ROLES OF INFORMATION IN CORPORATE MERGERS, ACQUISITIONS AND INVESTMENTS

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Serif Aziz Simsir

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Serif Aziz Simsir, Ph. D.

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The goal of this dissertation is to show how information asymmetries among market participants affect the way they operate in the financial markets. The first chapter investigates deal initiation in the context of mergers and acquisitions. We use Securities Exchange Commission (SEC) documents of the merging firms in our sample to discover which side (acquirer or target) initiated the deal. Our analysis indicates that target firms receive substantially lower premiums when they initiate the merger: abnormal returns to target firm stocks around the merger announcement date are 12 percentage points lower in such deals. When premiums are calculated over a longer time period, this difference increases to 27 percentage points. We argue that the information asymmetries between merging firms is the primary reason for this finding. Alternative explanations, such as financial distress and liquidity hypotheses, are considered as well. Our findings also relate to acquirer returns, synergy gains from mergers, characteristics of firms involved in buyer- and seller-initiated deals and the effect of the Sarbanes-Oxley Act on premium differences across initiation groups.

The second chapter examines how information asymmetries within the set of outside investors influence the investment and financing decisions of firms. In our model, some investors have access to private level information which is not publicly available to others. We show that this external information asymmetry systematically influences the equilibrium stock price, which in turn affects firm's payoff from equity

financing. In particular, firms are better off with equity financing when the information asymmetry among the set of outside investors is low.

In the third chapter, we analyze past stock returns of the merging firms, and examine their role in explaining abnormal returns around the announcement of the merger to the public. We provide several hypotheses that link these two return variables, and discuss their relevance in our context.

BIOGRAPHICAL SKETCH

Serif Aziz Simsir began his doctoral studies in the Department of Economics at Cornell University in the Fall of 2003. His research interests are in Corporate Finance and Information Economics. His committee members are Robert T. Masson (chair), Yaniv Grinstein and Yongmiao Hong.

Aziz graduated from Marmara University in 2000 with a B.S. degree in Industrial Engineering. In 2002, he earned his M.A. degree in Economics from Sabanci University.

Bu doktora tezi babam Orhan Şimşir, annem Jale Şimşir, kardeşim Muzaffer Şimşir, anneannem Fikret Atasay ve rahmetli büyükbabam Muzaffer Atasay'a ithaf edilmiştir.

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CHAPTER 1

THE INFORMATION CONTENT OF DEAL INITIATION IN MERGERS AND ACQUISITIONS

1.1 Introduction

Hypothetical Scenario 1: In February 2007, after a discussion with several board members, Gordon Gekko, CEO of Teldar Paper Inc., contacted representatives of the company's investment bank, Sterling Group, to explore strategic opportunities. On February 27, 2007, Mr. Gekko authorized Sterling to approach several companies on his company's behalf in order to assess their interest in acquiring Teldar. During the first week of March 2007, Sterling contacted 10 parties, including Bud Fox, CEO of Fox Enterprises, to solicit interest in a possible strategic transaction with Teldar.

Hypothetical Scenario 2: On February 27, 2007, Bud Fox, CEO of Fox Enterprises, contacted Mr. Gekko, CEO of Teldar Paper Inc., to arrange a meeting on March 10, 2007, in New York. At that meeting, Mr. Fox indicated that Fox Enterprises would be interested in learning more about Teldar's business in order to assess interest in a possible business combination with Fox Enterprises. Mr. Fox and Mr. Gekko spoke several times throughout the month and Mr. Fox expressed interest in acquiring Teldar[1].

Which of these hypothetical scenarios would result in Teldar Paper getting a higher offer price from Fox Enterprises? In the first, Teldar decides to sell its business for an unspecified reason. For that purpose, the CEO contacts potential buyers through an investment bank. In the second, Teldar receives an unsolicited offer from Fox,

[1] The scenarios described are not based on factual information.

though Teldar has no prior plans of selling its business.

This paper analyzes the relation between deal initiation decisions of merging firms and the corresponding market reaction to their stock price at the time of the deal announcement. We argue that there is an information asymmetry between buyers and sellers on the quality of the target firm, and that initiation decisions are signals of this quality. This adverse selection problem leads buyers to downgrade their valuation of the targets when target firms initiate the deal. In the Teldar-Fox example above, we therefore expect Teldar to get larger premiums in the case in which Fox initiates the merger (Scenario 2).

Existing merger databases, such as SDC Platinum (SDC), do not record which party initiated the deal. Using the Electronic Data Gathering, Analysis and Retrieval (EDGAR) system, we search the Securities Exchange Commission (SEC) filings of the merging parties (DEFM14A, TO-T, S-4 documents) to find a sample of mergers for which we can identify the deal initiator. It is not possible to locate this information for every merger, for various reasons, including missing documents, very complicated deal histories, etc., though we are able to identify 260 buyer-initiated deals and 183 seller-initiated deals between 1997 and 2006.

We find that, at the time of the merger announcement to the public, target firms experience an average of 12 percentage point higher abnormal returns in buyer-initiated deals, than in seller-initiated deals. When the return premiums are calculated over a longer time period, this difference jumps to 27 percentage points (both numbers are statistically significant at the 1% level). For a median-sized target firm in our sample ($173 million), these percentages amount to $20.7 million and $46.7 million, respectively.

