estimate the effect of the explanatory variables on the payment method choice.

7 Methodology

7.1 What we want to estimate and construction of the dependent variable

When analyzing the ownership dilution effect on the usage of stock payment there are essentially two questions of interest: 1) How does dilution affect the choice between using stock or not? 2) How does dilution affect the fraction of stuck usage? We obviously need to evaluate the two questions separately and find the appropriate statistical models to answer them. Both questions will make use of the information on the fraction of stock in the total payment. By specifying models that describe stock rather than cash usage in the considerations, we gain important advantages. Stock usage is a more causal factor for ownership dilution than the absence of cash payments, even though they are the inverse of each other. We also increase the quality and size of our data; using the *Zephyr* data and our definitions there are two sub-segments of stock payments compared to seven non-diluting payment methods. Choosing to estimate the stock usage, we risk measurement errors in two variables instead of seven. We also increase the sample size, because we require less data points and fewer observations are removed due to missing values. We also need a measure for the total consideration to estimate the fraction of stock. We can either use the sum of the different payment methods or the reported deal value. These two figures should theoretically (and intuitively) be equal, but as already addressed, deviations exist in the data set. When calculating the fraction of stock we choose the deal value instead of the sum of payment methods as the denominator. This is in line with the argument above on how we want to minimize measurement errors and missing values, in order to enhance the number of observations and the quality of the data. See Appendix A.3 for a detailed description on the assumptions regarding the fraction of stock.

7.2 How to evaluate Q1: How does dilution affect the choice between using stock or not?

When evaluating this question the specific variable of interest is the probability that stock is part of the consideration. A popular choice for the estimation of such probabilities is the linear probability model. This model has problems with probabilities below zero and above one that we want to avoid. Both the Logit and Probit models solve this problem. We choose to use the Probit model because we prefer the normality assumption over the logarithmic distribution. Among other arguments, the normal distribution makes the derivation of the marginal effects intuitive with the normal CDF and PDF.[23] The Probit is a nonlinear estimation method that uses maximum likelihood routines. The implication of this is that the magnitude of the coefficients cannot be interpreted before it is converted into marginal effects, which are given in Appendix A.8. Both the sign and significance of the variables can be interpreted normally. Below we have stated the Probit model we are estimating where **x** is a vector of control variables that will vary. Stock is a variable that is equal to 1 if there is any stock in the consideration, 0 otherwise. A formal derivation of the Probit model is given in Appendix A.12.

$$P(Stock = 1|x) = G(\beta_0 + \beta_1 SH1 AbsoluteDilution + \beta_2 AggregatedRelativeDilution + \beta \mathbf{x})$$

[23] Cumulative distribution function and probability density function.

Faccio & Masulis (2005) also deploy a Probit model in their study, but argue that the qualitative aspect of the payment method choice is most accurately described by an ordered Probit (ordered by all-cash, a mixture or all-stock). They argue that this is most accurate since the target shareholders often have a say in the form of consideration, and that the ordered Probit describes this aspect of the negotiation. However, for our study we find it reasonable to separate on the qualitative choice of yes or no to stock being a part of the payment method. Any deal involving stock in the consideration will imply some degree of dilution, and when the acquiring party has allowed for stock in the first place they are implicitly allowing for dilution (which may turn out to be higher than they initially intended). Thus, to measure the reluctance to experience reduced power and influence through a stock-deal, we think it is most appropriate to estimate the probability of stock being used at all. Only with this specification can we measure the reluctance to offer diluting payments in the first place. Karampatsas et al. (2014) also run their Probit regression on a binary dependent variable in their study of the importance of credit ratings for the medium of exchange, but separates the variable on the 50% stock-percentage threshold. Burch et al. (2012) take the same approach in their Probit dependent variable definition. Again, we believe that our research question is most accurately described by 0 vs. some stock in the consideration. Our approach is in line with Amihud et al. (1990) who run a Probit regression on the dependent variable defined as 0 for all-cash and 1 for stock-financed acquisitions.[24]

7.3 How to evaluate Q2: How does dilution affect the fraction of stuck usage?

When evaluating the magnitude of stock usage, the variable of interest is the percentage stock in the deal payment. Naturally this variable is bound to be a number between 0 and 100. We have large portions of observations at both the 0 and 100 level as can be seen in Appendix A.9. This kind of data causes OLS to give biased estimates. The Tobit model can tackle cases where the dependent variable is censored at both ends, hence this will be our preferred model for the usage of stock at the margin. When estimating the Tobit model we are essentially estimating the coefficients for the latent uncensored variable for stock percentage y*. Below is the Tobit model we seek to estimate, a formal derivation of the model is given in Appendix A.13. In line with the Probit model, **x** is a vector of control variables that will vary. Since only the censored stock percentage y has a meaningful interpretation we cannot interpret the Tobit coefficients before converting them to marginal effects that are given in Appendix A.8. The sign and significance of the coefficients can be interpreted normally.

$$y* = \beta_0 + \beta_1 SH1 AbsoluteDilution + \beta_2 AggregatedRelativeDilution + \mathbf{x}\beta + u$$

$$u|\mathbf{x} \sim N(0, \sigma^2)^{25}$$

We are in line with most other empirical M&A payment method studies in wanting to address the fractional stock usage using a Tobit estimator. Faccio & Masulis (2005), Harford et al. (2009), Ismail & Krause (2010), Eckbo et al. (2016), Swieringa & Schauten (2007) (among others) all investigate the currency choice with Tobit.

[24] Amihud et al. (1990) exclude mixed payments from the sample.

[25] The error term is normally distributed given both **x** and our two dilution variables, but we have simplified the notation by excluding the two variables in the formula

7.4 How we deploy our models

In both models above we refer to **x**, which is a vector of control variables that will vary. We will deploy our models with two specifications for **x** in addition to our two ownership dilution variables. First **x** is the variables we define as *need-to-have*, then we add the *nice-to-have* variables into **x**. The *need-to-have* variables are deemed necessary to control for in order to capture a clean effect on the margin for our two dilution variables. These are the main acquirer characteristics, the most important characteristics of the deal itself (intra-industry, cross-border and relative deal value), and the expected fixed effects from the acquisition of an industrial target and regional target dummies. The *nice-to-have* variables are factors that further increase the strength and the explanatory power of the models. These include the target attributes, the Q-interaction variables and presence of bidder-management. The rational behind this deployment is that since the first group should include the most critical control variables, our two ownership dilution variables should not encounter major changes in sign and significance when we add the second group. This will provide some indication on the robustness of the results.

8 Results

In this section we will present the key results of the analysis. We regard the Probit as our main model of interest since it estimates the probability of opening up for diluting payment methods in the first place. Thus, we will comment more on the Probit estimation than the Tobit estimation.

We will emphasize mostly our main variables of interest, but will also comment on the other control variables, and relate our findings to other relevant studies. When comparing results with other studies we acknowledge that some models might be specified differently (in terms of the dependent variable in the Probit) and have different samples, but it seems reasonable to assume that the sign and significance for most of the variables should be comparable across studies. But assuming that the *slope* of the coefficients is very sample-dependent it does not make sense to compare marginal effects. Also, we stress that only the final output of the statistical procedures are presented in this section. As we will elaborate on in the *robustness* section, the following regression output is the result of several rounds of different model specifications, where several variables have been excluded due to multicollinearity issues and other econometrical and economical pitfalls.

8.1 Probit model

The results from the Probit regression are presented in Table 4. Column 1 includes the *must-have* variables, while the *nice-to-have* variables are added in column 2. Overall, we note that there are only minimal changes between the two specifications, and in the following we will only comment on the final specification in Column 2. The model explains 24.1% of the variance in the choice of stock vs. cash in the consideration, expressed by the McFadden's R-squared (hereafter referred to as R-squared). Although one should be cautious in comparing R-squared across different models, with different sample variations to explain, the explanatory power in our model does seem reasonable (and quite satisfactory) compared to other payment method studies. We note from Table 4 that the R-squared inches only a bit higher after adding the *nice-to-have* variables, thus the main deal-, acquirer- and ownership variables account for the majority of the model's explanatory force.

Table 4: Probit Model with the two specifications

	Specification 1		Specification 2	
Probit model	Coefficient	Standard error	Coefficient	Standard error
Sh1 Absolute Dilution	-0.025***	(0.008)	-0.025***	(0.008)
Aggregated Relative Dilution	-0.437**	(0.190)	-0.436**	(0.191)
Relative Deal Value	3.181***	(0.332)	3.352***	(0.339)
Acquirer M/B	-0.001	(0.001)	-0.001	(0.001)
Acquirer Collateral	0.893***	(0.139)	0.972***	(0.178)
ln(Acquirer Total Assets)	-0.073***	(0.016)	-0.063***	(0.017)
Acquirer Cash To Value	-0.001**	(0.001)	-0.001**	(0.001)
Acquirer Div Payout Ratio	-0.037*	(0.021)	-0.038*	(0.022)
Cross-Border	-0.882***	(0.083)	-0.871***	(0.085)
Intra-Industry	0.148**	(0.066)	0.157**	(0.067)
Acquirer Leverage Ratio	-0.577***	(0.195)	-0.598***	(0.201)
Controlling Sh 20-60	-0.102	(0.088)	-0.109	(0.089)
Target Independence	0.060**	(0.028)	0.068**	(0.028)
Target Industrial	-0.452***	(0.090)	-0.441***	(0.092)
Target M/B			0.004	(0.008)
Target Collateral			-0.101	(0.161)
Target Leverage Ratio			-0.073	(0.146)
Target PE owned			0.072	(0.198)
Mngmt Ownership Presence			-0.314	(0.311)
Acq High-Q - Tar High-Q			-0.114	(0.095)
Acq High-Q - Tar Low-Q			0.190*	(0.102)
Acq Low-Q - Tar High-Q			-0.300**	(0.135)
Constant	0.301*	(0.180)	0.238	(0.194)
Observations	1,909		1,909	
Region Dummies	YES		YES	
pseudo-R-squared	0.233		0.241	
Log Likelihood	-1014		-1004	

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

In both the Probit models the dependent variable takes on the value 1 for stock deals. The standard errors are based on QML (Huber/White) heteroskedasticity- robust standard errors. This means that the significance tests based on the z-stats are also heteroskedasticity robust. Specification 1 contains the *must-have* variables and in the Specification 2 we have added the *nice-to-have* variables. The R-squared refers to the The McFadden's pseudo R-squared that is based on log-likelihood ratios.

