

NHH



Norwegian School of Economics

Bergen, Spring 2019

Strategic vs. Financial Acquirers

An empirical study of differences in premium payments and target company preferences between strategic and financial acquirers in M&A

Katerina Jæger and Ole Berge Ramsnes

Supervisor: Karin S. Thorburn

Master thesis, MSc in Economics and Business Administration,
Finance

NORWEGIAN SCHOOL OF ECONOMICS

This thesis was written as a part of the Master of Science in Economics and Business Administration at NHH. Please note that neither the institution nor the examiners are responsible – through the approval of this thesis – for the theories and methods used, or results and conclusions drawn in this work.

Abstract

This master thesis examines differences in the takeover strategies between strategic and financial buyers. By using SEC merger filings, we study the phase of transactions that occur before deals are made public. The detailed data from the merger filings enables us to include variables that most M&A research overlook.

We find that strategic buyers paying in cash pay the highest premiums, but also that financial and strategic firms do not bid on the same target companies. In transactions with a strategic acquirer, 91% of bidders are strategic. In transactions with a financial acquirer, only 14% of bidders are strategic. Something seems to be separating these two acquirer groups, and this is what we attempt to uncover in this thesis. Through various probit regressions, we find that targets with higher R&D expenses and targets with higher operating expenses are more appealing to strategic buyers. We also discover that when targets engage investment banks to find buyers, the acquirer is more likely to be financial.

Preface

This master thesis concludes our Master of Science in Economics and Business Administration with a concentration in Finance at the Norwegian School of Economics (NHH).

We want to thank our supervisor Karin S. Thorburn, whose expertise has been particularly useful in formulating our hypotheses and guiding us through extensive amounts of literature. We grew particularly interested in the field of M&A after taking her M&A class during our second semester at NHH, and we have been very fortunate to work with her further on this topic. We hope this thesis adds to existing research and inspires further examinations of strategic and financial acquirers, which we believe is a relevant and exciting topic within M&A.

Bergen, May 31st, 2019



Katerina Jæger



Ole Berge Ramsnes

Table of Contents

Abstract	ii
Preface	iii
1. Introduction	1
1.1 <i>Structure of the thesis</i>	3
2. Literature Review	4
2.1 <i>Competitiveness in the M&A market</i>	4
2.2 <i>Strategic and financial buyers</i>	5
2.3 <i>Acquisition premium by strategic versus financial buyers</i>	5
2.4 <i>Merger waves and the market split between strategic and financial buyers</i>	6
2.5 <i>Target expenses and acquirer type</i>	7
2.5.1 R&D expenses.....	7
2.5.2 Operating expenses	8
2.6 <i>Method of sale and the involvement of investment banks</i>	8
2.7 <i>Financial buyers: target selection and fund performance</i>	9
2.8 <i>Preemptive bidding</i>	10
3. Hypotheses	12
4. Data	14
4.1 <i>SDC and Compustat databases</i>	14
4.1.1 SDC criterion	14
4.1.2 Compustat and additional criterion	15
4.2 <i>SEC merger filings</i>	15
4.2.1 Merger filing data gathering	15
5. Variables	17

5.1	<i>Dependent variables</i>	17
5.2	<i>Independent variables</i>	18
5.2.1	Deal characteristics	18
5.2.2	Target characteristics	20
5.2.3	Market conditions	22
6.	Methodology	23
6.1	<i>OLS regression</i>	23
6.2	<i>Probit regression</i>	24
6.3	<i>Two-sample t-test</i>	25
7.	Descriptive Statistics	26
7.1	<i>Deal overview</i>	26
7.2	<i>Variable overview</i>	28
7.3	<i>Difference in means between buyer groups</i>	29
7.3.1	Premium differences	29
7.3.2	Transaction characteristics: financial versus strategic bidders	30
7.3.3	Transaction characteristics: sales process and investment bank involvement	30
7.3.4	Target characteristics	31
8.	Results	32
8.1	<i>OLS model specification and premium differences</i>	32
8.1.1	Self-selection and causality	34
8.1.2	Target initiation	34
8.2	<i>Probit regressions</i>	35
8.2.1	Target expense levels and the effect on acquirer type	37
8.2.2	Investment bank buyer search's effect on acquirer type	39
9.	Robustness	42
9.1	<i>Sample size and causal relationships in the OLS model</i>	42

9.2	<i>Multicollinearity</i>	42
9.3	<i>Heteroskedasticity</i>	43
9.4	<i>Misspecification and omitted variable bias</i>	43
10.	Conclusion	44
	References	46
	Appendix	51
	<i>A.1 Sample creation</i>	<i>51</i>
	<i>A.2 Variables</i>	<i>52</i>
	<i>A.3 Descriptive statistics</i>	<i>55</i>
	<i>A.4 Results</i>	<i>56</i>
	<i>A.5 Robustness</i>	<i>61</i>

1. Introduction

The merger and acquisitions (M&A) market experienced strong growth during the 1990s and 2000s. The process of corporate takeover is complex and requires substantial investments, which makes it one of the most important strategic decisions a firm can undertake. Today, the M&A market remains one of the largest corporate markets and is the basis of research for many academic scholars. Most of this research uses the Securities Data Company's (SDC) Merger and Acquisition database or the Zephyr database. These databases are great for creating large samples and contain extensive amounts of public information about both target companies and acquirers.

However, these databases do not include detailed information about the company sales process and the events that take place before the public announcement of merger proposals. This information is available in merger filings submitted by all U.S. public targets in the Securities and Exchange Commission's (SEC) Electronic Data Gathering, Analysis, and Retrieval system (EDGAR). The process of collecting information from the merger filings is tedious and time-consuming, but the information within these documents open for further understanding of M&A transactions. Despite the thorough and legitimate information presented in the merger filings, most M&A research thus far has been conducted without their use.

The most notable publication using SEC merger data is Boone and Mulherin's "How Are Firms Sold?" (2007), which uses merger filing information to study firms sold in auctions versus negotiations. This article later inspired further M&A research. Aktas, Bodt, and Roll (2010) look further into negotiations using merger data and find that latent competition increases premiums, while auction costs reduce premiums. Fidrmuc, Papp, Roosenboom, and Teunissen (2012) use the merger filings to compare the sales process of target companies that private equity firms acquire to the sales process of target companies that strategic buyers acquire. Lastly, Liu and Officer (2018) study bid revisions in the pre-public part of transactions using data from merger filings.

Although these four publications answer several questions about the M&A process, many remain unanswered. The topic of strategic and financial buyers is particularly challenging to

examine because of the lack of useful data. Financial buyers are, in most cases, private companies and thus do not disclose any financial data or strategic plans. The merger filings clearly distinguish between the two acquirer groups and hence open for further understanding of the topic.

While strategic companies mainly acquire target companies to expand their own business, the motivation behind acquisitions is quite different for financial acquirers. Given the relatively short time frames of their investment funds and strong motivation to unload the companies they acquire within these time frames, it is natural to assume that there are factors that separate the target companies that are attractive to financial buyers from those that are attractive to strategic buyers. Through this thesis, we attempt to understand the M&A process further and identify the separating factors between acquirer types. Our dataset includes variables that, to our knowledge, have not been included in similar previous research. We couple the data collected from the merger filings with transaction data from the SDC database and financial information from Compustat to create a sample that contains key variables that are relevant to test our hypotheses.

After careful review of prior research on the topic, we formulate three hypotheses that we believe can help expand knowledge of the acquisition process and the differences between financial and strategic buyers:

Hypothesis 1: *Strategic buyers paying in cash pay higher premiums than financial buyers and strategic buyers paying with stock*

Hypothesis 2: *Targets with higher expense levels are more attractive to strategic buyers*

Hypothesis 3: *Targets that utilize an investment bank to find buyers are more likely to be acquired by a financial acquirer*

Before running regressions, we use t-tests to compare key variables between the two acquirer groups. These tests indicate differences between strategic and financial buyers. From these tests, we can see that an average of 91% of bidders are strategic in transactions with a strategic buyer. In deals with financial buyers, only an average of 14% of bidders are strategic. These

findings strongly suggest that strategic and financial buyers look for different characteristics when identifying acquisition targets.

We test Hypothesis 1 through multiple OLS regressions, and the results indicate that strategic buyers paying in cash pay higher premiums than both financial buyers and strategic buyers paying with stock. However, we are careful to claim causation as there is an inherent problem of self-selection when the targets are involved in deciding to whom they sell their company. A target company, together with its investment bank, is likely to know which types of buyers it is attractive to, and thus try to sell to these types of buyers. Nevertheless, our results indicate differences between strategic and financial buyers.

We test Hypothesis 2 and Hypothesis 3 using probit regressions. The regressions show that both higher levels of research and development (R&D) expenses and higher levels of operating expenses are less attractive to financial buyers. Intuitively, higher expense levels allow for greater synergies through cost-cutting, which is only relevant to strategic buyers. As for R&D expenses, innovation is associated with risk and thus might be less appealing to financial acquirers due to their relatively short investment horizon. Our two probit regressions also indicate that the buyer is more likely to be financial if the target uses an investment bank to help find buyers. A possible explanation for this could be that investment banks understand the preferences of financial buyers and only contact them if the target company falls within these preferences.

1.1 Structure of the thesis

We divide the thesis into ten sections. Following the introduction comes section 2 on literature review. We present our hypotheses in section 3, and an explanation of the data follows in section 4. Section 5 describes our variables, while section 6 looks at methodology. In section 7, we look at descriptive statistics, while section 8 presents our results and analysis. Lastly, we go through robustness in section 9, and our conclusion in section 10.

2. Literature Review

In the literature section we review some of the key topics that are relevant in a company sales process. These topics are part of the dynamics of the M&A market and focus on differences in preferences and behaviors of strategic and financial buyers. The previous findings of scholars create the foundation of our knowledge within the M&A market, and this knowledge forms the basis of our curiosity in learning more about the acquisition process.

2.1 Competitiveness in the M&A market

Research from the early 2000s uses public bidding activity to describe the takeover market as friendly with lacking competition. Schwert (2000) argues that the growing use of poison pills and changes to state takeover laws during the 1990s caused the corporate takeover market to be less competitive. Other researchers suggest that target company CEOs contributed to lowering the level of competition in M&A transactions during the 1990s by focusing on their own gains from transactions rather than maximizing deal premiums for the target shareholders (Moeller, 2005; Wolf, 2004).

In 2007 and 2008, Boone and Mulherin published studies offering new perspectives on the corporate control market by using a unique source of data. SEC filing documents gave them access to private bidding activity that earlier studies do not consider. Their findings suggest that the market for corporate control is much more competitive than the number of public bids indicate. They find that approximately half of the transactions in their sample consist of negotiations with a single bidder, while the other half consists of auctions with multiple bidders. Compared to previous studies, their findings open a new dimension for studying competitiveness within the M&A industry. Since then, other scholars have adopted this source of collecting data on private bidding activity in M&A.¹

¹ See Aktas et al. (2010), Gorbenko and Malenko (2014), Liu (2018), and Liu and Officer (2018).

2.2 Strategic and financial buyers

Strategic buyers are operating companies that seek target companies to merge with or acquire to create value that exceeds the sum of the two separate entities. Scholars and practitioners refer to this type of value creation as “synergies.” As part of their business strategy, strategic buyers seek target companies that will enhance their performance and are likely to create growth through synergies. Target companies are typically in the same area of business as their acquirers, although strategic buyers sometimes enter new areas of business through mergers and acquisitions.

Financial buyers are investment management companies that use funds committed by investors, in combination with debt, to acquire companies and delist them (unless the target is already a private entity prior to being acquired). Financial buyers create value by increasing the stand-alone value of the companies within their portfolio and exiting their positions once it becomes an appealing option. Common exit strategies include, but are not limited to, Initial Public Offering (IPO) and company sale. The investment portfolios of financial buyers typically have a duration of five to ten years.

2.3 Acquisition premium by strategic versus financial buyers

The traditional view suggests that strategic buyers can pay higher premiums than financial buyers because strategic buyers can achieve synergies. Depending on the preferences of the strategic buyer and the target company, the companies can share deal synergies in different ways. If the target shareholders receive payment in all-cash, the target receives its share of the synergies through the acquisition price. Alternatively, the target shareholders can receive the acquiring firm’s equity as payment, which leaves each company with a share of the risk associated with the post-transaction synergies. They can also receive a mix of cash and equity.

Bargeron, Schlingemann, Stulz, and Zutter (2008) compare premiums paid by public operating firms, private operating firms, and private equity firms. They find that public operating firms pay higher premiums than private equity firms, and these findings are significant when controlling for certain deal and target characteristics. Further, the authors find that private

operating firms pay lower premiums than public operating firms despite having equal predisposition to create synergies. This finding suggests that differences in premium payments between strategic and financial buyers may be explained by aspects that are different from the inclination to create synergies.