In addition to the information asymmetry hypothesis, we also consider the conjecture that firms in financial distress tend to search for potential buyers of their

businesses. It is conceivable that the managers are more likely to initiate merger talks and sell their companies at a discount in distressed times, as shareholders and managers face significant costs when their firms go bankrupt. Also, even if the firms themselves are not in financial distress, major shareholders could have liquidity motives to sell their companies. Our findings indicate that target firms are indeed financially weaker in seller-initiated deals than in buyer-initiated deals, but the reality of being in financial distress has no effect on premiums paid.

While target firms are paid significantly more in buyer-initiated deals, we find no evidence of overpayment by the buyer firms. The abnormal returns to buyer firms' stock at the announcement of the merger are -2% in both initiation groups. Synergies resulting from the merger show significant differences across initiation groups; +2.8% in buyer-initiated deals and +0.3% in seller-initiated deals. We also identify factors helping to explain deal initiation decisions by firms. Liquid (high cash holdings), large and high return-on-equity buyer firms tend to initiate deals more often. On the other hand, smaller target firms put themselves up for sale more frequently. Initiation has a weak power in predicting whether the announced deal will close successfully. However, controlling for other deal and financial firm characteristics, we find that seller initiation increases the chances of a successful close. Finally, we examine whether the differences in target firm premiums change over time. Multivariate analysis implies diminishing bid premium differences across initiation groups after 2002. Here, we discuss the potential effect of the Sarbanes Oxley Act of 2002 (SOX) in explaining this finding.

The concept of deal initiation in mergers and acquisitions is important for several reasons. Some readers may have strong prior beliefs that buyer-initiated deals imply higher premiums paid to target firms. The results in this paper confirm and quantify this conjecture. Using a hand-collected dataset, we measure the significance and

persistence of these premium differences. Second, this paper provides a fresh perspective on value creation and wealth transfers resulting from M&A's by examining the microstructure of the takeover market. Mergers and acquisitions are very significant events in their ability to reallocate capital among investors. This paper helps to identify which types of mergers create the most value and examines the nature of wealth transfers during this reallocation. Finally, we believe that an understanding of deal initiation could help to explain several other aspects of the merger process and raise interesting questions about the existing findings in the literature. These potential extensions and research questions are discussed in the conclusion.

The paper is organized as follows. In Section 1.2, we explain the hypotheses on the relationship between initiation decisions and abnormal returns to the target firms. Section 1.3 discusses relevant papers in the literature. Dataset formation and construction of variables is explained in Section 1.4. In Sections 1.5, 1.6 and 1.7, we analyze the power of initiation variables in explaining target premiums, buyer abnormal returns and synergistic gains, respectively. Section 1.8 identifies the types of firms involved in buyer- or seller-initiated deals. Section 1.9 of the paper has four parts. In the first part, we show that the difference in target firm premiums is not due to information leakage. In the second part, we analyze the predictive power of initiation for deal closing. Heterogeneity issues in our sample are discussed in part three of Section 1.9. The last section analyzes the effects of SOX on target firm premiums. Section 1.10 concludes.

1.2 Hypotheses

The first hypothesis is built on the theory relating to lemons markets. As stated in Genesove (1993), a market exhibits the Akerlof (1970) variety of adverse selection

under four conditions:

(i) Sellers know more about the quality of the good than buyers. This paper considers the market for firms. Sellers of firms, including target firm managers and advisors, have private information on the characteristics of their firms and thus assess the quality of their firms most accurately. Even though buyer firm managers have access to public data in the initial stages of merger talks, as well as private data in the due diligence process, target firm managers still possess superior information, such as unreported projections.

(ii) Both buyers and sellers value quality. The goods sold in this market, shares of firms, are investment goods. The expected rate of return on high quality firms is larger than low quality firms, and high rates of return are desired by every investor, *ceteris paribus*.

(iii) Prices are not determined by sellers. In the takeover market, price is most frequently determined by negotiation between the merging firms. However, even if the number of buyer firms negotiating with a target firm is low, there is outside competitive pressure. That is, target firms have outside options to start talks with other buyer firms, making the market competitive[2]. The extreme case is formal auctions, where prices are set by buyers.

(iv) Institutions do not eliminate the information asymmetry problem (e.g. warranties and standardizations cannot fully protect the buyer). While some merger agreements involve the use of representations and warranties that survive deal closing and result in indemnification in the case of a breach by one the merging firms, associated costs (both legal and time) make their use limited. Earnouts, defined as the portion of payment contingent upon post-merger performance of the target firm, have the potential to help alleviate the information asymmetry between the merging parties.

[2] Aktas, De Bodt, and Roll (2008).

However, the costs of using these tools are significantly higher in the acquisition of publicly traded target firms, as the ownership of such firms is quite dispersed.

We argue that there is an information asymmetry between the merging firms and that their initiation decisions are important signals, as they reflect hidden information. For example, a seller-initiated deal may raise questions about the motivations for the sale. Buyer firm managers will naturally ask: Why is this company selling itself? Are there problems we are unaware of? What are the immediate obstacles to operating independently? Are they overvalued? In effect, the suspicion that the target firm is a lemon leads the buyer to discount the price it is willing to pay[3]. On the other hand, in buyer-initiated deals, target firms have no prior intentions of being sold. The buyer firm simply approaches the target firm and asks if the target firm is interested in a take over. The likelihood of a target turning out to be a lemon is much less when a buyer chooses a firm and proposes a deal.