8.1.1 Reduced ownership control

We find that both our main variables of interest (*Sh1 Absolute Dilution* and *Aggregated Relative Dilution*) are statistically significant with the expected sign in explaining the binary choice of stock vs. no stock in the M&A currency decision. This finding strongly supports our hypothesis that bidder-shareholders dislike both the absolute and relative dilution of control that would have occurred in an all-stock deal.

The *Sh1 Absolute Dilution* variable is significant at any reasonable significance level in the final regression. The negative coefficient suggests that increased absolute dilution of the controlling shareholder is associated with a

lower probability of choosing a stock-financed acquisition. Interestingly (but not surprisingly) the variable was significant with the opposite sign before *Relative Deal Value* was added to the model. Given the descriptive statistics above (as wells as theory and intuition), we expect a relatively bigger target to motivate stock financing. But this model suggests that the absolute dilution of percentage ownership has a significant effect on the preferred payment method, in *excess* of the relative size of the deal. The economical interpretation of the variable's marginal effect is that a 1 percentage point reduction of the controlling shareholder's voting rights reduces the probability of observing stock in the consideration with 1.01%. This might seem economical insignificant, but consider an acquisition of relatively big target. The absolute dilution of the controlling bidder-shareholder could easily be 10 percentage points, reducing the likelihood of stock in the consideration with 10.1%.

Having established significance for the *absolute* aspect of the reduced control the acquiring shareholders are faced with, we now turn the *relative* control component to complete the corporate control picture. We see that *Aggregated Relative Dilution* also is significant at the 5% level in explaining the qualitative choice of including stock in the consideration. This suggests that the relative dilution in corporate control has an effect on the currency choice. If the shareholders in the *control core* of the bidder-firm are looking at a possible disturbance in their power structure through a stock-financed acquisition, the model suggests that they will be unwilling to offer stock in the first place. With all other variables at their mean values, the marginal effect of a 1 unit increase in *Aggregated Relative Dilution* is a 17.4% reduction in the probability of observing equity as a part of the consideration. A 1 unit increase in *Aggregated Relative Dilution* could for instance arise if there is only 1 bidder-shareholder in the control core, and this shareholder is reduced to the second largest through the acquisition. The variables's economical effect is quite substantial, and implies a clear tendency that bidder-shareholders dislike a loss of relative influence in the boardroom that can prevail through a stock-financed acquisition.

With both the *Sh1 Absolute Dilution* and *Aggregated Relative Dilution* significant in the probit regression,[26] we believe we have established new evidence for the notion that control motives matter for the M&A currency decision. More specifically, that *both* absolute and relative loss of influence matter in the choice of including stock vs. excluding stock altogether from the payment method. The significance of these variables is interesting since neither Faccio & Masulis (2005) nor Swieringa & Schauten (2007) (who deploy the same variable as Faccio & Masulis (2005)) get a significant relation with their measurement of reduced control.[27] We argued in the *Experimental Design* that their specification of reduced control through the CONTROL LOSS variable is incomplete. Here, we have tested for a segmentation of reduced control, to account for both the *absolute* and *relative* component of the ownership disturbance following a stock-financed acquisition. We argue that both aspects of control should be accounted for in order to measure the *real* impact on acquiring shareholders. Further, we measure the *aggregated* impact from target shareholders, and we do not need to make any simplifying assumptions on the ownership structure of the target since we have full ownership coverage. Finally, we measure the threat from target shareholders in relation to the ownership structure of the acquirer, and we exclude shareholders that

[26] Note also that the null hypothesis of multiple exclusion of the two ownership variables of interest was strongly rejected after performing the Wald Test. See Appendix A.6.

[27] Note that both studies get significance for their subsidiary/unlisted target dummies. To some extent this should also proxy for the reluctance of creating a legendary shareholder in the combined entity.

do not care about dilution or control. With our segmentation and specification of the control aspect, we end up establishing a significant relation between reduced control and the payment choice. Now we need to evaluate the model's control variables and further investigate the robustness of the analysis in order validate the strength of the results.

8.1.2 Deal characteristics

Relative Deal Value is positive and highly significant in the model. If the target is a relatively larger addition (measured by the value of the deal) to the equity value of the acquirer, the probability of choosing stock is significantly higher. This is in line with the empirical findings in Faccio & Masulis (2005) and Swieringa & Schauten (2007) who both find a significant negative relation between a bigger target and the probability of cash-deals in their ordered Probit regressions. Further, this finding supports the information asymmetry prediction by Hansen (1987), stating that a relatively bigger target motivates the need for stock financing to mitigate the problems of information asymmetry on target valuation. But maybe most importantly, this finding supports the argument that it will be complicated to finance a relatively big acquisition with cash or debt, thus forcing the use of shares in the consideration. While information asymmetries is more of a subtle concern, the difficulties in cash/debt financing a big acquisition is a real balance-sheet fact. Further, we argue that the dilution variables capture the reluctance to offer shares that reduce control, at the margin, but that the *Relative Deal Value* controls for the financing constraints in the method of payment choice. It is unlikely that the dilution motive will overrule the financing constraints related to acquiring a substantial target. While financing is a critical hygiene factor in the deal decision (no financing - no deal), the dilution motive is definitely more subtle.

Next, a deal being *Cross-Border* has significantly lower probability of being financed with stock, relative to a domestic deal. The binary variable is significant and negative at the 1% significance level. This strongly supports the argument that seller demand for bidder stock is lower in a cross-border deal.

Further, a deal characterized as *Intra-Industry* has significantly higher probability of being financed with stock, than diversifying outside-industry deals. This is as expected, and supports the finding in Eckbo et al. (2016); the more the seller knows about the currency offered (less uncertainty), the higher the demand for bidder-equity. When the parties operates in the same industry, the problems with information asymmetry on bidder shares as currency seem to be less prominent, and thus motivates stock financing.

8.1.3 Acquirer characteristics

We do not find supporting evidence for the investment opportunities hypothesis, as *Acquirer M/B* is insignificant in the regression. This is the case both before and after including the other M/B variables. Thus, in contrast to Faccio & Masulis (2005), Swieringa & Schauten (2007) and Martin (1996), we do not find that high-growth bidders prefer to finance acquisitions with equity in order to not constrain their investment opportunities. We suspect that this could be due to sampling differences, most notably that the above studies include private targets. Moreover, we do

not control for bidder overvaluation in this study, which could be a potential OVB in the analysis and especially affecting the M/B variables.

Turning to the debt-financing variables we also have some interesting results. The pre-deal *Acquirer Leverage Ratio* is significant and negatively affects the probability of observing stock-financed acquisitions. To some degree, this contradicts Faccio & Masulis (2005) who find a higher leverage ratio to be related to *more* stock. However, as stated in the *variables* section, Faccio & Masulis (2005) measure the post-deal debt burden in their ratio. Moreover, there are several arguments that can be raised to explain our estimate. Bidders with higher pre-deal leverage ratios have already signalled that they operate with higher debt ratios, and the nature of their business may allow for higher gearing. Thus, the *Acquirer Leverage Ratio* can be interpreted as a proxy for the financial nature of the firm, in contrast to a debt capacity variable. Moreover, our sign on the coefficient is in line with what Burch et al. (2012) find in their Probit regression.

Further, *Acquirer Collateral* is positive and significant in the regression. Given the debt capacity argument, it is surprising that a higher ratio of tangible assets increases the likelihood of stock financing. Indeed, our sign on the coefficient is opposite to what Faccio & Masulis (2005) find in their study. They find a significant negative effect both in their Probit and Tobit specification of the model. However, this effect is not well-founded in empirical literature, as both Swieringa & Schauten (2007) and Eckbo et al. (2016) find no evidence for the importance of collateral in their sample. Our study supports that the effect of higher collateral on the method of payment is ambiguous, and should be investigated further.

However, we find supporting evidence for the argument that larger bidders tend to prefer cash-financed deals. *Acquirer Total Assets* is significant and negatively related to the probability of stock-financing. As Faccio & Masulis (2005) argue, this could be due to better access to credit markets, and given the assumption that internal funds is not sufficient to finance acquisitions, this effect could be important in explaining the chosen currency form. Faccio & Masulis (2005) also find this relation, while Swieringa & Schauten (2007) fail to find significance.

In contrast to Faccio & Masulis (2005), we control for cash-related variables in our study. We follow Martin (1996) in his argumentation that the cash-variables are important to include in an empirical model seeking to explain the choice between stock and cash. And, as can be seen from Table 4, both the cash-availability variables are significant (at the 10% level) with the expected signs.

First, a higher *Acquirer Cash To Value* reduces the likelihood of stock-financed takeovers at the 5% significance level. This finding supports the argumentation in Martin (1996) and the theory of Myers (1984); that firms with more liquid assets will prefer to finance investments with internal funds, rather than outside equity.

Moreover, the *Dividend Payout Ratio* is significant at the 10% level, with a negative sign. Assuming that the ratio is a valid proxy for the free cash flow level, this finding is in line with the free cash flow theory of Jensen (1986). In our sample, bidders with a higher payout ratio is less likely to finance the acquisition with stock. While

Swieringa & Schauten (2007) failed to find evidence in favor of this effect, our model supports the findings in Zhang (2001), who first applied this FCF-proxy variable. Martin (1996), who applies a different measure,[28] gets an unstable sign on his free cash flow variable. Hence, our model contributes to the not so unambiguous FCF-effect on the M&A currency decision.

In contrast to several of the studies reviewed, we do not find supporting evidence for the effect of having the controlling shareholder in the 20-60% intermediate ownership range in conjunction with our corporate control variables. Interestingly, the variable is significant when we exclude our reduced-control variables. But while the *Controlling Sh 20-60* variable only *indicates* whether the controlling shareholder is in a vulnerable position, our main ownership variables *measure* whether that is actually the case. Thus, we argue that our main variables are preferable to the more indicative alternatives deployed by other studies. Moreover, having the management as one of the five largest bidder-shareholders does not have an effect on the payment method in this specification of the model.

8.1.4 Target characteristics

The next group of variables we included in the model were the target specific characteristics. As can be seen from Table 4, of the variables solely controlling for target attributes, it is only the *Target Independence* variable that turns out to be significant in the model. The indicator is significant at the 5% level in the Probit regression. A higher *Target Independence*, indicating a more concentrated ownership structure of the target, raises the probability of observing stock-financing in the sample. This could indicate that dominant shareholders in the target firms prefer to participate in the combined firm.

Next, the *Target M/B* ratio is insignificant in the final model specification. Thus, looking at the isolated M/B-variables, we fail to find supporting evidence for the risk sharing hypothesis. At first glance, the bidders in our sample do not seem to have a particular preference for stock when much of the target value is in future, uncertain growth opportunities. However, as we will see further down, the Q-ratio interaction variables may suggest that there is evidence of the risk sharing hypothesis in our sample.