Contrary to the traditional view, Fidrmuc et al. (2012) and Gorbenko and Malenko (2014) find that strategic buyers do not consistently pay higher premiums than financial buyers. According to their findings, the average premium paid by strategic buyers is higher than that paid by financial buyers, but further analysis indicates that target characteristics preferences by strategic and financial buyers explain the difference. They find that financial buyers are generally more interested in mature, poorly performing companies, and these types of companies are expected to receive lower premiums. Fidrmuc et al. (2012) control for several factors, including the type of sales process, whether the target or acquirer initiated the transaction, and the target company's market-to-book ratio, and find no difference in premiums paid by strategic and financial companies.

2.4 Merger waves and the market split between strategic and financial buyers

The activity level within the corporate control market follows a pattern of waves. These waves appear to be pro-cyclical, with drops in activity from peaks to troughs. Some studies find that the variation in activity stems from shocks and restructuring within industries, while other studies point to changing conditions in the credit market as a possible explanation (Mitchell & Mulherin, 1996; Andrade, Mitchell & Stafford, 2001; Harford, Martos-Vila & Rhodes-Kropf, 2014). Harford (2005) argues that neither economic incentives nor favorable credit markets can drive merger waves on their own. According to Harford (2005), within industry factors create the economic incentives for firms to engage in the corporate control market, but sufficient levels of capital liquidity are necessary for transactions to be attractive. These findings present a possible explanation for why the corporate control market is pro-cyclical with levels of activity clustering within industries.

During the 2000s, the private equity industry experienced significant growth and established a stronger position within the market for mergers and acquisitions (Cumming, Siegel &

Wright, 2007). The growth of private equity firms allows them to engage in larger deals and make them better equipped to compete against strategic buyers. Private equity firms typically finance a large proportion of their transactions using leverage, which makes them dependent on having low-cost debt available. Strategic buyers, on the other hand, have more options as to how they finance deals and which methods of payment they use. Harford et al. (2014) find that the availability of cheap debt drives growth in the merger and acquisition industry and strengthens the position of financial buyers. Consequently, strategic and financial buyers experience shifts in relative purchasing power based on the conditions of the credit market (Harford, 2005). This finding makes sense, as strategic and financial buyers are both exposed to the credit market through debt financing of transactions, but financial buyers generally finance their transactions using higher proportions of debt than strategic buyers (Axelson, Jenkinson, Strömberg & Weisbach, 2013).

2.5 Target expenses and acquirer type

There are supporting arguments suggesting that both R&D expenses and operating expenses influence the outcome of acquirer type. These are two different motivations for acquirers to select target companies, and they require different kinds of skill sets to implement successful changes in the target company post-transaction.

2.5.1 R&D expenses

Bena and Li (2014) find that overlapping innovation activities between two companies increase the probability of a merger. Their findings suggest that strategic buyers are more prominent in transactions where target companies have higher R&D expenses. Moreover, Phillips and Zhdanov (2013) find that smaller firms that conduct R&D spending gain motivation from a potential sale of the company to a strategic buyer. Companies with active marketing departments, large customer bases, and vast industry knowledge have better structures for creating growth through sales of innovative products than smaller companies with less favorable business structures.

2.5.2 Operating expenses

Previous research makes different findings concerning the effect of target companies' operational performance on acquirer type. Barger et al. (2008) find that private companies acquire targets with higher operational cash flows than those that public companies acquire. Their findings indicate that target companies with potentials of cutting costs are less appealing to private than public acquirers. Gorbenko and Malenko (2014) find that target companies with investment opportunities attract strategic buyers, while mature companies with low profitability attract financial buyers. Further, they find that strategic companies favor synergies through growth over opportunities of cost-cuts through overlapping, while financial buyers seek poorly performing target companies in which they can apply their recipe of restructuring and managerial incentives to increase performance. Levine (2017) finds evidence that both target companies with investment opportunities and target companies with high operating costs are of interest to strategic acquirers.

2.6 Method of sale and the involvement of investment banks

In M&A research, it is common to define company sales processes as either auctions or negotiations, where negotiations are sales processes with only one bidder. Target companies control the structure of their own sales processes. Regardless of the sales process structure, it is common practice for both parties in a transaction to hire an investment bank as an advisor. If an auction is the preferred method of sale, the target company must decide whether to receive help from its investment bank in the search for buyers.

Previous research that compares premiums target companies receive from auctions to premiums they receive from negotiations yield ambiguous results. Bulow and Klemperer (1996) find that target companies receive higher premiums from public auctions than negotiations. Further, they find that "if the board expects at least one extra serious bidder to appear in an auction, then it should generally not negotiate and should directly begin an auction" (Bulow & Klemperer, 1996, p. 17). According to their findings, most target companies should start an auction process and actively seek potential acquirers in hopes of attracting additional serious bidders. Boone and Mulherin (2007) do not find a difference

between premiums that target companies receive from auctions and negotiation. These findings strictly contradict the findings of Bulow and Klemperer (1996).

There are some risks associated with an extensive sales process. It requires more resources to organize auctions than negotiations, and each new company included in the sales process increases the chance of confidential information being leaked (Boone & Mulherin, 2011). Although rumors of a merger or acquisition tend to have a positive effect on the target company's share price in the short run, failure to complete a transaction after rumors emerge may lead to a sharp decline in the target company share price (Pound & Zeckhauser, 1990). Consequently, target companies face risks and uncertainty as rumors of a sales process spread.

From the perspective of potential acquirers, there are significant costs of participating in a company auction (Gentry & Stroup, 2019). In any transaction, there are costs of screening a potential target and a risk that the target valuation is below the threshold that makes the deal worth pursuing. Once a company valuation is done and the transaction proves worthy of pursuing, there are continuing costs that include investment bank fees, lawyer fees, time and effort made by the management, etc. In addition to the monetary costs, there are opportunity costs associated with the use of time and labor resources upon entry into an auction sales process.

Previous studies compare differences in transaction outcomes depending on the perceived quality of the investment banks that are involved in the sales process. In these studies, scholars find different results. Qingzhong (2005) find that hiring a top-tier investment bank leads to 3% higher abnormal returns for the target company, while Servaes and Zenner (1996) find no difference in target abnormal returns for target companies that engage top-tier investment banks compared to those that hire investment banks that are not considered top-tier.

2.7 Financial buyers: target selection and fund performance

Financial buyers' primary objectives are to buy companies with significant potential for value creation, make appropriate strategic changes to these companies, and pick the best method and time to exit their investments. Financial buyers are limited to payment in cash and typically

finance most of their transactions using leverage, which makes availability of cheap debt financing a crucial factor to their performance. Previous research shows that financial buyers raise debt at favorable terms, which is partly explained by financial buyers typically being repeat customers with their lenders (Ivashina & Kovner, 2011).

Dittmar, Li, and Nein (2012) analyze the post-transaction performance of target companies that were initially attractive to financial buyers and are later bought by strategic buyers and compare these target companies' performance to the performance of target companies that were only attractive to strategic buyers. The authors find that target companies initially picked by financial buyers perform better than target companies that only attract strategic buyers. This finding supports the claim that financial buyers are experts at picking undervalued targets.

Gottschalg and Phalippou (2009) examine the performance of private equity funds and find that the average return of private equity funds net-of-fees is lower than the return of the S&P500. Only the top quartile of private equity firms in their sample yield net-of-fees returns that outperform the S&P500. In other words, investors must invest in a top-performing private equity firm to receive above-market returns. Studies find signs of persistence in performance in net-of-fees return among private equity firms, but the level of persistence is noisy and involves risk (Kaplan & Schoar, 2005; Korteweg & Sorensen, 2017). Hence, the historical performance of a private equity fund may yield some indication of the fund's expected future performance, but there are far from any guarantees of repeated success or failure.

2.8 Preemptive bidding

Preemptive bidding, or jump bidding, is a frequently studied strategy in public bidding. A preemptive bid can serve as a signal of high target company valuation, which reduces the expected payoff for competitors and makes the transaction less attractive to them (Fishman, 1989). Dimopoulos and Sacchetto (2014) and Fishman (1989) argue that the presence of high entry costs enables initial bidders to use preemptive bidding to deter competitors from entering auctions. Low initial bids send signals of equilibrium values below the actual equilibrium values, which attract competitors and cause them to drive up the price in transactions where they do not have the highest valuations (Klemperer, 2004).

Betton and Eckbo (2000) and Betton, Eckbo, and Thorburn (2009) find some support of preemptive bidding in successful tender offer contests, indicated by the fact that initial bid premiums are marginally higher in single-bid transactions compared to the premiums of initial bids in multiple-bid transactions. Betton and Eckbo (2000) find that bid premiums increase sharply from first to second bids, which is an indication that bidders may attempt to deter competition through preemptive bidding. However, Betton et al. (2008) find that the size of premiums in initial bids do not affect the probability of competing bidder entry. Ultimately, preemptive bidding in M&A is difficult to measure, as private valuations are unobservable and multiple factors can cause bidders to adopt bidding strategies that appear preemptive, including target management resistance.

As pointed out by Liu and Officer (2018), private preemptive bids do not influence competitors unless the target company discloses bidding information. Liu (2018) finds that preemptive bidding is not a prominent strategy in the private bidding phase of M&A transactions. Instead, she finds that transactions with high premiums and a low number of private bids are the result of target company resistance. This finding supports the idea of target management resistance that is also put forth by Betton and Eckbo (2000) and Dimopoulos and Sacchetto (2014).

3. Hypotheses

This section presents our three hypotheses, which aim to further explore the dynamics of strategic and financial buyers in the company sales process. Previous research within specific key topics of M&A yields results that are either ambiguous or inconclusive. We want to better understand the acquisition process by contributing to the existing research and thus form our hypotheses thereafter.

Hypothesis 1: *Strategic buyers paying in cash pay higher premiums than financial buyers and strategic buyers paying with stock*

Hypothesis 1 is consistent with the findings by Bargeron et al. (2008), who find that strategic acquirers pay higher premiums than financial acquirers. Other research finds that premium payments by strategic and financial buyers are not significantly different (Fidrmuc et al., 2012; Gorbenko & Malenko, 2014). We add to the existing research by distinguishing strategic buyers by payment type. This distinction reflects the fact that strategic buyers have the option to pay in cash, stock, or a mix of cash and stock.

Stock acquisitions are thought to be subject to lower premiums than all-cash acquisitions because the shareholders of the two companies share the estimated upside potential. If a stock acquisition is successful, the target company's shareholders receive capital gains in the form of stock price increases in the new company. Moreover, acquisitions in stock include mergers of equals, which typically have lower premiums.

Hypothesis 2: *Targets with higher expense levels are more attractive to strategic buyers*

Hypothesis 2 explores the relationship between target expense levels and acquirer type. Previous research finds that target companies with higher levels of R&D expenses are more attractive to strategic buyers (Fidrmuc et al., 2012; Gorbenko & Malenko, 2014). High R&D expenses are often linked to new businesses and innovation and can thus be more appealing to strategic acquirers. Financial acquirers may associate high levels of R&D expenses with higher risk due to uncertainty regarding the degree in which the search for innovation leads to conversion into products and profits. With investment timelines of about five years, most

financial acquirers are likely to associate targets with high levels of R&D expenses with undesirable levels of risk.

Levine (2017) finds that target companies have higher operational costs and that strategic acquirers have lower operational costs than their respective peers. Strategic buyers are inclined to use their own cost levels as proxies for the cost level potential of firms they acquire. Consequently, they are likely to see targets with high operating expenses as desirable acquisition candidates. On the other hand, Gorbenko and Malenko (2014) argue that opportunities of cost-cutting in target companies do not motivate strategic acquirers.

Most previous research concludes that targets with higher expense levels are more attractive to strategic buyers than financial buyers. Scholars uniformly find that target companies with high R&D expense levels are more interesting to strategic buyers, while the research on target operating expenses and acquirer type have more ambiguous findings. Hypothesis 2 aims to further examine the connection between target expense levels and acquirer type.

Hypothesis 3: *Targets that engage an investment bank to find buyers are more likely to be acquired by a financial buyer*

In the company sales process, target companies can use investment banks in the search for potential buyers. Intuitively, target companies are inclined to find strategic buyers for themselves (often competitors or customers), whereas they may need an investment bank to find financial buyers. Investment banks typically have vast experience from both the buyer and seller side of transactions, which should leave them better dispositioned than target companies to know what financial buyers are looking for in target companies.