The same type of information asymmetry arguments are discussed in the management literature. Kitching (1973)'s survey data covers 407 acquisitions made in European countries between 1965 and 1970. The survey was administered to buyer firm managers who completed at least one acquisition during this period. Combining this survey with financial and accounting data, the author identifies several factors affecting the success of an acquisition. One of these factors, "availability of the target firm", has an adverse effect on the success of the merger. That is, if the acquisition is made because the target firm was available, then the deal is more likely to be classified as a failure. Kitching explains this finding as follows: "If you buy a company because it approaches you ('company was available'), you are more likely to

[3] While selling decisions of target firms could signal bad news to buyer firms, there might be innocent and verifiable reasons for selling a business, such as retirement of a major shareholder in private firms, inability to access capital that is needed to expand, etc. However, we believe that these motivations are relatively rare in established publicly traded companies, which fully compose our dataset.

have a 'lemon' on your hands than a 'superstar'"[4].

When target shareholders approve a merger, they agree to sell their equity to the buyer firm all together. In that sense, this process resembles procedures in investment financing. There are significant differences between the two cases, though they both involve selling stock in the market. In the investment financing case, Myers and Majluf (1984) argue that only overvalued (lemon) firms issue equity, as the information asymmetry between firm managers and outside investors causes a discount in the stock prices of firms. High quality firms do not sell equity at a discount, preferring other sources of financing. If we apply the same argument to the takeover market, the party that shows a willingness to sell at the current market prices (target firms in seller-initiated deals) should be, on average, of lower quality. Therefore, premiums paid to such target firms are expected to be less than those for buyer-initiated deals[5].

There could be alternative explanations for our findings on premium differences across initiation groups. There is evidence in the literature that fire sales, as well as liquidity-motivated asset sales, are completed at lower premiums [Shleifer and Vishny (1992), Pulvino (1998), Officer (2007)]. Therefore, the liquidity needs of major shareholders in target firms could be a reason for observing lower premiums in seller-initiated deals. This liquidity hypothesis claims that, if a major shareholder or the sole owner of a firm faces a liquidity crisis, they could decide to sell the firm as quickly as possible. Their need for immediate liquidity could entail a relative discount on the fundamental value of the firm's assets. However, adapting the liquidity hypothesis to

[4] Kitching (1973), Chapter 5, page 188.

[5] Up to this point, we assumed that sellers know more about their business than buyers. In some cases, the reverse could also be true. When a buyer approaches a target firm for a merger, the target firm could question the reasons for buyer firm's interest: Why are they interested in buying us? Do they know something about our products/industry that we do not know? This could lead the target firm to ask a higher price in the negotiation process, implying the same premium difference across initiation types.

deal initiation is not obvious. An important condition must be met for the liquidity theory to apply to deal initiation: the shareholders in a liquidity crisis should have the power to sell the company. They are either majority shareholders with more than 50% of the stock, so that their decision to liquidate their position amounts to a sale of the company, or they are minority shareholders who can convince other shareholders to do so. As a proxy for liquidity needs for such shareholders, we use Venture Capital (VC)/Private Equity (PE) fund information in the SDC database. This results in a very small number of observations (24 out of 947 deals), as VC/PE funds tend to have stakes primarily in private firms, rather than in public. Hence, measuring the liquidity needs of shareholders is a major obstacle in testing the liquidity hypothesis.

It is also possible that none of the shareholders experience a liquidity crisis, but that the firm itself does. The managers and shareholders of financially distressed firms face significant uncertainty about the fate of their firms. Thus, they can choose to avoid the costs of bankruptcy by selling the firm to a willing acquirer at a relative discount. As discussed in Bris, Welch, and Zhu (2006), these costs, such as the time spent in bankruptcy, the change in the value of the firm's assets over this period, attorney and accountant fees, etc., could amount to a significant portion of the firm's assets. While these costs incentivize both shareholders and managers to make an exit through an acquisition, the incentives of managers could be much stronger for an acquisition, as human capital risk is much harder to diversify. Such employment risks are studied in Gilson (1989), who report a higher turnover of senior management in financially distressed firms. In addition, the benefits of being taken over can provide incentives by itself [Hartzell, Ofek, Yermack (2004)]. We call this view the financial distress hypothesis.

Both the information asymmetry and financial distress hypotheses predict lower premiums paid to target firms in seller-initiated deals. If the information asymmetry

hypothesis is more relevant, we should observe premium differences for both financially distressed and liquid targets. If the financial distress hypothesis is correct, we should not. This will be our primary method to test the power of these hypotheses.

1.3 Related literature

Our study contributes to the empirical corporate finance literature in several ways. Most importantly, we are not aware of any other paper analyzing deal initiation in the context of mergers and acquisitions. The market microstructure literature has enjoyed the availability of trade initiation data in the last few decades, thanks to tick tests, resulting in a significant number of published papers. Even though the nature of intraday data (including quality and quantity) cannot be compared to the merger data, it provides a rough counterpart to our initiation-data-added merger database. Second, our analysis provides a direct test for Akerlof's lemons market theory. The papers in the economics literature compare the prices of traded goods to those of goods not traded, as a price differential among these groups is an implication of the theory[6]. Since traded (sold) target firms receive a control premium, and target firms not traded do not, it is impossible to follow the same route in this case. However, dividing the sample of traded target firms by willingness to trade (initiation decisions) eliminates the problem and yields an alternative test to the lemons market theory.