In addition, none of the variables addressing the balance sheet characteristics of the target are proven significant. Neither *Target Leverage* or *Target Collateral* seem to have an effect in explaining the chosen consideration form in the Probit model. Thus, our model does not support the argument of Hansen (1987) that the financial characteristics of the target affect the debt capacity in the degree that it affects the payment method choice.

Finally, the presence of a substantial private equity shareholder in the target does not seem to affect the stock vs. no-stock choice. We suspect that the effects of cash-hungry PE-sellers are less evident in a sample of public targets (where the PE-owners may have limited influence compared to their unlisted portfolio companies).

[28] Martin computes the bidder-FCF and relates it to the value of the acquisition.

8.1.5 Risk sharing combined

The last category of variables included in the model are the *Q-interaction* variables. As Martin (1996) showed in his study, the interaction between the parties' market-to-book ratios may play a role in the decision. Indeed, two of the *Q-interaction* variables are proven significant in the model. We stress that the variables must be interpreted as compared to the base variable - which is when both the acquirer and target has Q-ratios below 1. Thus, in the deals where the acquirer has a *high* Q-ratio combined with a *low* target-Q, we find higher probability for stock-financing than in the low-low case. This finding supports the argument that growth-acquirers (High Q) wish to finance investments with equity to support their growth opportunities, when the information asymmetry on target is not a main concern (Low Target-Q). However, the *Acq Low-Q - Tar High-Q* variable is also significant, but with the unexpected sign. According to the hypothesis, stock financing would be preferable in such a case, but our model finds the opposite. Thus, this additional set of variables provides mixed results in relation to the hypothesis and findings in Martin (1996).

8.2 Tobit model

Next, we turn to the Tobit estimation to evaluate the *fractional* stock usage. For our study, we are especially interested in assessing the differences compared to the Probit model. Specifically, how do the explanatory variables differ in explaining the intensive usage of stock vs. the qualitative decision of including stock at all in the consideration? Again, we are mostly interested in our main ownership variables, and will thus comment mostly on these. Moreover, since we regard the Probit model as our main model of interest, we will in a smaller degree than above relate the results of the Tobit model to other studies. This is also due to the observation that studies which deploy both Probit and Tobit models, usually get the similar sign and significance on the coefficients across the two models. One example is the Faccio & Masulis (2005) study where very little changes between the two models, both in terms of significance and sign on the coefficients. Thus, we regard that the value-added in relating the results to other studies (again) is limited. The output from the Tobit regression is reported in Table 5:

Table 5: Tobit Model with the two specifications

	Specification 1		Specification 2	
Tobit model	Coefficient	Standard error	Coefficient	Standard error
Sh1 Absolute Dilution	-1.645**	(0.652)	-1.586**	(0.653)
Aggregated Relative Dilution	-27.72*	(16.83)	-26.05	(16.62)
Relative Deal value	234.8***	(23.95)	240.5***	(24.17)
Acquirer M/B	-0.088	(0.065)	-0.090*	(0.055)
Acquirer Collateral	76.14***	(12.18)	79.33***	(15.88)
ln(Acquirer Total Assets)	-8.558***	(1.540)	-7.493***	(1.589)
Acquirer Cash To Value	-0.140**	(0.060)	-0.149**	(0.064)
Acquirer Div Payout Ratio	-3.053**	(1.245)	-3.035**	(1.308)
Cross-Border	-89.16***	(8.849)	-86.28***	(8.833)
Intra-Industry	10.29	(6.421)	10.61*	(6.392)
Acquirer Leverage Ratio	-60.86***	(18.40)	-61.55***	(19.25)
Controlling Sh 20-60	-7.785	(8.856)	-8.094	(8.838)
Target Independence	5.374*	(2.885)	5.964**	(2.885)
Target Industrial	-44.42***	(8.299)	-40.96***	(8.358)
Target M/B			0.548	(0.914)
Target Collateral			-8.497	(14.56)
Target Leverage Ratio			-5.136	(15.46)
Target PE owned			3.331	(17.84)
Mngmt Ownership Presence			-48.97*	(29.06)
Acq High-Q - Tar High-Q			-21.87**	(9.394)
Acq High-Q - Tar Low-Q			4.317	(9.834)
Acq Low-Q - Tar High-Q			-33.83**	(13.32)
Constant	66.82***	(17.01)	68.46***	(18.24)
Sigma	114.8***	(4.014)	113.9***	(3.984)
Observations	1,909		1,909	
Region Dummies	YES		YES	
left-censored OBS	938		938	
right-censored OBS	417		417	
uncensored OBS	554		554	
pseudo-R-squared	0.0585		0.0607	
Log Likelihood	-4331		-4321	

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

In both the tobit models the dependent variable takes on the percentage stock used in the consideration y[0,100] . The standard errors are based on QML (Huber/White) heteroskedasticity robust standard errors. This means that the significance tests based on the z-stats are also heteroskedasticity robust. Specification 1 contains the *must-have* variables and in the Specification 2 we have added the *nice-to-have* variables. The R-squared refers to the The McFadden's pseudo R-squared that is based on log-likelihood ratios.

As in the Probit model we have added the *nice-to-have* variables in Column 2. This procedure reveals that *Aggregated Relative Dilution* is somewhat unstable in the Tobit model, as the variable goes from significant in the first, to insignificant in the final Tobit specification. But overall, and as anticipated, we note from Column 2 in Table 5 that very little changes in terms of the explanatory variables when moving from the Probit to the Tobit model. Thus, the clear majority of the above results hold in the Tobit estimation as well. Only *Aggregated Relative Dilution* and *Acq High-Q - Tar Low-Q* lose their significance on the 10% significance level. On the other

hand, *Acquirer M/B*, *Acq High-Q - Tar High-Q*, and *Mngmt Ownership Presence* gain significance in the Tobit model. Overall, the vast majority of the independent variables have stable signs and significance across all model specifications, indicating a consistency in the results. We also note that the model explains 6.07% of the variation in the fraction of stock usage in the sample. This is markedly lower than the R-squared of the Probit model. Although the R-squared should not be compared across the two models, due to several reasons, the substantial difference *may* indicate the following. It seems reasonable that there should be more fundamentals and firm-attributes that can explain whether the bidder will open up for stock or not, while the actual fraction of stock usage will be determined in a larger degree by ”uncontrollable” individual deal-negotiations.

Starting with the main corporate control variables we observe from Column 2 in Table 5 that *Sh1 Absolute Dilution* is significant at the 5% significance level in the Tobit regression. This suggests that the absolute loss of voting rights the dominant shareholder will experience through an equity-financed acquisition matters for the fraction of stock offered as payment. In line with the Probit model, the negative (and significant) coefficient supports the argument that the dominant shareholder will be reluctant to increase the equity-fraction of the payment when faced with absolute dilution of control. However, the economical marginal effect is modest as a 1 percentage point increase in absolute dilution reduces the fraction of stock in the consideration with roughly 0.1 percentage points. Even though the coefficients on the marginal effects cannot be directly compared across models (Probit measures a probability, while Tobit measures the fraction), the economic significance of the variable appears to be relatively higher in explaining the probability of observing stock in the payment method altogether (Probit).

While *Aggregated Relative Dilution* has kept it expected sign, the variable is not significant in the final Tobit specification. In the Probit model we established that the threat of reduced relative influence and control significantly reduces the probability of choosing stock in the consideration. However, in explaining the actual fraction of shares offered, the loss of relative control does not hold explanatory power. This could be interpreted as that the dominant bidder-shareholders abstain from offering shares in the first place when faced with a ”threat” from the target shareholders. But when they have opened up for shares at the outset, they don’t control the actual fraction offered to the target shareholders. This could be due to shareholders limited influence on the details of the deal structuring, and that shareholders only interfere in the ”big” issues such as equity vs. no equity. It is argued by several papers that bidder-management runs the structuring and negotiations of the deal, without interference from shareholders. This is supported by the fact that bidders (in most countries) are required by law to get shareholder approval for most (at least substantial) equity-financed investments,[29] but that the management team may have more liberty in the structuring of the actual fraction of equity in the deal. Indeed, as we comment on below, the bidder-management variable does gain significance in this specification.

All the variables controlling for the characteristics of the deal are also significant in the Tobit estimation. Domestic deals and deals within the same industry increase the fraction of stock deployed in the payment. Moreover, *Relative Deal Value* is still highly significant in explaining the fraction of stock offered.

[29] In the U.S., firms listed at NYSE need shareholder approval for issuing over 20% of the company’s equity value (Gaughan (2007)).

Next, all the variables capturing the financial characteristics of the bidder are relatively unchanged from the Probit estimation. Both a higher pre-deal leverage ratio and the size of the acquirer decrease the fraction of stock in the consideration at the 1% significance level. In addition, a higher ratio of tangible assets to total assets is still related to increased stock usage. For *Collateral* and *Total Assets* the effects are in line with what Eckbo et al. (2016) find in their Tobit estimation on the fraction of stock usage.

The cash-variables also have the expected positive sign at the 5% significance level in the Tobit estimation. Both a higher *Cash To Value* and *Dividend Payout Ratio* increase the intensive stock usage in our sample. The *Acquirer M/B* ratio is significant at the 10% level, in contrast to the insignificance in the Probit version. However, a higher *Acquirer M/B* is negatively related to the stock percentage in our study. This contradicts the investment opportunities hypothesis, and is opposite to what both Martin (1996) and Faccio & Masulis (2005) find in their models.

Although the *Target Collateral* and *Target Leverage Ratio* have the expected signs, none of the variables are significantly related to the currency decision in the Tobit estimation either. Thus, we do not find supporting evidence in any of our models for the argument that the financial characteristics of the target matter to the payment method. Moreover, and similar to the Probit estimation, neither the *Target M/B*, nor the *Target PE owned* hold explanatory power in the Tobit.

Turning to the *Q-interaction* variables, the interaction of a *Low-Q* acquirer and a *High-Q* target is negatively affecting the fraction of stock (relative to the low-low case). As with the Probit model, this is somewhat unexpected, and not in line with the risk sharing hypothesis. In addition, a *High-Q* acquirer and *High-Q* target is now significant and negatively related to the stock usage. This is also unexpected as both the investment opportunities hypothesis and the risk sharing hypothesis argue for a preference for stock in such an acquisition.