Previous research does not, to our knowledge, study the impact of hiring an investment bank to search for buyers. Testing this hypothesis requires detailed information about the roles of investment banks in transactions, which is unavailable in databases that M&A scholars commonly use to conduct their research. The time-consuming and tedious process of creating this type of sample can be discouraging, which may explain why scholars have yet to address questions related to this specific topic. Nevertheless, we believe further research on the role of investment banks can give new insights into the landscape of strategic and financial buyers in M&A.

4. Data

We use three different databases to form a sample suitable for testing our hypotheses. The process of creating this type of sample is time-consuming but also crucial to obtain the kind of information we need to evaluate our hypotheses. We present how we create our data sample in the following section.

4.1 SDC and Compustat databases

We identify relevant acquisitions using the SDC database. The database covers deals worldwide, include 150 data elements, and collects its content through direct deal submission from banking and legal contributors, coupled with research across sources such as regulatory filings, corporate statements, media, and pricing wires (Wharton wrds, 2016). In addition to identifying deals, we use the SDC database for transaction information such as deal announcement date, transaction value, price per share, and target industry. Further financial information is added using the Compustat North America Database from S&P Global Market Intelligence. This database includes U.S. and Canadian fundamentals and market information on both active and inactive public companies.

4.1.1 SDC criterion

To ensure that our hypotheses are testable, we create a sample of transactions with a proper mix of financial and strategic acquirers. We sample acquisitions in the value range of \$50 million to \$1700 million to meet this requirement. The time period is from 1/1/2010 to 1/1/2018, and the sample only includes transactions with public U.S. targets, where the bidder owns 100% of the shares following the transaction. We are only interested in mergers (stock or assets) and thus exclude transactions such as acquisitions of a majority interest, share repurchases, recapitalizations, and exchange offers. As for target industries, we include all except for financial services. We do this to separate financial bidders from the strategic ones, as a financial company acquiring another financial company can be considered a strategic transaction. The conclusions of this thesis will thus not apply to transactions involving financial targets.

4.1.2 Compustat and additional criterion

After applying appropriate filters, we have 560 transactions from the SDC Database. Next, we exclude all transactions involving targets or public acquirers not present in the Compustat Database, which we use for additional financial data. We also exclude deals where the acquirer is a non-financial private company or where it is unclear if the acquirer is strategic or financial. Lastly, we exclude certain deals due to a lack of information regarding the deal in the SDC Database. After completing these steps, we have a sample of 411 transactions.

4.2 SEC merger filings

We create the final sample by using data from the EDGAR database. More specifically, we use DEFM14A filings, which public companies submit when acquisitions require a shareholder vote. DEFM14A filings are legal documents that contain detailed information about proposed mergers. We create our sample based on a section of these documents called “Background of the Merger,” which outlines key events in the process leading up to a merger announcement. This section includes information about all bids and interactions that occur between potential acquirers and the target company, but only contains the names of companies whose involvement in a transaction is made available to the public at some point in the transaction. The section does, however, in most cases, point out if the parties involved in a transaction are strategic or financial, which makes this data particularly interesting for our thesis (see appendix A.2 for an excerpt from the “Background of the Merger” section).

Of the 441 selected deals, 220 are not available in the EDGAR database, and the final sample thus includes 191 deals. See table A.1.1 for an overview of all the steps that are taken to form the final sample.

4.2.1 Merger filing data gathering

While reading the DEFM14A reports, we collect various data points. These include data on who makes the first bid, if a target company engages an investment bank to find buyers, who initiates the deal, and the choice of payment method. We also note the number of public and private bids, and how many of these bids strategic companies make. We define a private bid

as any indication of interest involving a price or price range. A private bid can thus be anything from a binding offer, to an indication of interest, or verbally sharing a price or price range that a bidder indicates that it is willing to pay for the target. This definition implies that many of the private bids in our sample are not binding. However, we believe that all companies presenting a price for a target have done some valuation and is thus sufficiently interested in an acquisition to be included as a bidder.²

² See A.2.2 for an example of a transaction where the target uses an investment bank to find buyers.

5. Variables

In this section, we present all the variables that are relevant to our analyses. We begin by introducing our three dependent variables. Next, we present our independent variables, which we categorize as deal characteristics, target characteristics, and market conditions.

5.1 Dependent variables

Premium

We calculate *Premium* by subtracting the stock price one day prior to the deal announcement from the price per share offer and dividing by the stock price one day prior to the deal announcement. For all premiums below 5%, above 80%, and for deals with multiple public bids, we double check for announcements that indicate using the last closing price before the announcement date is incorrect. This method is in accordance with Mulherin and Simsir (2014), who find that using the “Date Announced” field in SDC leads to biased estimates in 24.1% of deals due to the influence of merger-related events, such as search-for-buyer announcements, on the target company stock price. We adjust to the appropriate dates and the corresponding prices using information from the merger filings when there are public announcements about previous bids or when the targets search for a buyer publicly.

Financial acquirer

Financial acquirer is a dummy variable that takes the value one if the acquirer is financial. We include it as the dependent variable in one of our two probit regressions, which is designed to test Hypothesis 2 and Hypothesis 3 regarding differences between strategic and financial buyers.

Financial bidder

Financial bidder indicates if a financial firm makes at least one of the private bids in a transaction and is set to one if the proportion of strategic bids is less than 100%. It is an alternative dependent variable to *Financial acquirer*, and we include *Financial bidder* to compare transactions where financial buyers submit bids to transactions where the acquirer is financial.

5.2 Independent variables

5.2.1 Deal characteristics

The deal characteristics variables include both explanatory and control variables, as well as variables we include in t-tests to better understand our sample. The variables are mainly from the SEC merger filings.

Strategic acquirer

The *Strategic acquirer* dummy variable specifies if the acquirer is strategic and is an explanatory variable in two of the OLS regressions on premium differences. Prior research finds both that strategic acquirers pay higher premiums than financial acquirers (Bargeron et al., 2008) and that strategic acquirers do not pay higher premiums when taking into consideration that strategic and financial acquirers are interested in different target characteristics (Fidrmuc et al., 2012; Gorbenko & Malenko, 2014).

Payment in stock

Strategic acquirers can pay with both cash and equity, and *Payment in stock* reflects this option. It displays how much equity the acquirer uses to pay for the transaction. We include this variable to control for the fact that financial buyers are unable to pay for target companies in stock. When target shareholders have the option to choose between cash and stock, we define the offer as an all-cash offer.

Strategic payment type variables

To reflect that strategic buyers have the option to pay in stock, we create the dummy variables *Strategic all-cash* and *Strategic stock or mixed payment*. Through these variables, we further investigate which acquirer group that pays the highest premiums by distinguishing by choice of payment type. We use *Strategic payment type* variables as explanatory variables in two of the OLS regressions.

Auction

Auction is a dummy variable equal to one when there is more than one private bidder. The variable marks the difference between an auction-type sales process and a negotiation with only one company. Bulow and Klemperer (1996) find that target companies receive higher

premiums when sold in auctions as opposed to negotiations. On the other hand, Boone and Mulherin (2007) do not find a significant difference in premiums received by companies sold in auctions versus companies sold in negotiations.

Strategic bids

Strategic bids represents the proportion of private bids that strategic buyers make, and thus takes any value between 0 and 1. We include this variable to further understand the bidding activity of strategic and financial buyers based on target and transaction characteristics. Although it is not the focus of their paper, Fidrmuc et al. (2012) find that an average of 93% of buyers that enter into confidentiality agreements are financial companies when the acquirer is financial, while financial companies only enter into 3% of the confidentiality agreements when the acquirer is strategic. *Strategic bids* allows us to go a step further by distinguishing private bids by acquirer type.

Target initiated

Target initiated is a dummy variable that takes the value of one if the target company initiates the sales process. The process is considered to be target initiated if the target company contacts potential buyers to start the sales process. Alternatively, a prospective buyer or third party starts the process by approaching the target. Boone and Mulherin (2007) find that when a buyer or third party initiates a deal, it has a positive and significant effect on the choice of an auction, which may affect *Premium*.

Investment bank

Investment bank is a dummy variable equal to one if the target engages an investment bank to search for potential buyers. This variable is included to test our hypothesis about whether the use of an investment bank in the process of finding buyers influences buyer type. We are not aware of other research that specifically looks at the effects of using an investment bank to search for potential buyers.

First bid variables

We have four *First bid* dummy variables. *Acquirer first bid* is equal to one if the acquirer makes the opening bid. *Financial first bid* is equal to one if a financial firm that is not the acquirer makes the first bid. *Strategic first bid* is equal to one if a strategic firm that is not the

acquirer makes the opening bid and *Plural first bid* is equal to one if multiple bidders make first bids simultaneously.

5.2.2 Target characteristics

We include target characteristics that prior research finds to influence the size of premium payments or acquirer type. In the OLS regressions, we use target characteristics as control variables. In the probit regressions, we use target characteristics as explanatory variables of financial bidder participation.

R&D expense

The *R&D expense* variable is the ratio of R&D expenses to net sales. Fidrmuc et al. (2012) find that targets with higher levels of R&D expenses are more attractive to strategic acquirers. Gorbenko and Malenko (2014) similarly find that strategic and financial acquirers' valuations depend on target characteristics and that valuations of strategic bidders are positively associated with R&D expense.

Operating expense

We calculate *Operating expense* by dividing operating expenses by net sales. Strategic acquirers typically emphasize cost synergies, which depend on opportunities for cost-cutting. Levine (2017) finds that target companies typically have higher costs levels than their acquirers. Acquirers are thus inclined to assume that they can bring target companies' cost levels down to their levels. This variable, as well as *R&D expense*, is essential in testing Hypothesis 2.

Price to book

We calculate *Price to book* by dividing price per share by book value per share. Previous research shows that financial buyers acquire targets with lower price to book ratios than targets that strategic buyers acquire (Fidrmuc et al., 2012). *Price to book* reflects targets' growth prospects, and targets with high growth prospects are thought to be more attractive to strategic buyers. Financial buyers typically favor more profitable companies with lower price to book ratios (Fidrmuc et al., 2012).

Profitability

Profitability is the ratio of net income to total assets, often referred to as return on assets. Fidrmuc et al. (2012) find that strategic buyers tend to buy less profitable targets, with profitability defined as return on assets. Additionally, they find that targets with high profitability receive higher premiums. Both these findings make *Profitability* relevant for our thesis, as it may influence both premium payments and the kind of buyers a target company attracts.

Leverage

Leverage is calculated by dividing long-term liabilities by total assets. Fidrmuc et al. (2012) use the same variable in their research on selling companies to financial versus strategic buyers and find that leverage influences the choice of sales method. Aktas et al. (2010) also suggest that leverage influence the choice of sales method, as firms with higher leverage may have an incentive to sell quickly and thus are more likely to sell to the first interested party. Since negotiations are more common among strategic buyers (Fidrmuc et al., 2012), leverage may indirectly influence what kind of buyers a target company attracts.

Cash

Cash is created by dividing cash and marketable securities by total assets. Fidrmuc et al. (2012) find that target companies that financial buyers purchase have higher cash balances than those that strategic buyers purchase. Financial buyers usually keep idle cash levels low, and target firms with high levels of cash are thus attractive targets to financial acquirers (Pozen, 2007). *Cash* is not included as an explanatory variable in the probit regression models due to high correlation with *Leverage*.

Industry

Due to our limited sample size, substantial variation in industries at the 3-digit SIC level, and low variation in industries at the 2-digit SIC level, we control for industry effects by including the variable *Industry*. It is equal to one if the target company is in the manufacturing industry.

In our sample, approximately half of the target companies are in the manufacturing industry, while the other half is in the industries of natural resources, services, or trade.³

5.2.3 Market conditions

We include market condition variables as control variables in both the OLS and the probit regressions. These variables control for factors that are outside of the deal and target characteristics.

Credit spread

Credit spread is the rate on Moody's Baa bonds minus the rate on 10-year Treasury bonds in the month of the transaction. Gorbenko and Malenko (2014) find that target company valuations by financial bidders correlate with aggregate economic conditions, which includes cost of debt measured by credit spread. Consequently, we include *Credit spread* as a control variable because it could have a stronger influence on the position of financial buyers in the merger and acquisition market relative to strategic buyers. Nevertheless, changes in *Credit spread* should also influence the willingness to pay of strategic acquirers through changes in cost of debt, which may affect *Premium*.

Year

Year includes yearly dummy variables for all the years in our sample. Some of our regression models include *Year* to reflect the yearly fixed effects of economic conditions in the M&A market.

³ SIC is short for Standard Industrial Classification and classifies companies by industry at different detail levels. The more digits, the more detailed the classification.