Conceptually, the work most similar to ours is Oler and Smith (2008). In this recent working paper, the authors identify firms that publicly express interest in being taken over (labeled as "take-me-over", or TMO firms) and analyze their characteristics. They argue that firms anticipating or experiencing financial distress

[6] Genesove (1993) analyze the used car market, Chezum and Wimmer (1997) the thoroughbred yearlings market and Gilligan (2004) the used aircraft market.

look for a potential buyer first, and if these private negotiations fail to produce any such acquirer, firms publicly announce their willingness to be sold. The authors find that (i) these TMO firms tend to be financially stressed or pre-stressed compared to their benchmarks, (ii) making a TMO announcement increases the likelihood of receiving an offer, (iii) TMO firms underperform in the year after the TMO announcement, and (iv) firms that announce TMO experience positive abnormal returns provided that they are eventually taken over. Besides dissimilarities in methodologies and datasets, there are two main differences between this work and ours. First, there is a loose relation between initiation and TMO announcement decisions. While a TMO firm is more likely to initiate a deal, seller-initiated deals do not necessarily result in TMO announcements. As recognized by the authors, private negotiating processes, which include initiation decisions, typically precede TMO announcements. Second, our study analyzes buy and sell sides of the merger process, while TMO analysis focuses primarily on the sell side.

Another related paper is Boone and Mulherin (2007), who differentiate between public and private measures of competition in the takeover market. The authors note that competition proxies reported in the merger databases (such as SDC) are misleading, as they indicate the number of bidders competing for the target firm around the public announcement of the deal to the public. They argue that the major negotiating processes take place privately, well before this public announcement is made. Using SEC documents of merging firms, they learn whether there is private competition in the first stages of the merger talks. In an "auction" the target firm is in touch with multiple bidder firms, while in a "negotiation", the target firm is in touch with only one. As we explain in detail in the next section, our classification of deal initiation is not tightly related to the level of private or public competition. A seller could initiate a deal with the buyer without contacting other bidders. On the other

hand, in a buyer-initiated deal, the seller firm could subsequently decide to contact other parties. Therefore, there is not a one-to-one relation between the two measures.

A third branch of literature relates diversity of opinion and information asymmetry measures to acquirer and target firm returns. Moeller, Schlingemann, and Stulz (2007) show that abnormal returns to the acquiring firm are lower in equity deals when information asymmetries and diversity of opinion proxies for the acquirer are high. Cheng, Li, and Tong (2008) and Chatterjee, John, and Yan (2008) examine the information asymmetry measures of public target firms and relate them to target firm abnormal returns. They find that opaque and high diversity of opinion types of target firms (high information asymmetries) experience higher abnormal returns the day the merger is announced to the public. Note here that the proxies used in these papers measure also the information asymmetries between the firms and the market. In our setup, the initiation decision is a private signal to the merging firms at the beginning of merger negotiations, and it does not involve outside investors. Therefore, the nature of the information asymmetries in our paper is different than in these two papers.

Direct information asymmetries between buyer and target firms are explored in two papers that discuss the use of earnouts in mergers. Datar, Frankel, and Wolfson (2001) and Kohers and Ang (2000) argue that merging firms can share risk by using contingent payments, especially when the information asymmetries between them are significantly high. As the authors recognize, the use of earnouts in the acquisition of public targets is quite limited[7], as the ownership dispersion in public firms increases costs (renegotiation, potential lawsuits, etc.) associated with the use of earnouts. Since our sample includes only public targets, we are unable to match our analysis to theirs. However, if the use of earnouts were common in public targets, we would expect more frequent use of earnouts in seller-initiated deals than in buyer-initiated deals.

[7] Only 1 deal in our sample involves with an earnout payment.

Even though deal initiation has not been studied before in the M&A literature, the market microstructure literature has successfully used the trade initiation concept in uncovering facts and testing theories about the mechanics of the stock market. The original form of the intraday data, which is the primary source of information for most empirical microstructure papers, does not specify whether an executed trade is a result of a buy or a sell order. However, trades can be classified as buyer- or seller-initiated through the use of tick tests[8]. Learning whether a trade is a result of a buy or sell order helps to investigate interesting topics. One such topic relevant to our paper is the effect of large-block transactions on stock prices[9]. Although there are significant dissimilarities between the two types of trades[10], deals in the takeover market could be viewed simply as block trades executed at a much larger scale. Keim and Madhavan (1996) show that the average price impact for a seller-initiated block trade is -4.32%, while it is +2.8% for a buyer-initiated block trade[11]. In their theoretical model, the actions of an informed trader with private information about the future stock payoff, is observed by all market participants. If the informed trader initiates a buy (sell) order, market participants infer that the private information that the informed trader possesses is positive (negative). Therefore, deal initiation carries brand new information about the stock payoff and permanently affects the stock price. From this perspective, our paper is analogous to theirs. We also claim that the private information possessed by merging parties is revealed through their deal initiation decisions.

[8] Lee and Ready (1991).
[9] A block trade is often defined as a trade of 10,000 or more shares at one time.
[10] For example, control rights (mergers result in a change of control), liquidity (blocks can be traded in a centralized stock market) and regulation (regulatory approval is needed in some merger deals).
[11] Price impact is defined as the ratio of the stock price one day after the block transaction divided by the stock price one week before.

1.4 Data

1.4.1 Sample formation

The merger, accounting and return data come from SDC, Standard & Poor's COMPUSTAT and Center for Research in Security Prices (CRSP) databases, respectively. The first step is to identify the M&A deals that are used in this analysis. The following restrictions are imposed in the SDC database:

- 'Deal value' is greater than $5 million;
- Both the acquirer and the target are public companies located in the US;
- The form of transaction is either 'merger', or 'acquisition of majority interest';
- The deal status is 'completed' or 'withdrawn';
- No financial or utility firms – for either acquirer or target firms; and
- Announcement of the deal falls in between 1/1/1997 and 12/31/2006.