While *Controlling Sh 20-60* remains insignificant, the *Mngmt Ownership Presence* is now significant (10%) and negatively related to the stock usage. Thus, having bidder-management as one of the 5 largest owners, decreases the fraction of stock in our sample. Although somewhat weak, this supports the prediction by the early U.S. payment method studies that bidder-management is reluctant to dilute their control through a share exchange. This also supports the above argument that inside ownership affect the *fraction* of stock, but not the qualitative yes-no to stock decision. Further the *Target Independence* variable keeps it sign in the Tobit, but is somewhat less significant. In addition, the acquisition of an industrial target negatively affects the fraction of stock, as it did in the Probit estimation.

We now turn to evaluate the robustness of the above results before concluding the analysis.

9 Assessment of robustness

We need to investigate the robustness of the results in our analysis. In the following section we will address potential factors that could interfere with the validity of the above results. We point out that assessing many of the statistical aspects of the Tobit and Probit is challenging, because a majority of the model assumptions are based on the underlying unobservable latent variable.

It is important that our chosen independent variables do not cause problems with multicolineariry. Before arriving at our final model specifications, we considered many different variable combinations based on economic reasoning. We wanted to include a sufficient amount of control variables so that we would be able to measure the true effect of our main dilution variables. We also wanted to control for key payment method hypotheses, but had to make sure that the set of control variables would not create disturbance for each other. After arriving at our ideal specification based on a qualitative assessment, we moved to quantitative analysis and assessed the possible econometric issues with an emphasis on multicolinearity. In line with Karampatsas et al. (2014) we conducted a VIF test on our ideal specification and assessed the variables with the highest VIF-scores.[30] In this process only *Acquirer Unused Debt Capacity* was deemed too problematic and as a result it was removed from the specification. The variable had a VIF of 3.45 and a correlation coefficient with *Acquirer Leverage Ratio* of -0.81. The variable was only significant when *Acquirer Leverage Ratio* was included in the models. After removing *Acquirer Unused Debt Capacity*, we were left with the final variable specifications that are used in the models above. Our two variables for ownership dilution showed no problems with multicolinearity through the analysis, supported by their relatively low VIF-scores (Appendix A.7). This indicates that we succeeded in our objective to segment dilution into component parts that can be independent of each other. In the final specification the largest VIF is reduced to 2.32 and multicolinearity should not interfere with the robustness of our results.

In order for our results to be valid we also need to address the possible endogeneity concerns in our models. Since our main focus throughout this analysis has been the effect of ownership dilution on stock usage, we need to address the possible endogeneity problem that could arise due to such a specification. The obvious problem with such dilution variables is that they are direct functions of the amount of stock applied. Hence, we are faced with a potential endogeneity problem casued by simultaneity, because the ownership dilution is only known at the exact moment when the stock percentage is decided. However, this is only true if you measure the actual dilution that did occur in the deal. In the analysis, both variables for absolute and relative dilution are based on a hypothetical situation that would have occurred if the deal was structured with a 100% stock payment. This solves the endogenity problem since the variables no longer are functions of the actual stock percent applied in the consideration. In addition, we get experimental variables that are comparable across all deals since we assume a constant stock percentage for all observations.

As Faccio & Masulis (2005) point out, it is important to investigate the possible censoring problems that could arise when utilizing a sample of bids. It is plausible that some potential acquirers outside the sample decided

[30] The VIF tests results are reported in Appendix A.7 together with a detailed commentary.

not to bid based on their concerns with ownership dilution and other factors. As Faccio & Masulis (2005) also argue, such censoring problems could cause the models to be biased on the effect of these factors. There might be potential issues for all the variables, but we focus on the possible effects on our two dilution variables. Ideally, we would investigate this possible bias by constructing the Heckman sample selection model. The procedure is based on first estimating a model for the probability of a firm actually making a bid. The Inverse Mills ratio is calculated for each observation in the model and then this value is included in the payment method models. If this variable is significant, then the final estimates on stock usage are most likely affected by censoring problems.

Due to two important data limitations, we do not preform the Heckman procedure on our models, and thus we cannot use this methodology to conclude on the effect of our sample selection. The first limitation is that the two main variables for ownership dilution make use of the actual size of the bid consideration. This means that even if we had followed the Heckman procedure, we could not have used our two dilution variables as predictors in a model for the probability of actually making a bid. The second limitation is that we do not have the appropriate sample to make such a probability model in the first place. We need a representative population of potential acquirers which includes the actual bids used in our analysis. With our data foundation, the only possibility would be to use the company population in the ownership database which the deals are matched with. However, a probability model for takeover bids based solely on an ownership database is likely to suffer from sample censoring issues in itself. It seems counter-intuitive to solve one censoring problem with another. Fortunately, it is likely that a potential sample bias would cause the models to *underestimate* the effect of ownership control concerns. In light of our hypotheses, it is more likely that bidders facing major reductions in control would be more reluctant than eager to bid. Given that we find significant results, the censoring problem might not be a major problem for the robustness and direction of our findings.

We might also encounter severe problems with the sample following our criteria that the deals must be matched with ownership data to be included. This could cause biases in the types of companies that are included in the final sample. However, the biggest impact of this sampling criteria is likely to be that we end up with a sample of public companies. Following rigid interpretations, our results are only valid for public deals. The imposed criteria was necessary to obtain sufficient information in order to answer the main research question. However, we hope that the results might be indicative of deals with different listing status. An argument in this direction is that corporate control concerns might be quite universal for many company types.

The above discussions indicate that the results should be robust given the current model assumptions. Finally, we also find it interesting to evaluate the results when the variable assumptions themselves change. The applied calibration of the *Aggregated Relative Dilution (SPIR)* variable requires a 10% voting stake in order for a shareholder to be included in the control core. This cutoff can be adjusted and following an argument that smaller shareholders could hold control in more fragmented ownership structures, we also evaluate the results for lower thresholds.[31] The analysis above established that *Aggregated Relative Dilution* had a significant negative effect on the probability of offering shares. We expect that the variable will eventually lose its significance if the threshold gets too low. This

[31] We have also evaluated the results for higher thresholds and they are always significant.

is due to the relative nature of the variable, which weights a particular rank reduction equally across companies regardless of the actual percentage ownership held by the respective shareholder.[32] As argued, this characteristic is sensible if the inclusion is limited to shareholders that both *value* and *can* exercise control.[33] When the threshold gets too low the variable might include shareholders that do not fit these criteria, and thus miscalculate the actual reduction in control across companies.

The tables in Appendix A.1.3 reevaluates the significance of both our dilution variables in all models, but we focus on the significant results for *Aggregated Relative Dilution* in the Probit. All other factors are held constant and the threshold values are changed from the current 10% through 1%. We see that *Aggregated Relative Dilution* has a significant effect for all threshold values above 5.5% and no significance below this cutoff. This might indicate that somewhere around 5% you start to include shareholders that are unable to exercise corporate control. As a result the calculated dilution does not have a significant effect on the payment choice. This is most likely because the relative dilution for shareholders with less than 5% stake might be irrelevant for the payment decision and that their inclusion obscure the relevant effect. Appendix A.1.3 also shows that the significance of *Sh1 Absolute Dilution* is unaffected by the threshold limit for the *Aggregated Relative Dilution* variable in all models. This indicates that we have succeeded in our objective to segment reduced control into component parts that can be independent of each other.

[32] Example: Sh1 has 50% in a company A, and Sh2 has 10% in a company B. They are both the dominant shareholder in their respective control core. Both company A and B conducts an acquisition using stock payment. Post-deal they both go from being the largest to the second largest shareholder. Both shareholders contribution to their respective company-SPIR would be 1, regardless of their absolute percentage stake.

[33] This is one of the two base criteria imposed on both our dilution variables in the *Experimental Design* section.

10 Conclusions

In this thesis we have sought to expand the understanding of what drives the currency decision in corporate acquisitions, with an emphasize on corporate control concerns. In the literature, corporate control motives is one of the highlighted key determinants for this important financing choice. However, as our review of the literature uncovered, there are still unresolved issues regarding this determinant. Specifically, few studies manages (or even attempts) to capture the subtle effect of the power contest that can emerge in many stock-financed acquisitions. Thus, in our study we asked: *what is the effect on the payment method choice from the potential reduction in influence and control following a diluting equity-financed acquisition?*

To answer this research question we proposed a segmentation of control, and developed two variables that aimed to capture the effects of reduced control. First, we deployed *Sh1 Absolute Dilution* that measures the *absolute* dilution of voting rights for the dominant shareholder in the acquiring firm. Next, we constructed a variable that aimed to measure the subtle impact from *relative* reduction in control. The *Aggregated Relative Dilution* variable aims to capture the impact on the acquirer's control structure from the potential entrance of target-shareholders that both value and can exercise control. Combining the two variables in a payment method model should capture the total reduction in power that could arise. The hypothesis was that increased threats to the bidder-shareholders' corporate control, measured by the above variables, should be associated with a reluctance to use equity in the consideration.

We tested the above hypothesis using a sample of 1,909 M&A deals announced between 2008 and 2014, linked with high quality ownership data on both the acquirer and target firm. As a result of our extensive data requirements for both parties, especially in terms of ownership data, we chose to investigate deals between public acquirers and public targets. The final payment method models include the following groups of determinants: *deal characteristics*, *acquirer financials*, *target financials* and various *ownership characteristics*, all anchored in well-established M&A literature.

First, we find that both our corporate control variables are significantly negatively related to the probability of observing shares in the consideration. When the bidder-shareholders are faced with the prospects of higher *absolute* dilution and higher *relative* dilution, we find that shares are significantly less likely to be offered in the first place. That both these variables are proven significant provide solid support for the hypothesis that acquiring shareholders care about maintaining control, and thus will be reluctant to offer diluting equity as payment.

Second, we find that, when estimating the *fraction* of stock in the consideration, only the *Sh1 Absolute Dilution* variable is significant. The *Aggregated Relative Dilution* variable is not significant when measuring this aspect of the payment method choice. We suggest that the latter result could be due to the different mechanisms in play between the qualitative aspect of deciding on stock altogether vs. deciding on the exact fraction of stock offered in the consideration. Specifically, bidders are most often required to get shareholder approval for initiating equity-financed investments. Both variables held significant explanatory power in the binary decision on stock

inclusion. But when deciding on the *actual fraction* the acquiring shareholders might have smaller influence in the structuring of details of the deal. Thus, overall, we find less evidence for the importance of reduced control on the *actual fraction* of stock usage than for observing stock in the consideration at all.