6. Methodology

In this section, we present the framework we use to evaluate our hypotheses. Our dependent variables are either continuous or binary, and we use different regression models that are appropriate for the type of dependent variable we are examining. First, we explain the regression models that we use to estimate the effect buyer type has on premium. Next, we describe the regression models we run to identify any characteristics that stand out in transactions where a financial buyer is the acquirer and transactions where financial buyers engage in bidding activity.

6.1 OLS regression

Our OLS regression models examine the relationship between acquirer type and *Premium*. The models include control variables that we expect to affect *Premium* independently of acquirer type. The control variables capture the effects that target characteristics, deal characteristics, and market conditions may have on *Premium*. These variables have a varying degree of relevance in controlling for *Premium*. If we include an abundant amount of control variables, it may cause our OLS regressions to be over-specified. Hence, we include a different number of control variables in the OLS regressions and focus our attention on those that we believe are the most accurately specified to represent the relationship between our key variables. To further evaluate our choice of model specifications, we run different diagnostics tests to check for problems of multicollinearity, heteroskedasticity, and model misspecifications in the regression models (see section 9 for robustness analysis).

$$\textbf{Premium 1} \quad \text{Premium}_i = \alpha_i + \beta_1 \text{Strategic_acquirer} + \beta_2 \text{Payment_in_stock} + \beta_3 \text{Investment_bank} + \beta_4 \text{Target_initiated} + \beta_5 \text{Credit_spread} + \beta_6 \text{Leverage} + \beta_7 \text{Profitability} + \beta_8 \text{Price_to_book} + \beta_9 \text{Cash} + \beta_{10} \text{R\&D_expense} + \beta_{11} \text{Operating_expense} + \beta_{12} \text{Industry} + \mu_i$$

$$\textbf{Premium 2} \quad \text{Premium}_i = \alpha_i + \beta_1 \text{Strategic_all_cash} + \beta_2 \text{Financial_acquirer} + \beta_3 \text{Investment_bank} + \beta_4 \text{Target_initiated} + \beta_5 \text{Credit_spread} + \beta_6 \text{Leverage} + \beta_7 \text{Profitability} + \beta_8 \text{Price_to_book} + \beta_9 \text{Cash} + \beta_{10} \text{R\&D_expense} + \beta_{11} \text{Operating_expense} + \mu_i$$

Premium 1 and Premium 2 (above) display two variations of our OLS regression model specifications (displayed in columns 2 and 3 of table 8.1). The control variables we include in

our regression models are motivated by the findings of previous research on related topics, while our explanatory variables tie to questions related to our hypotheses. Specifying the explanatory variables differently in the regressions allows us to examine the differences in premium payments between buyer types on a general level (Premium 1) and then break down the premium payment differences based on buyer type and choice of payment (Premium 2).

6.2 Probit regression

Two of our dependent variables, *Financial acquirer* and *Financial bidder*, are binary dichotomous variables that can only take the value of 0 or 1. When dealing with a binary dependent variable, the assumptions underlying OLS significance testing are violated and can lead to unreliable significance levels (Noreen, 1988). A significant weakness of linear probability models (LPM) is that they can estimate β coefficients that suggest probabilities below 0 or above 1. In probability calculations, values outside the unit interval are nonsensical. We are interested in the difference in the likelihood of a financial buyer versus strategic buyer being the acquirer in a transaction given certain target and transaction characteristics. Additionally, we explore the probability of financial buyers submitting at least one private bid in a transaction depending on target and transaction characteristics.

The probit model is a non-linear binary response model that restricts the predicted value of the dependent variable between 0 and 1 (Wooldridge, 2016). One of the key benefits of the models is that a change in the probability of an event caused by changes in an independent variable depends on the initial probability of an event (Hoetkey, 2007). More specifically, the effect of a change in independent variable X on the probability of event Y depends on the initial probability of event Y . The initial probability of event Y depends on all the independent variables in the model. In other words, the impact of a change in an independent variable on event Y depends on the value of all the other independent variables. Intuitively, this model characteristic is desirable because we expect the impact of a change in an independent variable on our dependent variables *Financial acquirer* and *Financial bidder* to be contingent on the status quo.

It is critical to understand that the interdependence of the independent variables causes the magnitude of the initial coefficients to be uninterpretable. We convert the estimated

coefficients into marginal effects to address this issue (see A.4.4 and A.4.5 for marginal effects tables). Next, we estimate the marginal effect caused by changes in each independent variable by separately calculating their average marginal effect on the dependent variable Y when all other independent variables are at their mean values. This technique of obtaining marginal effects is called Marginal Effects at the Means (MEMS).

Probit 1
$$P(Y = 1) = \varphi(\beta_0 + \beta_1 \textit{Investment_bank} + \beta_2 \textit{Target_initiated} + \beta_3 \textit{Credit_spread} + \beta_4 \textit{Long-term_debt} + \beta_5 \textit{Profitability} + \beta_6 \textit{Price_to_book} + \beta_7 \textit{R\&D_expense} + \mu)$$

Probit 1 (above) displays one of our probit regression specifications (see column 4 in table 8.2 and table 8.3). We use probit regression models to predict both *Financial acquirer* and *Financial bidder* with the same specifications of independent variables for both dependent variables. The coefficients (β) tie to different explanatory and control variables that we predict are relevant in terms of predicting both the involvement and acquisition probability of financial buyers in transactions. We deploy these models to identify key target and transaction characteristics that indicate whether financial buyers are interested in a target company. Additionally, we compare these characteristics between transactions where financial companies engage in bidding activity to those where a financial company is the acquirer.

6.3 Two-sample t-test

We compare the mean value of several target and transaction characteristics based on acquirer type (see table 7.4). The two-sample t-test indicates variables that may be driving the differences in bidding behavior between the two acquirer types. However, it is important to understand that this test compares the mean value of variables between samples, which is different from proving any causal relationship between acquirer type and any other variables in a regression setting.

7. Descriptive Statistics

In the following section, we provide an overview of our sample and present descriptive information about key variables. Most tables divide variables into columns that separate transactions into three categories: strategic buyer, financial buyer, and the total sample.

7.1 Deal overview

Table 7.1 below shows deals per year in our sample, consisting of 141 takeovers by a strategic buyer and 50 by a financial buyer. The years with the highest number of deals in our sample are 2012 and 2016, which both have 31 transactions. 2011 is the year with the fewest deals with only 11 transactions.

Table 7.1: Deal announcements per year

Year	Strategic buyer	<i>Strategic % of total</i>	Financial buyer	<i>Financial % of total</i>	Total
2010	16	73%	6	27%	22
2011	8	73%	3	27%	11
2012	26	84%	5	16%	31
2013	16	62%	10	38%	26
2014	17	85%	3	15%	20
2015	21	88%	3	12%	24
2016	19	61%	12	39%	31
2017	18	69%	8	31%	26
Total/ <i>Average</i>	141	74%	50	26%	191

2013 and 2016 have the highest proportion of financial buyers, with 38% and 39%, respectively. We observe the lowest financial buyer activity in 2015, 2014, and 2012 with 12%, 15%, and 16%, respectively.

In Table 7.2 below, we see the distribution of deals based on deal value. Most deals for both strategic and financial buyers are in the lower range of \$50 to \$650 million. In fact, 132 of the 191 deals are in this range.

Table 7.2: Deals by transaction value intervals in USD mill

Transaction value (\$M)	Strategic buyer	<i>Strategic % of total</i>	Financial buyer	<i>Financial % of total</i>	Total
50 to 200	27	68%	13	32%	40
200 to 350	29	78%	8	22%	37
350 to 500	19	63%	11	27%	30
500 to 650	19	76%	6	24%	25
650 to 800	4	67%	2	33%	6
800 to 950	15	94%	1	6%	16
950 to 1100	5	83%	1	17%	6
1100 to 1250	6	75%	2	25%	8
1250 to 1400	6	100%	0	0%	6
1400 to 1550	10	83%	2	17%	12
1550 to 1700	1	20%	4	80%	5
Total	141	74%	50	26%	191

We find the highest proportion of financial buyers in the lowest range, from \$50 to \$200, and in the highest range, from \$1500 to \$1700 million, with 32% and 80% of total deals in those years. The latter range, however, only has five deals in total. The lowest proportion of financial buyers are seen between transaction values of \$800 and \$950 million as well as in the \$1250 to \$1400 million range. These ranges have 6% and 0% financial buyers, respectively.

7.2 Variable overview

Table 7.3 below shows the distribution of key variables that we collect from the merger filings. We create different probit regression models with *Financial bidder* as the dependent variable to test Hypothesis 2 and Hypothesis 3 on differences between strategic and financial buyers. We use *Target initiated* and *Investment bank* as explanatory variables in the probit regressions and control variables in the OLS regressions on premium differences. None of the regression models include *Payment method*, but it is useful in creating an overview of the payment methods in our sample.

Table 7.3: Key variables

Financial bidder	Yes	No	Total	
Number of deals	75	116	191	
<i>Percent of total</i>	<i>39%</i>	<i>61%</i>	<i>100%</i>	
Target initiated	Yes	No	Total	
Number of deals	71	120	191	
<i>Percent of total</i>	<i>37%</i>	<i>63%</i>	<i>100%</i>	
Investment bank	Yes	No	Total	
Number of deals	135	58	191	
<i>Percent of total</i>	<i>70%</i>	<i>30%</i>	<i>100%</i>	
Payment method	Cash only	Cash and stock	Stock only	Total
Number of deals	135	33	23	191
<i>Percent of total</i>	<i>71%</i>	<i>17%</i>	<i>12%</i>	<i>100%</i>

In the total sample of 191 deals, 75 of the deals include at least one financial bidder. The remaining 116 deals only have strategic bidders. Target companies initiate the sales process in 71 of the 191 deals, and 135 target firms utilize an investment bank to help find buyers. As for the payment method, 135 acquirers pay all-cash. This number naturally includes all the 50 financial acquirers. Of the remaining 56 strategic buyers, 33 pay with a mix of cash and stock, and 23 pay solely in stock.

7.3 Difference in means between buyer groups

Table 7.4 below displays all the variables in our sample that are comparable between strategic and financial buyers with corresponding mean and median values for each variable. Further, we conduct t-tests to compare the differences in mean values of these variables based on buyer type.

Table 7.4: Descriptive statistics for all variables in Strategic and Financial buyer subsections

	All transactions N = 191		Strategic buyer N = 141		Financial buyer N = 50		Diff. in means
	Mean	Median	Mean	Median	Mean	Median	
Transaction characteristics							
Premium	36%	32%	38%	33%	28%	30%	10%**
Auction	.65	1	.60	1	.82	1	-0.22***
Strategic bids	71%	100%	91%	100%	14%	0	77%***
Target initiated	.37	0	.38	0	.36	0	0.02
Investment bank	.70	1	.61	1	.94	1	-0.33***
Transaction value	572	429	586	452	533	386	53
Acquirer first bid	.58	1	.64	1	.42	0	0.22***
Strategic first bid	0.19	0	0.22	0	0.10	0	0.12*
Financial first bid	0.12	0	0.05	0	0.32	0	-0.27***
Plural first bid	.11	0	.09	0	.16	0	0.07
Credit spread	2.73%	2.74%	2.74%	2.74%	2.70%	2.72%	0.04%
Target characteristics							
R&D expense	.10	0.01	.12	.01	.04	.01	0.08*
Price to book	3.22	1.95	2.98	1.95	3.90	1.99	-0.92
Profitability	-.029	0.10	-.04	.01	.00	.02	-0.04*
Leverage	.18	0.09	.18	.07	.17	.10	0.01
Operating expense	.96	0.89	.99	.89	.88	.89	0.11
Cash	.21	0.14	.22	.15	.18	.11	0.04
Services	0.30	0	0.27	0	0.40	0	-0.13*
Manufacturing	0.61	1	0.65	1	0.50	.5	0.15*
Trade	0.04	0	0.03	0	0.06	0	-0.03
Natural resources	0.05	0	0.05	0	0.04	0	0.01

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$ *The list is limited to variables that are relevant for comparison between the two buyer groups*
See table A.2.1 for variable definitions

7.3.1 Premium differences

The t-tests provide an early indication of differences in premium payments between strategic and financial buyers. Strategic acquirers pay an average premium of 38%, whereas the average premium payment by financial acquirers is 28%. The difference of 10% is significant at the

5% level. This finding is the first step in terms of evaluating Hypothesis 1 about premium differences between buyer types.

7.3.2 Transaction characteristics: financial versus strategic bidders

The most interesting finding in our comparison between the two buyer groups comes to light in the *Strategic bids* variable. When the acquirer is strategic, we find that strategic bidders on average submit 91% of the bids. The median value in the same category is 100%. These statistics indicate that when the acquirer is strategic, the bidding process involves few financial bidders. When the acquirer is financial, the proportion of strategic bids averages 14%. In this category, the median is 0%. The difference between the mean value of the two groups is 77% and is significant at the 1% level.