The deal size restriction is to exclude very small firms from our analysis. Only US acquirers and targets are included in the sample (in order to find the initiation data from their SEC filings easily). Private targets are excluded from the sample, as price data are not available for such firms. The form of acquisition is restricted to the above criteria, to make it clear that the merger substantially changes the ownership of the merging firms. The sample includes completed and withdrawn deals. Financial and utility firms are also excluded from our sample, as accounting structures of financial firms differ from non-financials, and utilities in the US are mostly regulated. Finally, the sample consists of deals that are announced to the public between 1997 and 2006. As of May 6, 1996, all public companies are required to make their filings through EDGAR. We start our sample at the beginning of the calendar year (1997) following this date.

Then, these filtered SDC data are matched with the CRSP and COMPUSTAT

databases, which yield a total of 947 data points. As a last step, we use the EDGAR database to search for the company filings for either the buyer firm or the target firm, to get the initiation data for each deal. If they exist, the initiation data are in the "Background of the Merger"[12] section of the following documents:[13]

- DEFM14A, definitive proxy statements relating to mergers and acquisitions;
- PREM14A, preliminary proxy statements relating to mergers and acquisitions;
- 14D9, tender offer solicitation/reco. statements filed under Rule 14-d9;
- TO-T, third party tender offer statements; and
- S-4, registration of securities issued in business combination transactions.

The background section summarizes past contact and negotiation between the buyer and the target firm, such as who the initiator of the merger is, how the managers of the firms first met, how the negotiations proceeded, what decisions the board of directors took, which investment banks were hired, etc.

Even though the official SEC documents do not explicitly state the hidden agendas of merging firms, they are quite accurate in defining the actions taken during the takeover process. Our main source for determining the deal initiator mostly comes from the actions taken by these parties. If a target is interested in selling itself, then it considers "strategic alternatives" to operating as an independent company and typically hires an investment bank to evaluate its options. Then, this target firm directly, or through its investment bank, contacts potential buyer(s) and solicits interest for its business. In this type of deal, target firms have intentions of selling themselves without any prior offer from a bidder, and hence we designate these as "seller-initiated". In a typical "buyer-initiated" deal, the target firm does not have any

[12] If the background section is missing, the "Material Contacts and Board Deliberations" section has this information.
[13] Source: www.sec.gov. The SEC documents are filed before the deal closing. Therefore, it is possible that merging firms file documents with the SEC, but fail to close the deal. This means that we have the initiation information for both completed and withdrawn deals, conditional on data availability.

prior intentions of selling its business. A buyer firm, or their investment bank, approaches the top management of the target firm and expresses interest in a "strategic combination" with the firm. Target firm management then takes this offer to the board of directors and responds to the buyer firm with their decision. In some cases, target firms negotiate with the offering buyer firm on a one-to-one basis and end up being bought, and in some cases, they contact other firms that might be interested in a combination with the target firm. If a target firm is eventually bought by the buyer that made the very first offer, even if there were other bidders involved in the process, we classify it as a "buyer-initiated" deal.

Unfortunately, initiation information is not available for each deal in our sample. In 96 deals, merging firms did not file documents with SEC, and in 408, we are unable to discern which party initiated the deal, even though merging firms filed documents with the SEC. Therefore, a total of 504 deals (out of 947) in our sample do not have initiation information[14] [15].

In cases where the initiation information cannot be found, the history of negotiations is quite complicated. There are instances in which a third party (usually another bidder) is involved in the process, which makes initiation ambiguous. For example, a target receives an unsolicited offer from Firm A and then hires an investment bank that contacts potential buyers for the target, and the target firm ends up merging with Firm B. In this case, the initiation is not clear. Firm A's initial contact leads the target firm to initiate the deal with Firm B, so it cannot be classified as a seller-initiated deal. Similarly, it cannot be classified as a buyer-initiated deal, as Firm A does not merge with the target. There are other cases where the intentions of the

[14] In Section 1.9.3, we explain the source of missing data, and compare initiation and no-initiation groups.

[15] In several deals, investment banks initiate talks between the merging firms. Since neither firm has prior intentions to merge, we do not classify these types of deals as buyer- or seller-initiated.

merging firms are unclear. The SEC document could read "The CEO's of Firm K and Firm L met in an industry convention and discussed the merits of a business combination involving the two companies". That sentence does not designate any of the firms as a deal initiator. Therefore, we drop these types of transactions from the dataset and only focus on cases in which the buyer firm clearly initiates contact with the target and ends up buying it, or the target firm initiates contact with the buyer and ends up being bought by it. The former is classified as a buyer-initiated deal, and the latter is classified as a seller-initiated deal.

1.4.2 Construction of variables

We categorize our variables into three groups: return variables, initiation variables, and deal and financial characteristics of the merging firms. Variable names are italicized throughout the text.

1.4.2.1 Return variables

To measure the impact of the merger on the market valuation of the merging firms, we calculate, using the market model[16], abnormal returns to the acquirer and the target stock around the announcement date. We use a 5-day event window size, over (-2,+2), to calculate the abnormal returns[17]. The return variables are denoted by *a_CAR* and *t_CAR* for the acquirer and target firm, respectively.