The above findings are robust to the inclusion of several other explanatory variables and various model specifications. Regarding the other determinants included in the model, serving as control variables, we find that the majority are significant and stable through a variety of specifications. In line with other studies we find that higher *relative value of the deal*, *intra-industry* and *domestic deals* all increase stock usage. Further, we find that both a higher ratio of *cash relative to deal value* and a higher *dividend payout ratio* (proxy for free cash flow), significantly increase stock usage. Next, we get significant relations between the method of payment and the following financial variables of the acquirer; the ratio of *tangible assets to total assets*, the *pre-deal leverage ratio* and size - measured as *log of total assets*. The *collateral* ratio is positively related to stock financing in our model, while the *size* and *leverage ratio* of the acquirer reduces stock payment. We fail to find consistent supporting evidence for the *investment opportunities hypothesis* and the *risk sharing hypothesis*, as all our *M/B*-variables are unstable and mostly insignificant across the models. We do not find evidence suggesting that the financial characteristics of the target affects the currency choice. In addition, we do not find that control motives are more present when the dominant shareholder of the acquiring firm is in the 20-60% ownership range. However, if the target has a more concentrated ownership structure, stock financing is more likely in our models. Overall, the included determinants explain around 24% of the variation in the qualitative currency decision of including shares or not, while the explanatory force is markedly lower when the dependent variable is the *fraction* of stock usage.

Despite the findings in this thesis, we stress that there are still unresolved issues on the importance of corporate control for the payment method choice. We encourage further research on the validity of the variables we have introduced, with a broader set of control variables. In specific, we suggest that the variables should be linked with the more detailed *SDC M&A database*, in order to control for characteristics overlooked by this study. The mode of the acquisition, taxation motives, and a more sophisticated classification of the target (subsidiary/private) are aspects of the deal known to have an effect that should be included in any payment method model. In addition, as a natural next step, we suggest further investigation of the preferences of target shareholders, and their importance for the currency choice. Here we have accounted for the impact of target shareholders from a bidder-shareholder perspective. However, what the target shareholders really prefer in terms of payment and their ability to influence the structuring of the deal, is still an open issue that calls for further research.

Appendix A

A.1 Detailed information on the Aggregated Relative Dilution variable (SPIR)

A.1.1 Clarifying example on the application of SPIR

Here we present a relevant scenario to demonstrate the application of the SPIR variable. Consider a bidder with a market capitalization of 10 BUSD which is acquiring a target worth 4 BUSD (i.e. Deal Value 4 BUSD). Assume that there are four shareholders (i) included in the acquirer control core with 30, 15, 12 and 10 percent ownership stake respectively (we add the letter A and denote i =A1,A2,A3,A4 for clarity). In the target control core there are three shareholders (j) with 50, 15 and 10 percent respectively (j =T1,T2,T3). Given these data points we can calculate the ownership stake held by each entity in the combined company, using the formulas B2 and B3 in Appendix A.2. We then rank the stakes held in the combined control core from largest to smallest. The figure below summarizes the situation thus far and the arrows indicate the movement of each shareholder.

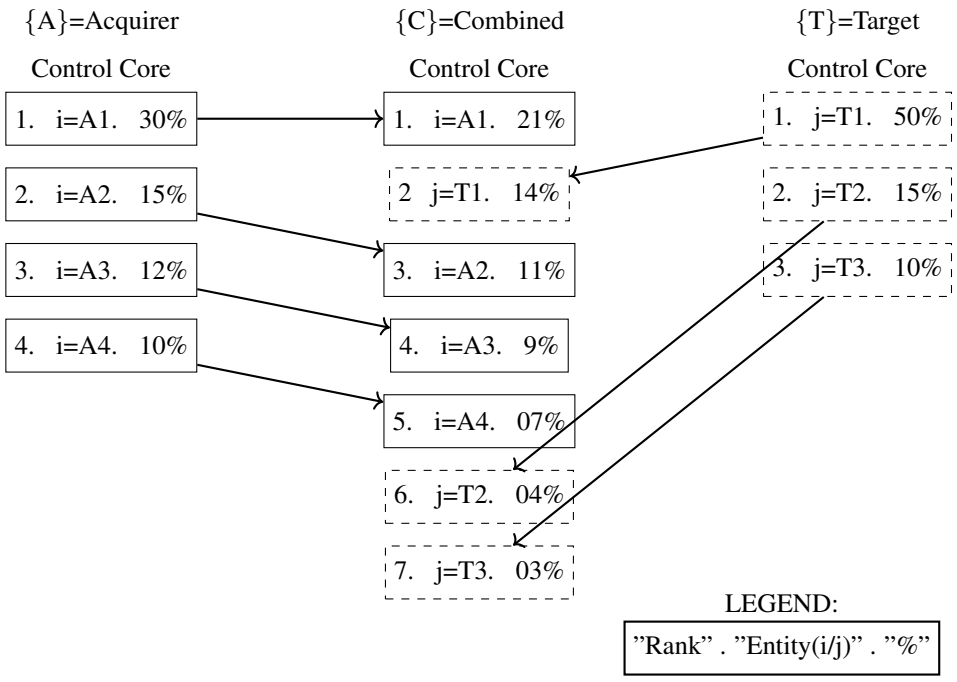


Figure 3: Clarifying example of the SPIR variable

Now we have both the pre- and post-merger ranks for the acquirer control core and we can apply the SPIR formula for all (i) entities where n=4.

$$SPIR = \sum_{i=1}^{n} \frac{R_i^{POST} - R_i^{PRE}}{R_i^{PRE}}$$

$$SPIR = \frac{1-1}{1} + \frac{3-2}{2} + \frac{4-3}{3} + \frac{5-4}{4} \approx 1.08$$

Not so coincidentally, this is close to the sample mean SPIR for positive values. The example was created to show a typical deal that involves reduction in relative control. The scenario also highlights some important characteristics

of the variable. In order for a deal to cause a change in relative control you either need a powerful entity in the target, a relatively large deal size, or most often both (as this the case here). Notice also that the SPIR formula takes the sum only through i = A1,A2,A3,A4. Even tough the target shareholder information is used to construct the variable, we only measure the reduced relative control for the acquirer entities. Another important characteristic is that a shareholder going from the rank of x to the rank of y will always have the same contribution to SPIR, for equal values of x and y. This is regardless of the percentage held, deal size or market cap.[34] The metric measures only the relative movement and this makes it comparable across all deal characteristics.

A.1.2 The control core shareholder types incuded in the Aggregate Relative Dilution (SPIR)

The control core shareholder types in the SPIR variable	
Employees and managers	IN the control core
Financial companies	IN the control core
Individuals and families	IN the control core
Industrial companies	IN the control core
Private equity firms	IN the control core
Public and Goverments	IN the control core
Venture capital	IN the control core
Mutual and Pension Funds	NOT IN the control core
Insurance companies	NOT IN the control core
Banks	NOT IN the control core
Foundations	NOT IN the control core
Other	NOT IN the control core

The classification on which shareholder types that both *value* and *can* exercise corporate control is based on a qualitative assessment. We assume that the 5 shareholder groups excluded are either unable (aggregated shareholder types) or passive investors that will not actively interfere in corporate decisions. We stress that there are some shareholder types that are border-line w.r.t the two segments. But this classification is an attempt to utilize the data material and incorporate a realistic assessment of which shareholders that will care about dilution and control issues.

[34] See Appendix section A.1.4 below on the individual marginal contributions to SPIR from every potential shareholder in the acquirer control core.

A.1.3 Sensitivity analysis on the significance of absolute and relative dilution for different voting stake thresholds

Table 6: Sensitivity analysis for Aggregated Relative Dilution (SPIR)

Threshold	Probit		Tobit	
	Specification 1	Specification 2	Specification 1	Specification 2
10% (base)	**	**	*	-
9%	**	**	-	-
8%	**	**	-	-
7%	*	*	-	-
6%	*	*	-	-
5.5%	*	*	-	-
5%	-	-	-	-
4%	-	-	-	-
3%	-	-	-	-
2%	-	-	-	-
1%	-	-	-	-

The stars indicate the significance level for the Aggregated Relative Dilution(SPIR). ***, ** and * indicate 1%, 5% and 10% significance level respectively. All specifications are constant and only the threshold for the SPIR variable is changed. The threshold is the minimum percentage voting stake required to be included in the control core. A 5.5% threshold is the turningpoint where the variable becomes insignificant.

Table 7: Sensitivity analysis for Sh1 Absolute Dilution

Threshold	Probit		Tobit	
	Specification 1	Specification 2	Specification 1	Specification 2
10% (base)	***	***	**	**
9%	***	***	***	**
8%	***	***	***	**
7%	***	***	***	**
6%	***	***	***	**
5.5%	***	***	***	**
5%	***	***	***	**
4%	***	***	***	**
3%	***	***	***	**
2%	***	***	***	**
1%	***	***	***	**

The stars indicate the significance level for the Sh1 Absolute Dilution. ***, ** and * indicate 1%, 5% and 10% significance level. All specifications are constant and only the threshold for the SPIR variable is changed. The threshold is the minimum percentage voting stake required to be included in the control core. As expected the significance is independent of the threshold limit.

A.1.4 Individual marginal effects on the SPIR variable

Individual entity contribution to SPIR

	PRE.1	PRE.2	PRE.3	PRE.4	PRE.5	PRE.6	PRE.7	PRE.8	PRE.9	PRE.10
POST.1	0.00									
POST.2	1.00	0.00								
POST.3	2.00	**0.50**	0.00							
POST.4	3.00	1.00	**0.33**	0.00						
POST.5	4.00	1.50	0.67	**0.25**	0.00					
POST.6	5.00	2.00	1.00	0.50	0.20	0.00				
POST.7	6.00	2.50	1.33	0.75	0.40	0.17	0.00			
POST.8	7.00	3.00	1.67	1.00	0.60	0.33	0.14	0.00		
POST.9	8.00	3.50	2.00	1.25	0.80	0.50	0.29	0.13	0.00	
POST.10	9.00	4.00	2.33	1.50	1.00	0.67	0.43	0.25	0.11	0.00
POST.11	10.00	4.50	2.67	1.75	1.20	0.83	0.57	0.38	0.22	0.10
POST.12	11.00	5.00	3.00	2.00	1.40	1.00	0.71	0.50	0.33	0.20
POST.13	12.00	5.50	3.33	2.25	1.60	1.17	0.86	0.63	0.44	0.30
POST.14	13.00	6.00	3.67	2.50	1.80	1.33	1.00	0.75	0.56	0.40
POST.15	14.00	6.50	4.00	2.75	2.00	1.50	1.14	0.88	0.67	0.50
POST.16	15.00	7.00	4.33	3.00	2.20	1.67	1.29	1.00	0.78	0.60
POST.17	16.00	7.50	4.67	3.25	2.40	1.83	1.43	1.13	0.89	0.70
POST.18	17.00	8.00	5.00	3.50	2.60	2.00	1.57	1.25	1.00	0.80
POST.19	18.00	8.50	5.33	3.75	2.80	2.17	1.71	1.38	1.11	0.90
POST.20	19.00	9.00	5.67	4.00	3.00	2.33	1.86	1.50	1.22	1.00