These statistics tell us a lot about the two buyer groups and cast a new light on research that compares strategic and financial buyers. If the two groups do not bid on the same targets, it may not make sense to compare the two acquirer groups. It also becomes even more interesting to compare targets that are attractive to strategic buyers to targets that are attractive to financial buyers.

The *Financial first bid* variable also reflects the differences in preferences between strategic and financial acquirers. The variable indicates when a financial bidder makes the first bid but does not end up being the acquirer in the transaction. In transactions with a strategic acquirer, a financial buyer only makes 5% of the first bids, whereas a competing financial buyer makes the first bid in 32% of the transactions where the acquirer is financial. The difference in mean values is significant at the 1% level. It thus appears to be a rare event that a strategic buyer ends up acquiring a target when a financial bidder makes the first bid.

7.3.3 Transaction characteristics: sales process and investment bank involvement

In table 7.4, we find that it is more common to use auction as a sales process in acquisitions with a financial acquirer than those with a strategic acquirer. This finding suggests that selling by negotiation is a more common process when selling to strategic acquirers. The difference in the use of auctions between the two groups is significant at the 1% level and ties together

with the use of an investment bank to find buyers. This variable is also significantly different between the two groups, as financial buyers are more likely to acquire targets that engage an investment bank to find buyers. It makes sense that contacting more potential buyers increases the probability of there being an auction sales process. Since it appears that *Investment bank* has a strong influence on *Auction*, we choose to focus more on the first.

7.3.4 Target characteristics

The t-tests in table 7.4 give us some indications of target characteristics that are interesting to strategic and financial buyers. We find that *R&D expense* is significantly different between the two acquirer groups at the 10% level, as strategic buyers seem to acquire targets with higher levels of R&D expenses. This finding is an early indication in support of Hypothesis 2 that we test further in section 8. *Profitability* is also significantly different at the 10% level between the two groups, with financial buyers acquiring targets that have higher profitability. Lastly, we see that targets in the manufacturing industry seem to be more interesting to strategic buyers than financial buyers, whereas targets in the services industry seem to be more appealing to financial buyers than strategic buyers. Both these differences are significant at the 10% level.

8. Results

In this section, we present the results from testing the three hypotheses introduced in section 3. We want to understand further the dynamics of strategic and financial buyers in the company sales process and hence start by looking at OLS regressions on premium differences between strategic and financial buyers. We then move into a discussion on self-selection and causality. To test Hypothesis 2 and Hypothesis 3, we use probit regressions with *Financial acquirer* as the dependent variable. We also run the same probit regressions with *Financial bidder* as the dependent variable instead of *Financial acquirer*. We include the analysis of bidding behavior based on buyer type to understand the similarities between transactions where financial companies are interested in a target company and those where they end up acquiring the target company.

8.1 OLS model specification and premium differences

To examine the hypothesis regarding premium differences between buyer groups, we test the following null hypothesis:

H₀: Strategic buyers paying in cash do not pay higher premiums

H₁: Strategic buyers paying in cash pay higher premiums

In table 8.1 on the next page, we show four regressions with different model specifications. In column 1, we compare premiums paid by strategic and financial buyers without controlling for payment type. We find no significant effect of *Strategic acquirer* on *Premium*.

In column 2, we take out *Year* and replace it with *Credit spread* because we believe *Credit spread* serves as a control variable for changes in economic conditions over time. Previous research finds that lower credit spreads lead to higher premiums (Du & Gerety, 2018; Gorbenko & Malenko, 2014). However, our results indicate the opposite and suggest that higher credit spreads reflect better economic conditions and thus higher premiums. We also include *Payment in stock* to control for differences in payment type. Although the stock variable has a significant and negative effect on premium, being a strategic acquirer does not have a significant effect on *Premium*.

Table 8.1: Premium regressions (OLS)

	Dependent variable: Premium			
	(1)	(2)	(3)	(4)
Strategic acquirer	0.026 (0.044)	0.063 (0.047)		
Payment in stock (%)		-0.141** (0.068)		
Strategic all-cash			0.089* (0.048)	0.075* (0.045)
Strategic stock or mixed payment			- -	-0.014 (0.05)
Financial acquirer			0.014 (0.05)	- -
Investment bank	-0.07 (0.045)	-0.086** (0.043)	-0.061 (0.043)	-0.061 (0.043)
Target initiated	-0.066 (0.042)	-0.072* (0.041)	-0.08* (0.041)	-0.08** (0.041)
Credit spread		0.085** (0.041)	0.088** (0.041)	0.088** (0.041)
Constant	0.237** (0.114)	0.091 (0.149)	0.103 (0.149)	0.118 (0.15)
Target characteristics	Yes	Yes	Yes	Yes
Year	Yes	No	No	No
Industry	Yes	Yes	No	No
N	191	191	191	191
R ²	0.256	0.250	0.253	0.253

Robust standard errors in parentheses

* p<0.10, ** p<0.05, *** p<0.01

See table A.2.1 for variable definitions

In column 3, we replace *Strategic acquirer* and *Payment in stock* by *Strategic all-cash*, *Strategic stock or mixed payment*, and *Financial acquirer*. We set *Strategic stock or mixed payment* as the base case, and we check for significant differences between strategic buyers that pay in all-cash and strategic buyers that pay in stock or a mix of stock and cash. In this regression model, *Strategic all-cash* is positive and significant at the 10% level. This finding is in line with Hypothesis 1, which states that strategic buyers paying in cash pay higher premiums than strategic buyers paying with stock.

In column 4, we run the same regression as in column 3, except we change the base category from *Stock or mixed payment* to *Financial acquirer*. This change enables us to compare premium payments by financial buyers to premium payments by strategic buyers who pay all-cash. As in column 3, we find that *Strategic all-cash* is positive and significant at the 10%

level. This finding is in line with Hypothesis 1, stating that strategic buyers paying in cash pay higher premiums than financial buyers.⁴

8.1.1 Self-selection and causality

Even though strategic buyers paying in all-cash appear to be paying the highest premiums, this does not indicate that all target companies should try to approach strategic buyers that pay all-cash. Based on our analysis of descriptive statistics (see section 7), we know that strategic and financial buyers do not bid on the same targets. The mean percentage of strategic private bidders is 91% when the acquirer is strategic and 14% when the acquirer is financial. The medians are 100% and 0%, respectively. Comparing premiums between these two groups may thus make little sense as they are rarely interested in the same targets.

It is also hard to come around the inherent self-selection problem in these types of studies. The targets themselves, to a large degree, choose their own sales process, even if a potential acquirer initiates the process. Target companies contact the type of buyers they believe are willing to pay the highest premium for their outstanding shares. In the merger documents, target managements often comment that their firms are unlikely to be attractive to one of the two buyer groups.

Because of the potential self-selection problems in our sample and the fact that strategic and financial buyers do not seem to bid on the same companies, we do not claim causality between buyer group and premium. It is also important to point out that scholars come to different conclusions on this topic. The results of Barger et al. (2008) are in line with our findings, while Fidrmuc et al. (2012) and Gorbenko and Malenko (2014) find that strategic and financial buyers do not pay significantly different premiums when controlling for target characteristics.

8.1.2 Target initiation

We find that the initiation of a transaction by a target company is negatively associated with acquisition premiums. There are many potential explanations for why target-initiated

⁴ See table A.4.1 for complete OLS regression.

transactions receive lower premiums than those that are initiated by a prospective buyer or another third party. For instance, target companies that initiate transactions may have more undesirable characteristics, outside of those that we include in our analysis, than target companies that do not initiate transactions. Alternatively, target companies that do not initiate the transaction may be more reluctant to sell, which forces acquirers to offer higher premiums.

8.2 Probit regressions

Based on the findings in section 7, we know that strategic and financial acquirers do not bid on the same targets. We are thus increasingly interested in the effect certain target- and transaction characteristics have on the outcome of acquirer type.

To test Hypothesis 2 and Hypothesis 3, we quantify the effect expense levels of target companies and engaging an investment bank to search for potential buyers, have on the probability of the acquirer being financial as opposed to the acquirer being strategic. Additionally, we estimate the effects the same explanatory and control variables have on the probability that a financial buyer submits at least one private bid in a transaction, independently of the type of buyer that ends up acquiring the target. We specify both probit regressions in various ways to observe how the magnitudes and significance levels of key variables change with variations in the model. We present the output on the following pages, with *Financial acquirer* as the dependent variable in table 8.2 and *Financial bidder* as the dependent variable in table 8.3.⁵

⁵ See table A.4.2 and A.4.3 for complete probit regressions.

Table 8.2: Financial acquirer probit regressions

	Dependent variable: Financial acquirer				
	(1)	(2)	(3)	(4)	(5)
Investment bank			1.505*** (0.353)	1.346*** (0.306)	1.357*** (0.300)
Target initiated		-0.001 (0.219)	-0.235 (0.228)	-0.166 (0.220)	-0.165 (0.218)
Credit spread		-0.010 (0.436)	0.054 (0.480)	-0.120 (0.275)	-0.180 (0.269)
Long-term debt	-0.728 (0.585)	-0.729 (0.588)	-0.781 (0.576)	-0.677 (0.543)	-0.330 (0.486)
Profitability	0.274 (0.897)	0.275 (0.901)	-0.026 (0.907)	0.102 (0.876)	0.857 (0.779)
Price to book	0.040* (0.022)	0.040* (0.022)	0.045** (0.020)	0.036* (0.021)	0.026 (0.020)
R&D expense	-3.183** (1.496)	-3.181** (1.494)	-3.761** (1.652)	-3.893*** (1.467)	
Operating expense					-0.913** (0.465)
Constant	-0.230 (0.324)	-0.210 (0.981)	-1.336 (1.188)	-1.065 (0.841)	-0.341 (0.933)
Year	Yes	Yes	Yes	No	No
Industry	Yes	Yes	Yes	No	No
N	191	191	191	191	191
Pseudo R ²	0.0306	0.0306	0.1418	0.1418	0.1286
Correctly classified	75.39%	75.39%	79.06%	74.87%	73.82%

Robust standard errors in parentheses

* p<0.10, ** p<0.05, *** p<0.01

See table A.2.1 for variable definitions

Table 8.3: Financial bidder probit regressions

	Dependent variable: Financial bidder				
	(1)	(2)	(3)	(4)	(5)
Investment bank			1.800*** (0.323)	1.644*** (0.282)	1.679*** (0.287)
Target initiated		0.170 (0.202)	-0.113 (0.215)	-0.038 (0.211)	-0.037 (0.210)
Credit spread		-0.137 (0.430)	-0.056 (0.472)	-0.004 (0.276)	-0.067 (0.274)
Long-term debt	-0.536 (0.520)	-0.588 (0.522)	-0.614 (0.509)	-0.607 (0.504)	-0.434 (0.462)
Profitability	0.377 (0.987)	0.436 (0.977)	0.164 (0.952)	0.469 (0.917)	0.867 (0.837)
Price to book	0.039* (0.021)	0.041* (0.021)	0.050*** (0.019)	0.041** (0.018)	0.033* (0.017)
R&D expense	-3.047** (1.396)	-2.978** (1.389)	-3.997*** (1.535)	-2.965** (1.409)	
Operating expense					-1.210** (0.500)
Constant	-0.044 (0.311)	0.201 (0.959)	-1.175 (1.112)	-1.311 (0.818)	-0.270 (0.953)
Year	Yes	Yes	Yes	No	No
Industry	Yes	Yes	Yes	No	No
N	191	191	191	191	191
Pseudo R ²	0.0266	0.0266	0.2040	0.2040	0.2045
Correctly classified	67.02%	67.54%	74.87%	70.16%	68.59%

Robust standard errors in parentheses

* p<0.10, ** p<0.05, *** p<0.01

See table A.2.1 for variable definitions

8.2.1 Target expense levels and the effect on acquirer type

To examine the hypothesis regarding the effect of target expense levels on acquirer type, we test the following null hypothesis:

H_0 : Expense level of a target company does not influence acquirer type

H_1 : Expense level of a target company influences acquirer type

To test the null hypothesis, we observe the magnitude and significance of *R&D expense* on *Financial acquirer* in different specifications of the model (see table 8.2). In column 1, we include selected target company characteristics while controlling for *Year* and *Industry*. *R&D expense* stands out in magnitude relative to other independent variables and is significant at the 5% level. In column 2, we include *Target initiated* to account for the effect caused by the target company being the initiator of the transaction. Additionally, we include *Credit spread*, as other scholars find that an increase in the credit spread leads to an increase in the probability of financial companies being losing bidders in a transaction.⁶ We do not find any significant effects of *Target initiated* nor *Credit spread* on *Financial acquirer* in any of our model specifications. Further, the magnitude and significance of *R&D expense* remain virtually unchanged by the inclusion of these additional variables.