The market reaction at the time of the merger announcement does not necessarily reflect the change in the target shareholder's wealth. For example, if the market

[16] We estimate market model parameters over (-316,-64) relative to the event day.
[17] We also tried 3- and 11-day event window sizes. All of the results in this paper are robust to the choice of the event window size.

anticipates the merger announcement, arbitrage activity could drive the price of the target firm up prior to the announcement. Therefore, the event day abnormal returns may not fully reflect the wealth effect of the merger on the target firm shareholders. As an alternative measure, we define bid premium (*bidpremium*) as the buy-and-hold[18] abnormal returns in the target firm stock starting 63 trading days before the event date and ending at the deal closing date. If the deal is not completed, we truncate the period at +126 days[19].

To estimate the synergies created from the merger, we take the weighted average of buyer and target firm CAR's, with the weights being determined by the market value of equity of the buyer and target firms 6 trading days before the announcement of the merger (*synergy*).

It is possible that there is more publicity involved in seller-initiated deals, as target firms or their investment banks usually contact many parties while searching for potential acquirers. This might decrease the surprise component of the market reaction to the announcement of the merger. We calculate the run-up in the merging firms' stock prices over the (-63,-6) period to capture information leakages before the merger announcement (*t_runup*).

We explain in Appendix A.1 the details of the market model, as well as the construction of the variable *bidpremium*.

1.4.2.2 Initiation variables

Our sample consists of 947 observations. For the reasons stated earlier, 504 of them do

[18] The term "buy-and-hold" is more intuitive for post-merger abnormal return calculations, after the merging firms are identified. We use this term to distinguish it from the abnormal returns calculated from the market model.

[19] Roughly 6 months. This restriction binds for mostly withdrawn deals, as completed deals typically close well before +126 days.

not have initiation information; these observations cannot be identified as buyer- or seller-initiated. These unclassified observations could actually be buyer-initiated, seller-initiated, neither or both, but due to the lack of information in their SEC documents (or they do not even have SEC documents), they cannot be properly classified. For these reasons, we create three different initiation dummy variables: *initiation_b* takes a value of 1 if the deal is buyer-initiated and 0 otherwise, *initiation_s* takes a value of 1 if the deal is seller-initiated and 0 otherwise, and *initiation* takes a value of 1 if the deal is buyer-initiated and 0 if seller-initiated.

1.4.2.3 Deal and financial characteristics

Short term market reactions to the announcement of mergers have been extensively examined in the M&A literature, to assess the resulting wealth creation or transfer from mergers. Several firm and deal characteristics are shown to influence cross sections of abnormal returns of merging firms. The list of factors include deal characteristics such as the method of payment [Travlos (1987), Chang (1988)], form of acquisition [Jensen and Ruback (1983), Huang and Walkling (1987)], asset relatedness [Morck, Shleifer, and Vishny (1990)], hostility [Schwert (2000)], competition [Bradley, Desai, and Kim (1988)], relative size [Asquith, Bruner, and Mullins (1983)], toehold [Betton and Eckbo (2000)], termination fees [Officer (2003)], and financial characteristics of the merging firms such as Tobin's Q [Lang, Stulz, and Walkling (1991) and Servaes (1991)], leverage [Maloney, McCormick, and Mitchell (1993)], cash flow [Lang, Stulz, and Walkling (1989)], cash holdings [Harford (1999)], and size [Moeller, Schlingemann, and Stulz (2004)].

In addition to the variables above, our analysis includes sales growth, price/earnings, return on equity, R&D, capital expenditures and dividend/price ratios

of the merging firms[20]. We keep the set of control variables large so that initiation dummies do not capture the effects of omitted variables. To test the relevance of the financial distress hypothesis, we compute liquidity, Altman's Z [Altman (1968)] and current ratios of target firms. For the liquidity hypothesis, we create dummy variables to capture significant family and VC/PE ownership in target firms. In Appendix A.2, we explain how the set of deal and financial characteristics are constructed using SDC and COMPUSTAT data.

1.4.3 Data summary

In Table 1.1, we summarize return, initiation, deal and financial variables. 59% of the identified deals are initiated by buyer firms. This percentage drops to 28% if unidentified deals are included in the sample. These numbers do not show a great variation in the time series; only in the years 2001 and 2003 do seller-initiated deals outnumber buyer-initiated deals. The number of buyer and seller-initiated deals with respect to years is displayed in Figure 1.1.

[20] For a discussion of the financial characteristics of the merging firms, see Sorensen (2000). Sales growth, R&D and capital expenditures proxy for merging firm's future growth opportunities.