The table is based on the individual elements of the SPIR Sum: $\frac{R_i^{POST} - R_i^{PRE}}{R_i^{PRE}}$

The table shows each individual entity's contribution to SPIR for a given initial rank in the acquirer control core (PRE.x) and a rank in the combined control core (POST.x). The table shows the complete set of possible individual contributions since there can be a maximum of 10 entities in the acquiring core and 20 in the combined core. Notice how a marginal increase of 1 is always a shareholder doubling its rank. Summing the above individual effects gives the total SPIR value. The entrance of a target shareholder in the control core have effect for all acquirer entities below and you can find the total effect by summing an diagonal array - starting where the target shareholder enters and with a length representing the number of acquirer shareholders below. We have bolded the example in Appendix A.1.1 where the SPIR = 0.50 + 0.33 + 0.25 = 1.08

A.2 Variable definitions

Variable	Formula/Comment	Source/Input.
Variables in model specification		
SH1 Absolute Dilution	$$Sh1\ percent^{PRE} - percent^{POST}$$ See the section 4 on Experimental Design for detailed information about *SH1 Absolute Dilution.*	B1,B2
Aggregated Relative Dilution	$$\sum_{i=1}^{n} \frac{R_i^{POST} - R_i^{PRE}}{R_i^{PRE}}$$ See the section 4 on Experimental Design and Appendix A.1 for detailed information about *Aggregated Relative Dilution(SPIR).*	B1,B2,B3
Relative Deal Value	Ratio of the deal value over the estimated equity-value of the combined firm (market value of acquirer and deal value). Deal value is the fair value of the equity in the target company. When the bidder is listed on multiple exchanges, we apply the market value of the *company*, not the individual security. We assume that the *company* conducts the transaction, not the individual security.	$Zephyr_{BVD}$, $Datastream$
Acquirer M/B	Ratio of the market value of equity plus book value of interest-bearing debt divided by book value of equity plus book value of interest-bearing debt. Market value of equity calculated as closing price times number of shares outstanding, all variables year-end prior to announcement date.	$Datastream$, $Worldscope$
Acquirer Collateral	Ratio of net plant, property and equipment (Net PPE) over total book value of assets. Net PPE represents gross (historical cost) PPE less accumulated reserves for depreciation, depletion and amortization.	$Worldscope$
ln(Acquirer Total Assets)	Natural logarithm of the book value of total assets, year-end prior to deal announcement.	$Worldscope$
Acquirer Cash To Value	Ratio of cash and cash equivalents (short-term investments) on bidder balance sheet prior to announcement over deal value.	$Zephyr$, $Worldscope$
Acquirer Div Payout Ratio	Ratio of total common (cash) dividends distributed in the fiscal year preceding the announcement year, over net income after preferred dividends.	$Worldscope$
Cross-Border	Dummy that takes the value of 1 when the parties are recorded with different country-codes.	$Zephyr$, $Worldscope$
Intra-Industry	Dummy that takes the value of 1 when the parties are recorded with the same 3-digit SIC-code.	$Zephyr$
Target Independence	Indicator constructed by BVD indicating the target's degree of independence with respect to its shareholders, where 1 is the highest degree of independence and 4 is the lowest degree of independence (concentrated ownership). Collective types of shareholders (who are regarded as unable to exert a controlling power over a company) are excluded from the below calculation. The below evaluations include both direct and total ownership, thus aiming to capture the ultimate controlling shareholder. A value of 1 is attached to targets where the known shareholders hold less than 25% of the shares. Value of 2 is attached to targets where the controlling shareholder holds between 25% and 50% ownership. 3 is attached when there is a shareholder with 50% or higher total ownership. 4 is activated when there is a direct owner who holds over 50% of the voting rights.	$Ownership_{BVD}$
Acquirer Leverage Ratio	The pre-deal financial gearing of the bidder. Calculated as long and short-term interest bearing debt, over book value of total assets, extracted at year-end prior to announcement year.	$Datastream$

Variable	Formula/Comment	Source/Input.
Controlling Sh 20-60	Dummy that takes the value of 1 when the largest shareholder in the acquiring firm holds between 20% and 60% of the voting rights in a direct link to the the subject company. The ownership data must precede the announcement year with no more than 2 years.	$Ownership_{BVD}$
Target Industrial	Dummy that takes the value of 1 when the target is classified as an industrial company.	$Ownership_{BVD}$
Target M/B	Ratio of the market value of equity plus book value of interest-bearing debt divided by book value of equity plus book value of interest-bearing debt. Market value of equity calculated as closing price times number of shares outstanding.	$Datastream$, $Worldscope$
Target Collateral	Ratio of Net Plant, Property and equipment (PPE) over book value of total assets.	$Worldscope$
Target Leverage Ratio	Ratio of short and long term interest bearing debt over book value of total assets.	$Worldscope$
Target PE owned	Dummy that takes the value 1 when a private equity investor is one of the 3 largest direct shareholders, measured by voting rights.	$Ownership_{BVD}$
Mngmt Ownership Presence	Dummy that takes the value 1 when bidder-management (aggregated) is one of the 5 biggest shareholders. Ownership data must preceded the announcement year with no more than 2 years, but matches with the most recent ownership data.	$Ownership_{BVD}$
Acq High-Q - Tar High-Q	Interaction variable that takes the value of 1 when both parties have an estimated Q-ratio above 1. The Q-ratio is calculated as the market value of equity (number of shares outstanding times the closing price 1 month prior to announcement) over the book value of equity. Thus the Q-ratio variables are calculated on the equity level, not the firm level. All interaction variables are relative to the base case where both parties have Q-ratios below 1.	$Datastream$, $Worldscope$
Acq High-Q - Tar Low-Q	Acquirer with Q-ratio over 1 and target with Q-ratio below 1. Interpretation and construction as above.	$Datastream$, $Worldscope$
Acq Low-Q - Tar High-Q	Acquirer with Q-ratio below 1 and target with Q-ratio higher than 1. Interpretation and construction as above.	$Datastream$, $Worldscope$
Region Dummies	Encompasses 7 regional dummies, grouped according to the target's home continent.	$Zephyr$
Interim variables used as inputs		
B1.Percent. own. acq/tar pre	Direct voting rights in the subject company as reported from the database. The recorded voting rights must precede the deal announcement with no more than 2 years.	$Ownership_{BVD}$,
B2.Percent. own. acq post	$\frac{B1 * Market\ cap}{Market\ cap\ +\ Deal\ value}$	$B1, B4, B5$
B3.Percent. own. tar post	$\frac{B1 * (Deal\ value\ -\ Debt\ Assumed)}{Market\ cap\ +\ Deal\ value}$ We subtract assumed liabilities from the deal value as this component is not "payment" to the target shareholders.	
B4. Market cap	Calculated as closing price 1 month prior to announcement times the number of common shares outstanding.	$Datastream$
B5. Deal value	The consideration paid for the actual stake acquired. As reported from Zephyr in Million USD.	$Zephyr_{BVD}$

A.3 Construction of the percentage stock variable used in all models

In both the Probit and Tobit models we make use of the percentage stock in the consideration to define the dependent variable. Mainly, we are interested in evaluating the proportion of *stock equivalents* in the *deal consideration* and we define the following variable:

$$Percentage\ stock = \frac{shares\ +\ stock\ equivalents}{deal\ value}$$

Using this variable definition, we are making 2 assumptions. (1) We state that we only care about the stock percentage, and regard all other payment ingredients as *non-diluting transactions*. And (2), we investigate the stock percentage of the deal value, not relative to the sum of the payment methods. The main rationale for (2) is that we place more trust in total deal value than the sum of payment methods. The implication of (1) is that we implicitly assume that the non-stock payment methods are cash and cash equivalents. This is only true to some degree, but we can say with certainty the remaining components definitely not are stock components. And we can justify this with our focus on dilution, only stock deals dilute ownership, thus grouping all other payments into non-diluting transactions seems beneficial.
Naturally, the next question becomes; what do we define as *stock and equivalents (i.e. diluting payments)* and what do we categorize as *cash and equivalents* or *non-diluting payments*?
We classify the following methods of payment as *stock and equivalents*:
(1)**Shares** obviously falls under this category. *Zephyr* calculates the share component as:

$$Shares\ component =\ number\ of\ shares\ issued \times closing\ price\ announcement\ day_{t-1}$$

(2) **Convertible debt** is included in the stock fraction when present. This is in line with other papers. Given the option to convert the stake into equity in the combined company, we find it most reasonable to classify the component as a diluting method of payment.

It follows that we classify the below payment methods as *non-diluting* transaction types:
(1)**Cash** is only recorded when *Zephyr* can confirm that there is an actual cash transaction in the deal consideration, it is not added as an residual even though cash is the most common payment form.
(2)**Debt Assumed** is included when the acquirer assumes debt in the target company. Debt assumed is not part of the actual payment to the target shareholders, but still a part of the deal value.
(3)**Loan notes** is essentially a note acknowledging debt owed. It is assumed that the loan note does note involve shares.
(4)**Debt** is included when the consideration includes an element of debt repayment.
(5)**Cash assumed** is included when the acquirer assumes cash in the target company.
(6)**Deferred payment** means that the acquirer satisfies the consideration over an interval of installments.
(7)**Other** is an unspecified component, but *Zephyr* confirms that the element is not an equity component.

(8)**Earnouts**. We exclude deals involving earnouts because of the uncertainty regarding the nature of this component.

A.4 Further elaborations on the ownership database utilization

This thesis only evaluates direct ownership and the economical rational for this is presented in the main text. In this section we present some data handling arguments that further contribute to the validity of this delineation. The ownership database does not report the indirect ownership of a given shareholder, only the direct and total. Total ownership is the sum of direct and indirect and is reported only when both parts of the sum is known. This means that the indirect ownership is only available as a residual when both direct and total is reported. This gives three possible ways to utilize the ownership information: 1) Only make use of the total ownership. 2) Make use of direct ownership and supplement with indirect when it is known as a residual. 3) Only use the direct ownership. Due to the inherent uncertainty of the total ownership, option 1 leaves us with 3 % of the ownership data and is not relevant. The problem with using option 2 is that indirect ownership can only be known with certainty in 1% of the cases. This means that by choosing option 3, there is only a 1% loss in the available data.