In column 3, we include *Investment bank* and find that the negative effect of *R&D expense* on *Financial acquirer* remains strong and is still significant at the 5% level. In column 4, we include the same host of independent variables as in column 3, except we take out *Year* and *Industry*. We find that these changes have a small effect on the interpretation of the key variables in our model.

Lastly, we run the same regression in column 5 as in column 4, but *Operating expense* replaces *R&D expense*. When we include each expense variable separately, they are both significant at a minimum of 5% level in all specifications of the model. Given their high level of correlation (>0.75), it is not surprising that both the expense variables are significant. To avoid poorly specified models and issues with multicollinearity, we do not include both expense variables simultaneously in our probit regressions.

Our findings strongly suggest that financial buyers are less likely to buy target companies with high expense levels, which is evidence against the null hypothesis. More specifically, we find that a 0.10 unit increase in a target company's *R&D expense* decreases the average marginal probability that the acquirer is financial by an average of approximately 10% (see table A.4.4 for marginal effects). This finding corresponds with the findings of Bena and Li (2014) and

⁶ See Fidrmuc et al. (2012), Gorbenko and Malenko (2014), and Harford (2005)

Phillips and Zhdanov (2013). *R&D expense* remains large in magnitude and significant at a minimum of 5% level in all specifications of the model. Moreover, we find that a one unit increase in a target company's *Operating expense* decreases the average marginal probability that the acquirer is financial by an average of approximately 26%. This finding corresponds with the findings of Levine (2017).

As an additional step in our analysis, we run regressions that estimate the probability that at least one financial buyer submits a private bid in a transaction (see table 8.3). We run the regressions using the same model specifications as in table 8.2, except we replace *Financial acquirer* by *Financial bidder*. We run these regressions to study to the differences between the target characteristics in transactions where financial buyers are interested enough to submit private bids and those where they end up being the acquirer. Understanding these differences is critical to further distinguish between transactions with strategic and financial acquirers.

The results displayed in table 8.3 are very similar to the results in table 8.2 in terms of magnitude and significance of expense levels. The resemblance of these tables suggests that the involvement of financial buyers is limited to transactions where the target companies have characteristics that meet their criteria. Our findings in table 8.3 indicate that financial buyers are less interested in target companies with high expense levels. These results are further evidence supporting Hypothesis 2.

8.2.2 Investment bank buyer search's effect on acquirer type

To examine the hypothesis regarding the effect of the target company using an investment bank to search for buyers on acquirer type, we test the following null hypothesis:

H₀: Using an investment bank to search for buyers does not influence acquirer type

H₁: Using an investment bank to search for buyers influences acquirer type

To test the null hypothesis, we include *Investment bank* in three different model specifications and observe the changes, if any, in magnitude and significance of its coefficients. The last three columns of table 8.2 display these models. In column 3, we control for key target characteristics together with *Year* and *Industry*. We find that the effect of *Investment bank* on *Financial acquirer* is large and significant at the 1% level. In column 4, we include the same

host of independent variables, but take *Year* and *Industry* out of the regression. In doing so, *Investment bank* remains virtually unchanged in magnitude and remains significant at the 1% level. Lastly, we swap *R&D expense* for *Operating expense* in column 5 and find that this change causes no noteworthy change to *Investment bank*.

We find that target companies that engage an investment bank to search for buyers have an increased average marginal probability of being acquired by a financial buyer of approximately 35% (see A.4.4 for marginal effects), and this finding remains consistent in different specifications of the model. The marginal effect of *Investment bank* is significant at the 1% level for all model specifications. These findings provide strong evidence against the null hypothesis and support the claim put forth in Hypothesis 3.

To further examine the role of *Investment bank* in determining the acquirer type, we follow the same methodology as in the previous subsection. We replace *Financial acquirer* by *Financial bidder* and run the same three regressions as in the previous section (see table 8.3). Interestingly, we find that the effect of *Investment bank* is larger on *Financial bidder* than it is on *Financial acquirer*. Our results suggest that hiring an investment bank to search for potential buyers increases the average marginal probability of receiving at least one private bid from a financial buyer by approximately 60% (see table A.4.5 for marginal effects).

The sizable effect of *Investment bank* on *Financial bidder* fuels a possible explanation of why strategic and financial buyers do not bid on the same target companies. The differences in bidding behavior appear to be driven by differences in investment bank involvement, as sales processes in which investment banks are not actively searching for potential buyers virtually never include financial buyers. In our sample, investment banks actively search for prospective buyers in 94% of the transactions where the acquirer is financial, as opposed to 60% in the transactions where the acquirer is strategic (see table 7.4). Hence, investment banks' involvement in transactions seems to play a significant role in determining whether a company sales process involves financial buyers, which in turn affects the probability of a financial buyer acquiring the target.

A possible explanation supporting these findings could be that the frequent involvement of investment banks in transactions provide them with a vast knowledge of what type of targets financial buyers are interested in pursuing. In transactions where investment banks do not

search for potential buyers, investment banks are still involved on the selling side and advise the target. It is likely that they only push for the target to contact financial buyers if they believe financial buyers are interested in acquiring the target company. It is also unlikely that the target knows the financial buyer market as well as the investment bank, and therefore, it makes sense to ask an investment bank for help when reaching out to these buyers.

9. Robustness

9.1 Sample size and causal relationships in the OLS model

We collect the main proportion of our sample data through extensive reading of SEC merger filing documents. This data collection process is tedious and time-consuming, which puts a constraint on the size of our sample. We carefully consider this fact when examining our results. More specifically, we consider the potential increase in the variance of our beta coefficients when we analyze and make claims based on our findings.

In our OLS regression models, we are most interested in the difference in premiums paid by strategic and financial buyers when taking into consideration their choice of payment type. Although our OLS regressions indicate that strategic companies pay higher premiums than financial companies when controlling for key target characteristics and other relevant factors, we are careful of inferring a causal relationship suggesting that strategic buyers offer higher premiums than financial companies. Further research shows that strategic and financial companies concentrate their bidding activities on different target companies, and there may be factors that we do not include in our sample that explain the difference in premiums between the two types of acquirers. Examples of target company factors that could explain the difference in premiums paid by strategic and financial companies include, but are not limited to, company stock performance, historical company growth, and industry merger waves within the target companies' industries.

9.2 Multicollinearity

Problems of multicollinearity occur when two or more independent variables are highly correlated. Goldberger (1991) argues that multicollinearity causes many of the same problems that are caused by small sample sizes. When explanatory variables exert high correlation with other independent variables, it drives up the variance in the estimated beta coefficients and reduces the probability of finding significant explanatory variables (Wooldridge, 2016).

To avoid further increases in the variance of our beta coefficients, we ensure that our explanatory variables do not suffer from issues of multicollinearity. First, we run a VIF-test

that examines how much correlation influences the variance in each independent variable (Wooldridge, 2016). The VIF-test indicates that our explanatory variables do not suffer from problems of multicollinearity (see table A.5.1). To further investigate potential issues of multicollinearity, we create correlation matrices of the explanatory variables in our regression models (see table A.5.2 and A.5.3). These matrices only indicate high correlation between dichotomous variables that represent mutually exclusive events, which does not cause reason for concern.

9.3 Heteroskedasticity

We perform a Breusch-Pagan test on our OLS regression models to determine if the pattern of residuals is homoscedastic (see table A.5.4). These test-results strongly suggest that our OLS regressions suffer from issues of heteroskedasticity. To further examine this issue, we plot the residuals of our OLS regression model (see plot A.5.5). The fan-like shape of the residuals plot around the estimated regression is a clear indication of heteroskedasticity. The presence of heteroskedasticity does not cause bias nor inconsistency in the OLS estimators, but it causes the variance of estimated beta coefficients and their respective t-statistics to be biased (Wooldridge, 2016). To address this issue, we use robust standard errors in all our models.

9.4 Misspecification and omitted variable bias

The Ramsey RESET test and Link-test check our models for misspecification issues and omitted variable bias, respectively (see table A.5.4). The tests yield ambiguous results concerning our model specifications. The Ramsey RESET test strongly suggests that our OLS regression models suffer from misspecification while the Link-test indicates that the same models do not suffer from omitted variable bias. Further, the Link-test shows no sign of omitted variable bias for any of our probit regressions and the Hosmer-Lemeshow goodness-of-fit test suggests that our probit regressions are generally well-specified.

10. Conclusion

In this thesis, we compare premium payments by strategic and financial acquirers and identify differences in target and transaction preferences between them. We collect unique data from SEC filings and gain a new perspective on the company sales process. We find that strategic buyers, on average, pay higher premiums than financial buyers. However, further analyses of transaction data show that strategic and financial buyers rarely compete against each other in the search for attractive target companies. In transactions with a strategic acquirer, 91% of private bids are submitted by strategic buyers while transactions with a financial acquirer only receive 14% of private bids from strategic buyers. Hence, differences in premium payments do not necessarily provide evidence of differences in the willingness and ability to pay between buyer types.

The breakdown of transactions based on company characteristics shows that financial buyers are less interested in target companies with high expense levels. We find that a 0.10 unit increase in a target company's *R&D expense* decreases the average marginal probability that the acquirer is financial by an average of approximately 10%. Additionally, we find that a one unit increase in a target company's *Operating expense* decreases the average marginal probability that the acquirer is financial by an average of approximately 26%. These results are similar when we replace *Financial acquirer* by *Financial bidder* as the dependent variable. Companies with high expense levels thus seem to attract fewer private bids from financial buyers and are less likely to be acquired by such a buyer.

In terms of transaction characteristics, we find that the role of investment banks influences the outcome of acquirer type. We find that engaging an investment bank to search for potential buyers increases the average marginal probability of receiving private bids from financial buyers by approximately 60% and increases the average marginal probability of being acquired by a financial buyer by approximately 35%. These findings may suggest that target companies can identify strategic acquirers by themselves but depend on investment banks to search for financial buyers. Another possible explanation could be that investment banks only contact financial buyers when they believe financial buyers are interested in the target company.

Despite the findings of this thesis, we want to stress that there are additional steps that can be taken to build on our analysis. First off, we believe that increasing the sample size would add validity to our results. We also encourage further research on the efficacy of the variables we have introduced and for scholars to introduce additional control variables. To begin with, we believe that a larger sample would give more room for industry variables, which may play an important role in determining acquirer type. The target's historical stock performance could also affect which types of buyer a target company attracts. Lastly, we encourage scholars to try to work around the self-selection problem in our premium regressions to further examine potential differences in premium payments between strategic and financial buyers.