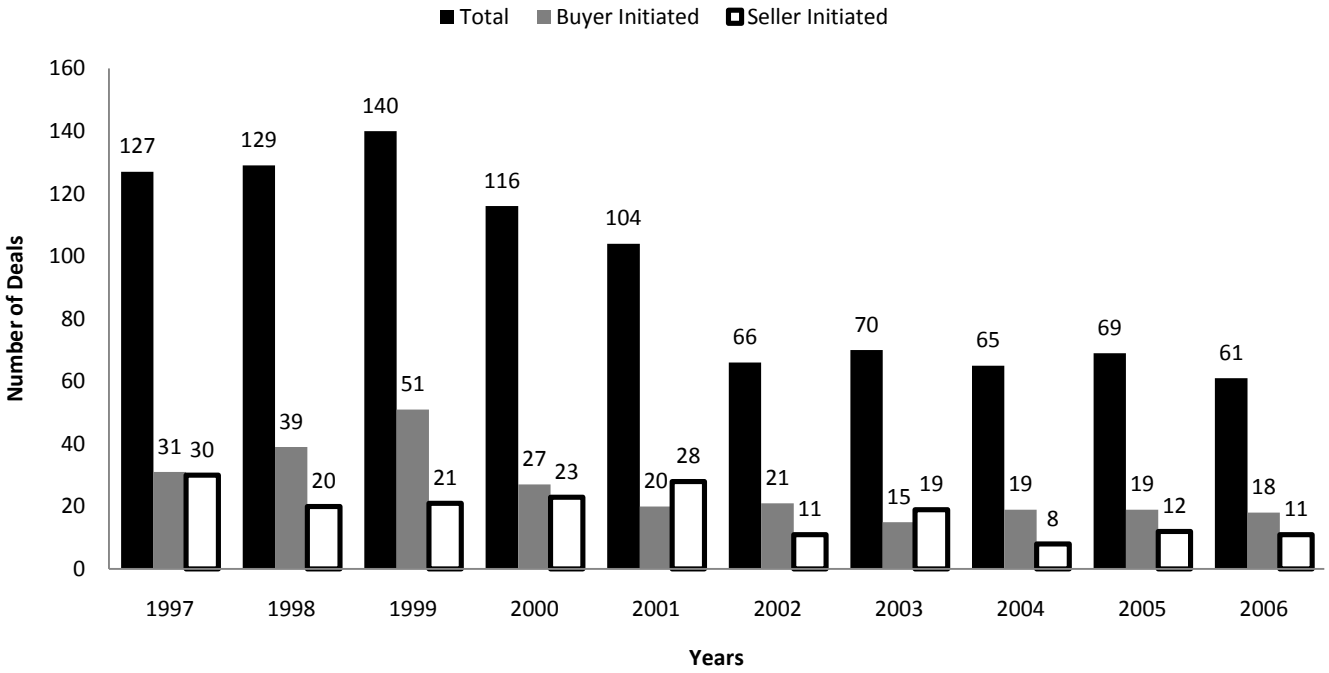

Figure 1.1
Deal Initiation with respect to years.

This figure shows the distribution of buyer- and seller-initiated deals over years. We draw our sample from the SDC database using the following restrictions: deal value is greater than $5 million, both acquirer and target are public firms located in the US, form of transaction is either 'merger' or 'acquisition of majority interest', deal status is 'completed' or 'withdrawn', no financial or utility firms and the deal announcement date falls in between 1/1/1997 and 12/31/2006. This sample is then matched with CRSP and COMPUSTAT databases. Deal initiation data comes from the SEC filings of the merging firms.

A comparison of buyer and target firm financial characteristics reveals that buyer firms are financially stronger than target firms. Buyer firms are larger, and they have higher cash flow, sales growth, Tobin's Q, return on equity and price earnings ratios than target firms. The average CAR to buyer (target) firm stock around the announcement date of the merger is -2% (+24.6%), and the weighted average of these percentages, synergies, is +2.1%. When a longer time period is used to measure premiums, target firm stock prices appreciate an average of 42.5%. Finally, the average run-up in target firms' stock price is 9%.

Table 1.1
Descriptive statistics

We draw our sample from the SDC database using the following restrictions: deal value is greater than $5 million, both acquirer and target are public firms located in the US, form of transaction is either 'merger' or 'acquisition of majority interest', deal status is 'completed' or 'withdrawn', no financial or utility firms and the deal announcement date falls in between 1/1/1997 and 12/31/2006. This sample is then matched with CRSP and COMPUSTAT databases. Deal initiation data comes from the SEC filings of the merging firms. a_*CAR* (*t_CAR*) is the abnormal returns to the acquirer (target) firm centered 5 days around the announcement of the merger. *synergy* is defined as the weighted average of buyer and target firm abnormal returns, where weights are determined by the market value of buyer and target firm equity calculated 6 trading days before the announcement of the merger. *t_runup* is the abnormal returns to target firm stock over (-63,-6). The normal returns are calculated using the market model with an estimation window of (-316,-64). *bidpremium* is the buy-and-hold return of the target firm stock starting at day -63 and ending at the deal closing day (or +126, if closing day is greater than +126). *initiation* is 1 if the deal is classified as buyer-initiated, and 0 if seller-initiated. *initiation_b* is 1 if the deal is buyer-initiated and 0 otherwise. *initiation_s* is 1 if the deal is seller-initiated and 0 otherwise. Due to space limitations, the definition and calculation of deal and financial variables are explained in Appendix A.2.

	N	mean	median	std. dev	min	max
PANEL A. RETURN VARIABLES						
a_CAR	947	-0.020	-0.015	0.108	-0.848	0.696
t_CAR	947	0.246	0.201	0.285	-0.770	2.638
synergy	947	0.021	0.007	0.173	-0.337	4.227
bidpremium	947	0.425	0.332	0.726	-1.065	7.880
t_runup	947	0.090	0.065	0.372	-2.276	2.293
PANEL B. INITIATION VARIABLES						
initiation	443	0.587	1	0.493	0	1
initiation_b	947	0.275	0	0.447	0	1
initiation_s	947	0.193	0	0.395	0	1
PANEL C. DEAL CHARACTERISTICS						
percentcash	947	0.404	0.179	0.441	0	1
tender	947	0.227	0	0.419	0	1
asset_related	947	0.644	1	0.479	0	1
hostile	947	0.027	0	0.163	0	1
unsolicited	947	0.072	0	0.258	0	1
competition	947	0.088	0	0.283	0	1
completed	947	0.879	1	0.327	0	1
rel_size	945	0.265	0.125	0.399	0	4.953
toehold	947	0.032	0	0.175	0	1.000