We gain another important advantage by excluding indirect ownership. If we utilize both direct and indirect ownership we risk an ownership percentage over 100 for one company. One way this could happen is illustrated in Figure 4 below, where the intermediate shareholder is a company. One shareholder's indirect ownership can then be another shareholder's direct ownership at the final node. The sum the direct and indirect for all shareholders in this instance would be 200%, because some percentages are counted multiple times.

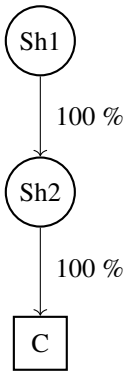


Figure 4: Illustrating that the total ownership may exceed 100% for a company in the datbase. The reported sum of the direct and indirect ownership for company C would be 200% in this case.

A.5 Descriptive statistics on the variables for the entire sample

Table 8: Summary statistics for the independent variables in the total sample

VARIABLES	Mean	Median	Min	Max	SD
Sh1 Absolute Dilution	3.403	0.938	0.001	60.83	6.305
Aggregated Relative Dilution	0.033	0	0	2.667	0.207
Relative Deal Value	0.173	0.091	7.96e-05	0.980	0.192
Acquirer M/B	2.095	1.310	-767.4	960.0	29.00
Acquirer Collateral	0.290	0.222	0	1.001	0.260
ln(Acquirer Total Assets)	7.573	7.617	-0.753	14.84	2.456
Acquirer Total Assets (MUSD)	32,702	2,033	0.471	2.798e+06	176,033
Acquirer Cash To Value	22.95	1.593	0	2,188	108.2
Acquirer Div Payout Ratio	0.838	0.151	-29.06	324.8	13.03
Target Inpependence	1.950	1	0	4	1.290
Target M/B	1.876	1.167	-47.76	151.5	4.861
Target Collateral	0.307	0.222	0	1.001	0.288
Target Leverage Ratio	0.194	0.127	0	3.232	0.239
Mngmt Ownership Presence	0.015	0	0	1	0.122
Cross-Border	0.215	0	0	1	0.411
Intra-Industry	0.424	0	0	1	0.494
Controlling Sh 20-60	0.180	0	0	1	0.384
Target PE owned	0.025	0	0	1	0.155
Acq High-Q - Tar High-Q	0.486	0	0	1	0.500
Acq High-Q - Tar Low-Q	0.235	0	0	1	0.424
Acq Low-Q - Tar High-Q	0.099	0	0	1	0.299
Target region Africa	0.033	0	0	1	0.180
Target region Asia	0.309	0	0	1	0.462
Target region Europe	0.025	0	0	1	0.157
Target region NorthAM	0.309	0	0	1	0.462
Target region Oceania	0.090	0	0	1	0.286
Target region SouthAM	0.024	0	0	1	0.153
Target Industrial	0.795	1	0	1	0.404

In the sub sample of acquisitions in which *Aggregated Relative Dilution* is greater than 0, the (conditional) mean is 1.01.

A.6 Wald test for multiple exclusion restrictions

We want to test the following hypothesis against the alternative in both the Probit and Tobit model.

$$H_0 : \beta_{Sh1\ Absolute\ Dilution} = \beta_{Aggregated\ Relative\ Dilution} = 0$$

$$H_1 : At\ least\ one\ of\ the\ coefficients\ are\ different\ from\ zero$$

Since we have used heteroskedastic robust errors in both models we use the Wald test statistic to evaluate exclusion restrictions. Below we have reported the Wald test statistic for both models.

Wald test for the probit model		
Model	Chi$^2(2)$	Prob $\geq$ $Chi^2(2)$
Probit	14.39	0.0007

The chi squared value from the Probit Wald test has two degrees of freedom with an associated p-value of 0.07 percent. With any reasonable significance level we can reject the null hypothesis. This means that the inclusion of our variables causes a statistically significant improvement to the overall fit of the Probit model.

Wald test for the tobit model		
Model	F(2, 1878)	Prob $\geq$ $F(2, 1878)$
Tobit	3.94	0.0197

The F statistic from the Tobit Wald test has 2 and 1872 degrees of freedom with an associated p-value of 2 percent. We can reject the null hypothesis at the 5% significance level. This means that the inclusion of our variables causes a statistically significant improvement to the overall fit of the Tobit model.

A.7 VIF test for multicollinearity

1) VIF test on the final specification	
Variable	VIF
Relative Deal Value	2.32
Acq High Q - Tar High Q	2.17
Target region Asia	2.08
Target region NorthAM	1.98
Target Collateral	1.91
Acquirer Collateral	1.91
Sh1 Absolute Dilution	1.89
Acq High Q - Tar Low Q	1.84
ln(Acquirer Total Assets)	1.59
Target region Oceania	1.44
(...)	(...)

2) VIF test on the alt. specification	
Variable	VIF
Acquirer Leverage Ratio	4.09
Acquirer Unused Debt Cap	3.45
Relative Deal Value	2.32
Acq High Q - Tar High Q	2.17
Target region Asia	2.08
Target region NorthAM	2.02
Target Collateral	1.92
Acquirer Collateral	1.91
Sh1 Absolute Dilution	1.89
Acq High Q - Tar Low Q	1.84
(...)	(...)

Note: Only 10 variables variables with the largest VIF showing for each test. 1) shows the test on our final specification and 2) shows the VIF for the alternative specification before Acquirer Unused Debt Capacity was dropped due to multicolinearity. According to O'Brien (2007), a VIF statistic over 10 is often viewed as problematic in the literature. We do not have values above 10 in any of our specifications, indicating that multicollinearity should not cause biases in our models. O'Brien (2007) emphasises that this rule of thumb should not be accepted blindly, hence we further investigated the variables with highest VIF.

A.8 Estimated marginal effects for the Probit and Tobit

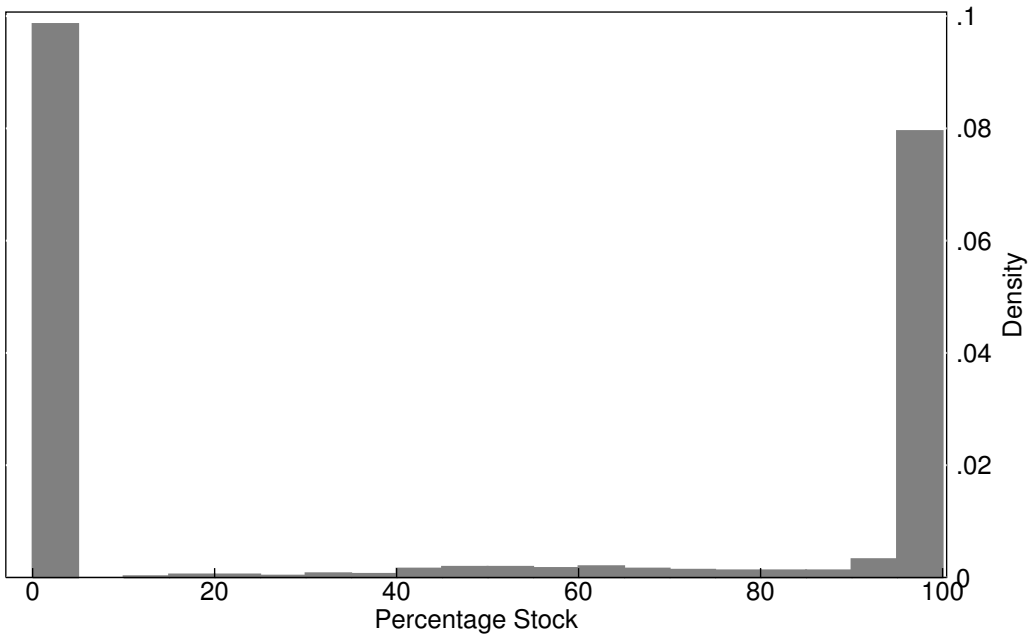
	Probit		Tobit	
VARIABLES	Marginal Effect	Standard error	Marginal Effect	Standard error
Sh1 Absolute Dilution	-0.010***	(0.003)	-0.099**	(0.040)
Aggregated Relative Dilution	-0.174**	(0.076)	-1.622	(1.035)
Relative Deal value	1.337***	(0.135)	14.97***	(1.579)
Acquirer M/B	-0.001	(0.001)	-0.006*	(0.003)
Acquirer Collateral	0.388***	(0.071)	4.938***	(0.995)
ln(Acquirer Total Assets)	-0.025***	(0.007)	-0.466***	(0.102)
Acquirer Cash To Value	-0.001**	(0.001)	-0.009**	(0.004)
Acquirer Div Payout Ratio	-0.015*	(0.009)	-0.189**	(0.081)
Cross-Border	-0.328***	(0.028)	-5.322***	(0.590)
Intra-Industry	0.062**	(0.026)	0.661*	(0.397)
Acquirer Leverage Ratio	-0.239***	(0.080)	-3.832***	(1.203)
Controlling Sh 20-60	-0.043	(0.035)	-0.504	(0.550)
Target Independence	0.027**	(0.011)	0.371**	(0.181)
Target region Africa	-0.111	(0.081)	-2.335*	(1.331)
Target region Asia	0.082**	(0.039)	1.804***	(0.644)
Target region EastEur	-0.070	(0.083)	-0.759	(1.468)
Target region NorthAM	0.025	(0.039)	-0.169	(0.594)
Target region Oceania	0.212***	(0.046)	1.923***	(0.726)
Target region SouthAM	0.103	(0.086)	2.204	(1.490)
Target Industrial	-0.173***	(0.035)	-2.555***	(0.536)
Target M/B	0.001	(0.003)	0.034	(0.057)
Target Collateral	-0.040	(0.064)	-0.529	(0.905)
Target Leverage Ratio	-0.029	(0.058)	-0.320	(0.964)
Target PE owned	0.029	(0.079)	0.207	(1.111)
Mngmt Ownership Presence	-0.124	(0.119)	-3.025*	(1.772)
Q - Acq High - Tar High	-0.045	(0.038)	-1.361**	(0.583)
Q - Acq High - Tar Low	0.075*	(0.040)	0.269	(0.613)
Q - Acq Low - Tar High	-0.119**	(0.052)	-2.097**	(0.829)
Observations	1,909		1,909	

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Note: The table gives the partial effects dy/dx.For the probit $y = P(Stock)$ and for the tobit $y = E(Stock\ percent|0 < Stock\ percent < 100)$. x is one explanatory variable. The partial effects in both models are dependent on the values of all explanatory variables and here we have given the partial effects at the average (PEA) . The marginal effect for dummy variables is the change when x goes from 0 to 1.