References

- Aktas, N., de Bodt, E., & Roll, R. (2010). Negotiations under the threat of an auction. *Journal of Financial Economics*, 98(2), 241-255.
<http://doi.org/10.1016/j.jfineco.2010.06.002>
- Andrade, G., Mitchell, M., & Stafford, E. (2001). New evidence and perspective on mergers. *Journal of Economic Perspective*, 15(2), 103-120. <http://doi.org/10.1257/jep.15.2.103>
- Axelson, U., Jenkinson, T., Strömberg, P., & Weisbach, M. S. (2013). Borrow cheap, buyer high? The determinant of leverage and pricing in buyouts. *The Journal of Finance*, 68(6), 2223-2267. <http://doi.org/10.1111/jofi.12082>
- Bargeron, L.L., Schlingemann, F.P., Stulz, R.M., & Zutter, C.J. (2008). Why do private acquirers pay so little compared to public acquirers? *Journal of Financial Economics*, 89(3), 375-390. <https://doi.org/10.1016/j.jfineco.2007.11.005>
- Bena, J., & Li, K. (2013). Corporate innovations and mergers and acquisitions. *The Journal of Finance*, 69(5), 1923-1960. <https://doi.org/10.1111/jofi.12059>
- Betton, S., & Eckbo, B.E. (2000). Toeholds, bid jumps, and expected payoffs in takeovers. *The Review of Financial Studies*, 13(4), 841-882. <http://doi.org/10.1093/rfs/13.4.841>
- Betton, S., Eckbo, B.E., & Thornburn, K. (2008). Markup pricing revisited. *Finance working paper*. <http://doi.org/10.2139/ssrn.1094946>
- Betton, S., Eckbo, B.E., & Thorburn, K. (2009). Merger negotiations and the toehold puzzle. *Journal of Financial Economics*, 91(2), 158-178.
<https://doi.org/10.1016/j.jfineco.2008.02.004>
- Boone, A.L., & Mulherin, J.H. (2007). How are firms sold? *The Journal of Finance*, 62(2), 847-875. <https://doi.org/10.1111/j.1540-6261.2007.01225.x>
- Boone, A.L., & Mulherin, J.H. (2008). Do auctions induce a winner's curse? New evidence from the corporate takeover market. *Journal of Financial Economics*, 89(1), 1-19.
<http://doi.org/10.1016/j.jfineco.2007.08.003>

- Boone, A.L., & Mulherin, J.H. (2011). Do private equity consortiums facilitate collusion in takeover bidding? *Journal of Corporate Finance*, 17(1), 1475-1495.
<https://doi.org/10.1016/j.jcorpfin.2011.08.007>
- Bulow, J., & Klemperer, P. (1996). Auctions versus negotiations. *The American Economic Review*, 86(1), 180-194. <http://doi.org/10.3386/w4608>
- Cumming, D., Siegel, D.S., & Wright, M. (2007). Private equity, leveraged buyouts and governance. *Journal of Corporate Finance*, 13(4), 439-460.
<https://doi.org/10.1016/j.jcorpfin.2007.04.008>
- Dittmar, A., Li, D., & Nain, A. (2012). It pays to follow the leader: acquiring targets picked by private equity. *Journal of Financial and Quantitative Analysis*, 47(5), 901-931.
<http://doi.org/10.1017/S0022109012000361>
- Dimopoulos, T., & Sacchetto, S. (2014). Preemptive bidding, target resistance, and takeover premiums. *Journal of Financial Economics*, 114(3), 444-470.
<https://doi.org/10.1016/j.jfineco.2014.07.013>
- Du, D., & Gerety, M. (2018). Credit spreads and merger pricing. *Journal of Asset Management*, 19(6), 169-178. <http://doi.org/10.1057/s41260-017-0072-5>
- Fidrmuc, J.P., Roosenboom, P., Paap, R., & Teunissen, T. (2012). One size does not fit all: selling firms to private equity versus strategic acquirers. *Journal of Corporate Finance*, 18(4), 828-848. <https://doi.org/10.1016/j.jcorpfin.2012.06.006>
- Fishman, M.J. (1989). Preemptive bidding and the role of the medium of exchange in acquisitions. *The Journal of Finance*, 44(1), 41-57. <http://doi.org/10.2307/2328274>
- Gentry, M. L. & Stroup, C. (2019). Entry and competition in takeover auctions. *Journal of Financial Economics*, 132(2), 298-324. <https://doi.org/10.1016/j.jfineco.2018.10.007>
- Goldberger, A. S. (1991). *A Course in Econometrics*. Cambridge, MA: Harvard University Press.

- Gorbenko, A. S., & Malenko, A. (2014). Strategic and financial bidders in takeover auctions. *The Journal of Finance*, 69(6), 2513-2555. <https://doi.org/10.1111/jofi.12194>
- Gottschalg, O., & Phalippou, L. (2009). The performance of private equity funds. *The Review of Financial Studies*, 22(4), 1747-1776. <https://doi.org/10.1093/rfs/hhn014>
- Harford, J., Martos-Vila, M., & Rhodes-Kropf, M. (2014). Financial vs. strategic buyers. *Harvard Business School working paper*. Retrieved from <https://hbswk.hbs.edu/item/financial-vs-strategic-buyers>
- Hoetkey, G. (2007). The use of logit and probit models in strategic management research: Critical Issues. *Strategic Management Journal*, 28(4), 331-343. <http://doi.org/10.1002/smj.582>
- Ivashina, V., & Kovner, A. (2011). The private equity advantage: leveraged buyout firms and relationship banking. *The Review of Financial Studies*, 24(7), 2462-2498. <http://doi.org/10.2139/ssrn.1017857>
- Kaplan, S.N., & Schoar, A. (2005). Private equity performance: returns, persistence, and capital flows. *Journal of Finance*, 60(4), 1791-1823. <http://doi.org/10.1111/j.1540-6261.2005.00780.x>
- Klemperer, P. (2004). *Auctions: theory and practice*. Princeton, NJ: Princeton University Press.
- Levine, O. (2017). Acquiring growth. *Journal of Financial Economics*, 126(7), 300-319. <http://doi.org/10.2139/ssrn.1928255>
- Liu, T. (2018). Bidding behind the scenes. Unpublished manuscript.
- Liu, T., & Officer, M.S. (2018), Inside the “black box” of private merger negotiations. Unpublished manuscript.
- Mitchell, M. L., & Mulherin, J.H. (1996). The impact of industry shocks on takeover and restructuring activity. *Journal of Financial Economics*, 41(2), 193-229. [https://doi.org/10.1016/0304-405X\(95\)00860-H](https://doi.org/10.1016/0304-405X(95)00860-H)

- Moeller, T. (2005). Let's make a deal! How shareholder control impacts merger payoffs. *Journal of Financial Economics*, 76(1), 167-190.
<https://doi.org/10.1016/j.jfineco.2004.11.001>
- Mulherin, H., & Simsir, S. (2014). Measuring deal premiums in takeovers. *Financial Management*, 44(1), 1-14. <https://doi.org/10.1111/fima.12053>
- Noreen, E. (1988). An empirical comparison of probit and OLS regression hypothesis tests. *Journal of Accounting Research*, 26(1), 119-133. <http://doi.org/10.2307/2491116>
- Phillips, G. M., & Zhdanov, A (2013). R&D and the incentives from merger and acquisition Activity. *Review of Financial Studies*, 26(1), 34-78.
<http://doi.org/10.2139/ssrn.2181152>
- Pound, J., & Zeckhauser, R. (1990). Clearly heard on the street: the effect of takeover rumors on stock prices. *The Journal of Business*, 60(3), 291-308.
<http://doi.org/10.1086/296508>
- Qingzhong, M. (2005). Mergers and investment banks: how do banks help targets?
Unpublished manuscript. <http://doi.org/10.2139/ssrn.869646>
- Servaes, H. and Zenner, M. (1996). The role of investment banks in acquisitions. *The Review of Financial Studies*, 9(3), 787-815. <https://doi.org/10.1093/rfs/9.3.787>
- Schwert, G. (2000). Hostility in takeovers: in the eyes of the beholder? *Journal of Finance*, 55(6), 2599-2640. <https://doi.org/10.1111/0022-1082.00301>
- Wharton wrds. (2016). Thomson reuters SDC mergers & acquisitions. Retrieved from
<http://www.whartonwrds.com/wp-content/uploads/2016/09/Thomson-Reuters-TR-version-of-SDC-MA.pdf>
- Wooldridge, J. M. (2016). *Introductory Econometrics: A Modern Approach*. Boston, MA: Cengage learning.

Wulf, J. (2004). Do CEOs in mergers trade power for premium? Evidence from “merger of equals”. *Journal of Law, Economics and Organizations*, 20(1), 60-101.
<http://doi.org/10.1093/jleo/ewh024>

Appendix

A.1 Sample creation

Table A.1.1: Steps to final sample

Sample filters	# of deals
Date Announced: 1.1.2010 to 1.1.2018; Target Public Status: Public	9,805
Deal Value (\$ Mil): 50 to 1700	4,577
Form of the Deal: Merger (stock or asset)	1,236
Target Industry Sector: Not Financial	909
Acquirer Public Status: Private, Public	687
Percent of Shares Owned after Transaction: 100	560
Financial Data in Compustat	343
Public Strategic Buyer or Private Financial Buyer	217
Complete Information	198
Clear if Acquirer is Strategic or Financial	194
Financial Investor Group	192
DEFM14A Available on SEC EDGAR	191

A.2 Variables

Table A.2.1: Variable definitions and sources

Variable	Definition	Data source
Acquirer first bid	Dummy variable equal to one if the first private bid is made by the acquirer and zero otherwise.	Merger documents
Auction	Dummy variable equal to one if >1 private bid is submitted and zero otherwise.	Merger documents
Cash	Cash and marketable securities over total assets for the last financial year reported before the deal announcement.	Compustat
Credit spread	Seasoned Baa corporate bond yield relative to yield on 10-years Treasury in the month of the announcement.	S&P
Financial acquirer	Dummy variable equal to one if the acquirer is a financial company and zero if it is strategic.	SDC
Financial first bid	Dummy variable equal to one if the first bid is made by a financial company that did not end up acquiring the company and zero otherwise.	Merger documents
Industry	Dummy variable equal to one if the target is defined as part of the Manufacturing industry group in SDC and zero otherwise.	SDC
Investment bank	Dummy variable equal to one if an investment bank helps the target find buyers and zero otherwise.	Merger documents
Leverage	Long term debt over total assets for the last financial years reported before the deal announcement.	Compustat
Manufacturing	Dummy variable equal to one if the target is defined as part of the Manufacturing industry group in SDC and zero otherwise.	SDC
Natural resources	Dummy variable equal to one if the target is defined as part of the Natural Resources industry group in SDC and zero otherwise.	SDC
Operating expense	Operating expenses over net sales for the last financial year reported before the deal announcement.	Compustat, SDC
Payment in stock	Percentage of the deal that is paid for in stock.	Merger documents
Plural first bid	Dummy variable equal to one if the first bids are made by multiple companies and zero otherwise.	Merger documents
Premium	Price offered less price on last trading day before announcement over price on last trading day before announcement. When there have been public bids	SDC, merger documents

	prior to this or information leakages we use the last trading day before the leak.	
Price to book	Price per share divided by book value per share for the last financial year reported before the deal announcement.	Compustat, SDC
Profitability	Net profit over total assets for the last financial year reported before the deal announcement.	Compustat
R&D expense	Research and development expenses over net sales for the last financial year reported before the deal announcement.	Compustat, SDC
Services	Dummy variable equal to one if the target is defined as part of the Services industry group in SDC and zero otherwise.	SDC
Strategic all-cash	Dummy variable equal to one if the acquirer is a strategic buyer paying in cash and zero otherwise.	Merger documents
Strategic first bid	Dummy variable equal to one if the first bid is made by a strategic company that do not end up acquiring the company and zero otherwise.	Merger documents
Strategic bids	Number of strategic private bidders divided by total private bidders.	Merger documents
Strategic stock or mixed payment	Dummy variable equal to one if the acquirer is a strategic buyer paying in stock or with both stock and cash and zero otherwise.	Merger documents
Target initiated	Dummy variable equal to one if the sales process is initiated by the target and zero otherwise.	Merger documents
Trade	Dummy variable equal to one if the target is defined as part of the Trade industry group in SDC and zero otherwise.	SDC

A.2.2: Example from a deal where the target uses an investment bank to help find buyers

Target: National Technical Systems Inc.

Acquirer: Aurora Capital Group

Investment bank: Houlihan Lokey

SEC filings: DEFM14A, Background of the Merger (excerpt)

In May 2013, the special committee met and determined that since market conditions were stabilizing, it was time to initiate the solicitation process. The special committee worked with **Houlihan Lokey and management to develop a list of prospective bidders**, including both potential strategic bidders comprised of companies that were in the testing and certification industry, or for whom expansion into the testing and certification industry would be a logical extension of their core business, and prospective financial buyers that might have an interest in the Company's business and had the financial resources to complete a transaction of the size contemplated.

In June 2013, in accordance with the special committee's directives, **Houlihan Lokey contacted 194 prospective bidders, consisting of 53 strategic buyers and 141 financial buyers**, including Aurora Capital Group and Financial Buyer A. A "teaser" memorandum was distributed to the 114 prospective bidders that expressed interest. The teaser did not identify NTS by name but invited interested parties to enter into a confidentiality agreement and receive a confidential information memorandum concerning the Company's business and prospects. Confidentiality agreements were secured with 114 prospective bidders (21 of which were strategic buyers and 93 of which were financial buyers), including Aurora Capital Group who entered into a confidentiality agreement on June 5, 2013. The confidential information memorandum was distributed to prospective bidders beginning in June 2013.