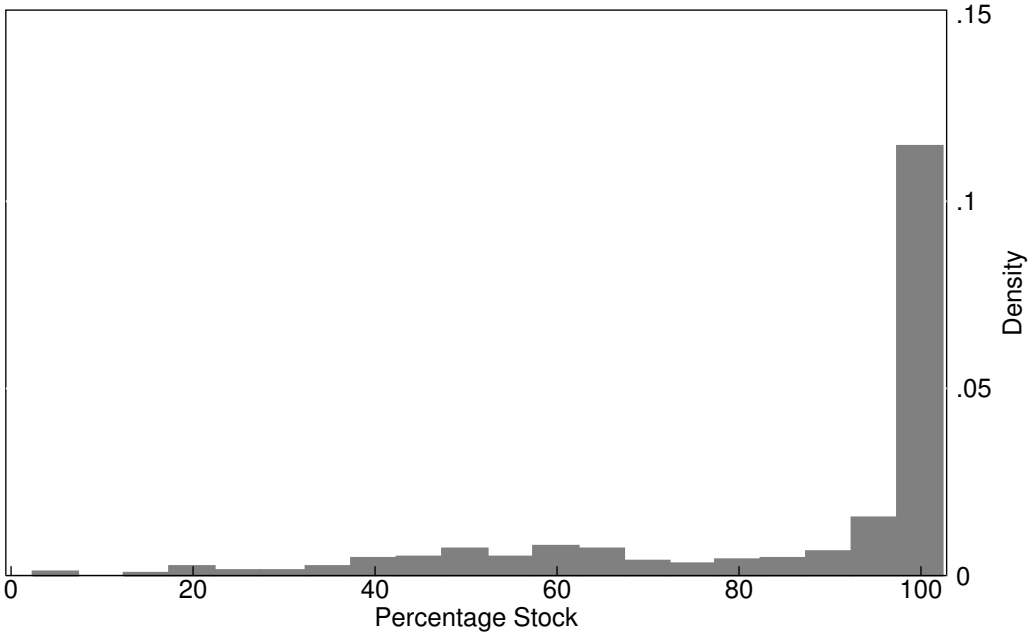
A.9 Descriptive statistics: Fractional stock usage

Figure 5: Histogram on the percentage stock usage for the entire sample



The histogram illustrates the need for Tobit estimation. We have large portions of the observations on the limit values of 0% and 100% stock. Using normal OLS methods on such data would produce biased estimates.

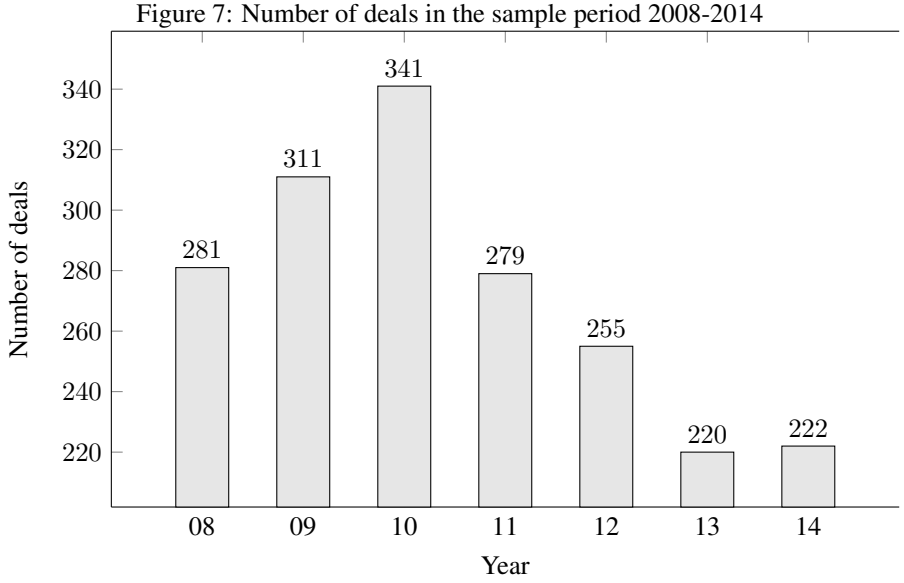
Figure 6: Histogram on the stock fraction given - *0 <fraction <100*



This histogram displays the fraction of stock for the observations that are not censored at the limit values of 0% and 100% stock. The entire range of values is represented and the vast majority of the observations has a stock percentage close to 100%

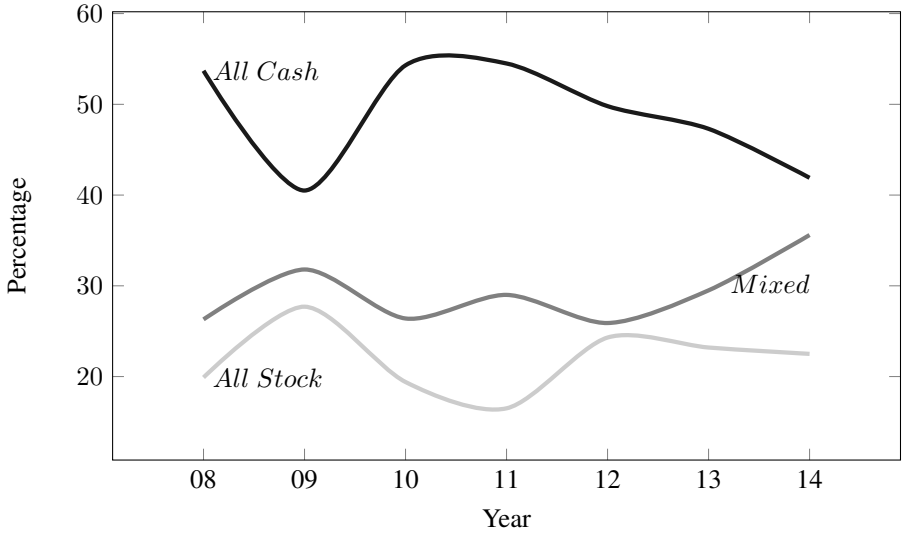
A.10 The annual distribution of the deals

Figure 7: Number of deals in the sample period 2008-2014



The time-trend of the deals (based on announcement year) is representative to the global M&A-trends in the period, with the exception of 2014. The 2014-deals can only match with 1 year of ownership data, which is likely to be the reason for the non-evident upswing in global M&A-activity that started in 2014.

Figure 8: Percentage of deal types in the sample period 2008-2014



The black line is the percentage all-cash deals. The medium gray line is the percentage mixed-payment deals. The light gray line is the percentage all-stock deals. The cash dominance is representative of global payment method trends in the sample period.

A.11 Company listing status after matching deals with ownership data

The share of public acquirers and targets after matching the ownership data	
Public acquirers	95.9%
Public targets	95.6%

This percentage is approximated using the match rate of *Market Capitalization Security* as a proxy for whether the company is public. One limitation with this approach is that the metric might be missing for a company even tough the entity is public. This would imply that the true estimate probably is higher than the above. Note that after performing this data test we limited the analysis to public companies exclusively.

A.12 Key theoretical aspects of the Probit model

In this section we will highlight some important theoretical aspects of Probit model applied above. We want to investigate the probability that stock is being used in a deal. Define y as a variable that is 1 if stock is being used and 0 otherwise. We also define x as a vector of our independent variables and for simplicity we now assume that x contains our two dilution variables. Then we want to investigate:

$$P(y = 1|x)$$

The difference between a linear probability model and the Probit model is that the probability is a nonlinear function G of the regressors. More specificly G is the standard normal cumulative distribution function.

$$P(y = 1|x) = G(\beta_0 + \beta_1 x_1 + ... + \beta_k x_k)$$

$$G(z) = \int_{-\infty}^{z} \frac{1}{\sqrt{2\pi}} e^{-(v)^2/2} dv$$

This ensures that the predicted probabilities for stock will only have meaningful values, since we know that $0 < G(z) < 1$ for all real numbers of z. We can derive the probit model from an underlying latent variable model for y*. We can think of y* as the latent variable for the stock percentage that is not bound by the interval [0,100]. Now y is the indicator function, 1[.], that is 1 if the percentage stock y* is larger than zero. Since we use a Probit model, u_i is assumed to have a standard normal distribution.

$$y*_i = \beta_0 + x_i\beta + u_i$$

$$y = 1[y* > 0]$$

Now we can derive the probability for stock based on the latent variable and verify that we get the same equation as above.

$$P(y = 1|x) = P(y* > 0|x) = P[u > -(\beta_0 + x\beta)|x] = 1 - G[-(\beta_0 + x\beta)] = G(\beta_0 + x\beta)$$

In our thesis we have made use of the partial effects of the independent variables on the probability of stock usage. In a linear regression, the partial effect is simply the coefficient. However, this is not the case for the nonlinear Probit model. We find the partial effect by calculating the partial derivative.

$$P(y = 1|x) = G(\beta_0 + x\beta)$$

$$\frac{\partial p(x)}{\partial x_j} = g(\beta_0 + x\beta)\beta_j$$

The partial effect is a function of all the independent variables represented by the vector x. This implies that we have to assign some meaningful values to these variables. We have chosen to use the sample means of each variable to obtain the partial effect at the average (PEA). We are using the PEA when refering to the marginal effects in this thesis.

A.13 Key theoretical aspects of the Two-boundary Tobit model

In this section we will highlight some important theoretical aspects of the Tobit model applied above. The dependent variable is the percentage of cash used in the M&A consideration and it is bound to be in the interval [0, 100]. The two-boundary Tobit model is appropriate when the dependent variable is censored in both ends. We estimate the following model:

$$y* = \beta_0 + \mathbf{x}\beta + u$$

$$u|\mathbf{x} \sim N(0, \sigma^2)$$

Where u is an independently distributed error term with zero mean and variance σ^2. As in the Probit case the latent variable y* is the thought percentage stock in the consideration that is not bound by the interval[0,100]. We observe only the percentage stock used y that is censored at both ends:

$$y_i = \begin{cases} 0 & if\ y* \leq 0 \\ y* & if\ 0 < y* < 100 \\ 100 & if\ y* \geq 100 \end{cases}$$

This censored nature causes the Tobit to be a nonlinear model. This means that, analogous to the Probit case, the partial effects of independent variables are not straight forward. In the Tobit we can take the derivative of either the conditional or unconditional expectation. In our thesis we have made use of the partial effects on the conditional expectations given by the following formula:

$$\frac{\partial E(y|0 < y < 100, \mathbf{x})}{\partial x_j}$$

The explicit formula for this partial derivative is beyond the scope of this text, but can be found in Wooldridge (2010).

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