A.3 Descriptive statistics

Table A.3.1: Summary statistics

Variable	Mean	Median	Min	Max	St.Dev
Premium	.36	.32	-.05	2.13	.28
Value of Transaction(\$mil)	572	429	52	1697	441
Private bids	3.07	2	1	20	2.88
Credit spread	2.73	2.74	1.82	3.56	.39
Leverage	.18	.09	0	.95	.23
Profitability	-.03	.01	-.83	.28	.15
Price to book	3.22	1.95	-5	30	5.18
Cash	.21	.14	0	.92	.21
R&D expense	.1	.01	0	2.17	.28
Operating expense	.96	.89	.33	4.5	.48
Strategic all-cash	.45	0	0	1	.5
Strategic mixed payment	.29	0	0	1	.46
Financial acquirer	.26	0	0	1	.44
Investment bank	.7	1	0	1	.46
Auction	.65	1	0	1	.48
Target initiated	.37	0	0	1	.48
Manufacturing	.61	1	0	1	.49

Table A.3.2: Targets by industry

Industry	Strategic	<i>% of total</i>	Financial	<i>% of total</i>	Total
Manufacturing	92	79%	25	21%	117
Services	38	66%	20	34%	58
Natural resources	4	57%	3	43%	7
Trade	7	78%	2	22%	9

A.4 Results

Table A.4.1: OLS Regressions displaying all independent variables

	Dependent variable: Premium			
	(1)	(2)	(3)	(4)
Strategic acquirer	0.026 (0.044)	0.063 (0.047)		
Payment in stock (%)		-0.141** (0.068)		
Strategic all-cash			0.089* (0.048)	0.075* (0.045)
Strategic stock or mixed payment			- (0.05)	-0.014 (0.05)
Financial acquirer			0.014 (0.05)	- (0.05)
Investment bank	-0.07 (0.045)	-0.086** (0.043)	-0.061 (0.043)	-0.061 (0.043)
Target initiated	-0.066 (0.042)	-0.072* (0.041)	-0.08* (0.041)	-0.08** (0.041)
Credit spread		0.085** (0.041)	0.088** (0.041)	0.088** (0.041)
<hr/>				
Leverage	-0.025 (0.105)	0.042 (0.107)	0.01 (0.106)	-0.01 (0.101)
Profitability	-0.313 (0.224)	-0.319 (0.222)	-0.316 (0.226)	-0.317 (0.226)
Price to book	-0.011** (0.004)	-0.01** (0.004)	-0.01** (0.004)	-0.01** (0.004)
Cash	-0.09 (0.12)	-0.12 (0.118)	-0.089 (0.117)	-0.089 (0.117)
R&D expense	0.159 (0.202)	0.118 (0.208)	0.161 (0.203)	0.161 (0.203)
Operating expense	0.055 (0.097)	0.102 (0.091)	0.07 (0.094)	0.07 (0.094)
Industry	0.067* (0.038)	0.056 (0.037)		
Deal2010	0.149 (0.098)			
Deal2011	- (0.098)			
Deal2012	0.165** (0.081)			
Deal2013	0.084 (0.086)			

Deal2014	0.139** (0.093)			
Deal2015	0.096 (0.085)			
Deal2016	0.148* (0.079)			
Deal 2017	0.058* (0.076)			
Constant	0.237** (0.113)	0.091 (0.149)	0.103 (0.149)	0.118 (0.15)
N	191	191	191	191
R ²	0.256	0.250	0.253	0.253

Robust standard errors in parentheses

* p<0.10, ** p<0.05, *** p<0.01

Table A.4.2: Financial acquirer probit regressions displaying all independent variables

	Dependent variable: Financial acquirer				
	(1)	(2)	(3)	(4)	(5)
Investment bank			1.505*** (0.353)	1.346*** (0.306)	1.357*** (0.300)
Target initiated		-0.001 (0.219)	-0.235 (0.228)	-0.166 (0.220)	-0.165 (0.218)
Credit spread		-0.010 (0.436)	0.054 (0.480)	-0.120 (0.275)	-0.180 (0.269)
Long-term debt	-0.728 (0.585)	-0.729 (0.588)	-0.781 (0.576)	-0.677 (0.543)	-0.330 (0.486)
Profitability	0.274 (0.897)	0.275 (0.901)	-0.026 (0.907)	0.102 (0.876)	0.857 (0.779)
Price to book	0.040* (0.022)	0.040* (0.022)	0.045** (0.020)	0.036* (0.021)	0.026 (0.020)
R&D expense	-3.183** (1.496)	-3.181** (1.494)	-3.761** (1.652)	-3.893*** (1.467)	
Operating expense					-0.913** (0.465)

Industry	-0.285 (0.229)	-0.285 (0.229)	-0.437* (0.25)		
Deal2010	-0.025 (0.396)	-0.017 (0.502)	-0.033 (0.513)		
Deal2011	0.214 (0.489)	0.221 (0.607)	0.473 (0.58)		
Deal2012	-0.337 (0.381)	-0.327 (0.592)	-0.378 (0.612)		
Deal2013	0.23 (0.36)	0.237 (0.458)	0.298 (0.468)		
Deal2014	-0.295 (0.444)	-0.293 (0.451)	-0.24 (0.494)		
Deal2015	-0.627 (0.439)	-0.619 (0.517)	-0.898 (0.55)		
Deal2016	0.296 (0.349)	0.303 (0.485)	0.209 (0.508)		
Deal2017	- -	- -	- -		
Constant	-0.230 (0.324)	-0.210 (0.981)	-1.336 (1.188)	-1.065 (0.841)	-0.341 (0.933)
N	191	191	191	191	191
Pseudo R ²	0.0306	0.0306	0.1418	0.1418	0.1286
Correctly classified	75.39%	75.39%	79.06%	74.87%	73.82%

Robust standard errors in parentheses

* p<0.10, ** p<0.05, *** p<0.01

Table A.4.3: Financial bidder probit regressions displaying all independent variables

	Dependent variable: Financial bidder				
	(1)	(2)	(3)	(4)	(5)
Investment bank			1.800*** (0.323)	1.644*** (0.282)	1.679*** (0.287)
Target initiated		0.170 (0.202)	-0.113 (0.215)	-0.038 (0.211)	-0.037 (0.210)
Credit spread		-0.137 (0.430)	-0.056 (0.472)	-0.004 (0.276)	-0.067 (0.274)
Long-term debt	-0.536 (0.520)	-0.588 (0.522)	-0.614 (0.509)	-0.607 (0.504)	-0.434 (0.462)
Profitability	0.377 (0.987)	0.436 (0.977)	0.164 (0.952)	0.469 (0.917)	0.867 (0.837)
Price to book	0.039* (0.021)	0.041* (0.021)	0.050*** (0.019)	0.041** (0.018)	0.033* (0.017)
R&D expense	-3.047** (1.396)	-2.978** (1.389)	-3.997*** (1.535)	-2.965** (1.409)	
Operating expense					-1.210** (0.500)

Industry	0.116 (0.212)	0.116 (0.212)	-0.009 (0.229)		
Deal2010	-0.229 (0.381)	-0.129 (0.5)	-0.098 (0.567)		
Deal2011	0.251 (0.482)	0.342 (0.584)	0.797 (0.551)		
Deal2012	-0.017 (0.351)	0.078 (0.554)	0.121 (0.586)		
Deal2013	0.125 (0.353)	0.173 (0.449)	0.279 (0.487)		
Deal2014	-0.642 (0.412)	-0.612 (0.423)	-0.591 (0.468)		
Deal2015	-0.578 (0.382)	-0.472 (0.492)	-0.773 (0.547)		
Deal2016	0.07 (0.34)	0.156 (0.471)	0.031 (0.508)		
Deal2017	- -	- -	- -		
Constant	-0.044 (0.311)	0.201 (0.959)	-1.175 (1.112)	-1.311 (0.818)	-0.270 (0.953)
N	191	191	191	191	191
Pseudo R ²	0.0266	0.0266	0.2040	0.2040	0.2045
Correctly classified	67.02%	67.54%	74.87%	70.16%	68.59%

Robust standard errors in parentheses

* p<0.10, ** p<0.05, *** p<0.01

Table A.4.4: Financial acquirer probit regressions with marginal effects

Dependent variable: Financial acquirer					
	(1)	(2)	(3)	(4)	(5)
Investment bank			0.375*** (0.079)	0.352*** (0.073)	0.384*** (0.077)
Target initiated		-0.000 (0.063)	-0.059 (0.057)	-0.043 (0.058)	-0.047 (0.062)
Credit spread		-0.003 (0.125)	0.013 (0.119)	-0.031 (0.072)	-0.051 (0.076)
Long-term debt	-0.209 (0.164)	-0.209 (0.165)	-0.194 (0.142)	-0.177 (0.141)	-0.093 (0.138)
Net Profit	0.079 (0.259)	0.079 (0.260)	-0.007 (0.226)	0.027 (0.230)	0.242 (0.220)
Price to book	0.012* (0.006)	0.012* (0.006)	0.011** (0.005)	0.009* (0.006)	0.007 (0.006)
R&D expense	-0.915** (0.395)	-0.914** (0.395)	-0.937** (0.370)	-1.019*** (0.341)	
Operating expense					-0.258** (0.128)
Year	Yes	Yes	Yes	No	No
Industry	Yes	Yes	Yes	No	No
N	191	191	191	191	190

We obtain marginal effects by using Marginal Effects at the Means.

Robust standard errors in parentheses.

* p<0.10, ** p<0.05, *** p<0.01

Table A.4.5: Financial bidder probit regressions with marginal effects

Dependent variable: Financial bidder					
	(1)	(2)	(3)	(4)	(5)
Investment bank			0.620*** (0.100)	0.584*** (0.093)	0.603*** (0.094)
Target initiated		0.063 (0.075)	-0.039 (0.074)	-0.014 (0.075)	-0.013 (0.075)
Credit spread		-0.051 (0.159)	-0.019 (0.163)	-0.001 (0.098)	-0.024 (0.098)
Long-term debt	-0.198 (0.191)	-0.218 (0.192)	-0.211 (0.174)	-0.216 (0.179)	-0.156 (0.166)
Net Profit	0.139 (0.366)	0.162 (0.363)	0.056 (0.328)	0.167 (0.327)	0.311 (0.301)
Price to book	0.015* (0.008)	0.015* (0.008)	0.017*** (0.006)	0.015** (0.006)	0.012** (0.006)
R&D expense	-1.128** (0.500)	-1.104** (0.499)	-1.377*** (0.494)	-1.054** (0.479)	
Operating expense					-0.434** (0.173)
Year	Yes	Yes	Yes	No	No
Industry	Yes	Yes	Yes	No	No
N	191	191	191	191	191

We obtain marginal effects by using Marginal Effects at the Means.

Robust standard errors in parentheses.

* p<0.10, ** p<0.05, *** p<0.01

A.5 Robustness

Table A.5.1: VIF-test for multicollinearity

OLS regressions			Financial acquirer probit	
Variables	Model (3)	Model (4)	Variables	Model (4)
R&D expense	2.93	2.93	R&D expense	1.61
Operating expense	2.60	2.60	Profitability	1.48
Cash	1.81	1.81	Price to book	1.12
Strategic stock or mixed payment		1.80		
Financial acquirer	1.67		Target initiated	1.08
Profitability	1.65	1.65		
Strategic all-cash	1.55	1.70	Credit spread	1.07
Leverage	1.48	1.48	Leverage	1.07
Investment bank	1.19	1.19	Investment bank	1.04
Price to book	1.18	1.18		
Target initiated	1.09	1.09		
Credit spread	1.08	1.08		
Mean VIF	1.62	1.68		1.21

Table A.5.2: Correlation matrix of key OLS regression variables

Correlation	Strategic all-cash	Strategic stock or mixed payment	Financial acquirer	Investment bank	Target initiated	Credit spread
Strategic all-cash	1					
Strategic stock or mixed payment	-0.577	1				
Financial acquirer	-0.533	-0.384	1			
Investment bank	-0.0960	-0.200	0.316	1		
Target initiated	0.0306	-0.0194	-0.0145	0.178	1	
Credit spread	0.122	-0.0912	-0.0433	0.0235	0.143	1

Table A.5.3: Correlation matrix of key probit regression variables

Correlation	Investment bank	R&D expense	Target initiated	Credit spread	Long-term debt	Net Profit	Price to book
Investment bank	1						
R&D expense	0.078	1					
Target initiated	0.178	0.066	1				
Credit spread	0.024	0.037	0.143	1			
Long-term debt	-0.023	-0.118	0.092	-0.155	1		
Net Profit	-0.008	-0.561	-0.0614	-0.015	-0.016	1	
Price to book	0.031	0.274	-0.069	-0.126	0.041	-0.138	1

Table A.5.4: Tests of regression models

		OLS model (3), (4)	Financial acquirer – probit (4)	Financial bidder – probit (4)
Breusch-Pagan / Cook-Weisberg test for heteroskedasticity	χ^2	79.80		
	$p > \chi^2$	0.000		
Ramsey Reset test	F(3, 174):	8.11		
	$p > F$:	0.000		
Link-test hat squared	t/z:	1.48	-0.54	0.53
	$p > t/z $:	0.14	0.592	0.60
Hosmer-Lemeshow goodness-of-fit test	χ^2 :		4.28	4.19
	$p > \chi^2$:		0.83	0.84

Plot A.5.5: Residual plot – OLS model (3)