Table 1.1 continued

a_termfee	945	0.004	0	0.011	0	0.092
t_termfee	926	0.049	0.042	0.067	0	1.051
financial_seller	946	0.025	0	0.157	0	1.000
family_seller	946	0.001	0	0.033	0	1.000
PANEL D. BUYER CHARACTERISTICS						
a_tobinq	947	2.835	1.945	3.596	0.213	58.041
a_booklev	947	0.458	0.449	0.237	-0.040	1.973
a_cashflow	918	0.072	0.093	0.168	-2.528	0.556
a_salesgrowth	910	0.305	0.124	0.736	-0.901	7.198
a_mvequity	947	19,601.24	2,093.73	55,235.42	7.810	615,078.6
a_liquidity	947	0.475	0.475	0.234	0	0.983
a_PE	915	19.240	18.730	40.130	-195.40	198.330
a_ROE	910	0.065	0.125	0.534	-4.580	4.380
a_R&D	932	0.061	0.028	0.107	0	1.846
a_capex	947	0.062	0.042	0.074	0	0.885
a_dividend	947	0.005	0.000	0.011	0	0.124
PANEL E. TARGET CHARACTERISTICS						
t_tobinq	931	2.137	1.496	2.180	0.123	28.395
t_book_lev	931	0.452	0.421	0.279	0	2.964
t_cashflow	873	-0.007	0.066	0.265	-2.289	0.555
t_salesgrowth	879	0.196	0.087	0.563	-1.000	3.531
t_mvequity	947	1,230.902	173.38	5,019.97	1.48	76,595.34
t_liquidity	931	0.558	0.591	0.257	0	0.995
t_cash	931	0.240	0.130	0.250	0	0.960
t_current	912	3.140	2.240	3.220	0.130	40.650
t_Altmanz	904	5.074	3.098	11.069	-26.074	153.839
t_PE	869	9.260	9.940	27.480	-98.570	99.010
t_ROE	881	-0.050	0.038	0.547	-4.708	4.744
t_R&D	920	0.092	0.028	0.149	0	1.274
t_capex	931	0.063	0.043	0.075	0	0.991
t_dividend	947	0.003	0	0.010	0	0.156

We compare deal and financial variable means across initiation groups in Table 1.2. *hostile* and *unsolicited* variable means are significantly higher in buyer-initiated deals[21]. Note a deal is classified as hostile in the SDC database if the deal is unsolicited and target management resists the offer. Therefore, *hostile* is a subset of *unsolicited*[22]. The variables *unsolicited* and *initiation* are positively correlated;

[21] In theory, there should be no unsolicited or hostile deals in the seller-initiated group. The mean for the unsolicited variable in Table 1.2 is 0.0054, meaning that 1 seller-initiated deal out of 183 is classified as unsolicited. We checked the SEC documents of the merging firms for this deal and did not find any reason as to why SDC classifies it as unsolicited.

[22] Another important point with the *unsolicited* and *hostile* variables is that the occurrence of these events is infrequent, compared to other time periods. For example, around 10% of the sample in Schwert (2000) is classified as hostile, while this ratio is only 2.7% in our sample. The chosen time period might play a role in this disparity, since his sample from 1975 to 1996 contains the 1980s, an active period for hostile takeovers.

whenever the deal is classified as seller-initiated, *unsolicited* will be 0 as the target firm contacts the buyer firm first. Seller-initiated deals start with the consent of the target firm management and are therefore never classified as unsolicited. However, when the deal is buyer-initiated, *unsolicited* can be either 0 or 1, as *unsolicited* measures the event around the announcement day. For example, a deal is buyer-initiated if Firm A initiates contact with the target first. If the target firm agrees to be taken over, the unsolicited variable will be 0. However, if Firm A unexpectedly makes an offer to the target firm and announces this to the public, then *unsolicited* would be recorded as 1.

Buyer firms in buyer-initiated deals are both larger and have higher return on equity than those in seller-initiated deals. Target firms in buyer-initiated deals appear financially stronger than target firms in seller-initiated deals. They have higher cash flow and Tobin's Q ratios, as well as significantly larger market capitalizations. The two tests we run, the sample equality of means t-test and the Wilcoxon rank sum test, yield different results for sales growth, price-earnings and return on equity ratios. However, these ratios are consistently larger for target firms in buyer-initiated deals. Also, Altman's Z score is significantly larger for targets in the buyer-initiated group. This measure is a proxy for bankruptcy risk, where values below 3 represent a high risk zone for firms. As Table 1.2 shows, the median Altman's Z value for targets in seller-initiated deals is 2.79, compared to 3.34 for targets in buyer-initiated deals. We discuss the effect of Altman's Z on premiums in the following section.

VC/PE ownership in target firms does not vary across initiation groups. On average, 2% of the target firms have these types of financial shareholders. The magnitude of this variable makes it hard to test the liquidity hypothesis properly, forcing us to focus on testing the remaining two hypotheses.

Table 1.2

Data summary by initiation groups

We draw our sample from the SDC database using the following restrictions: deal value is greater than $5 million, both acquirer and target are public firms located in the US, form of transaction is either 'merger' or 'acquisition of majority interest', deal status is 'completed' or 'withdrawn', no financial or utility firms and the deal announcement date falls in between 1/1/1997 and 12/31/2006. This sample is then matched with CRSP and COMPUSTAT databases. Deal initiation data comes from the SEC filings of the merging firms. Due to space limitations, the definition and calculation of deal and financial variables are explained in Appendix A.2. Two sample mean comparison test and Wilcoxon rank sum test results are reported in the t-value and z-value columns, respectively. We do not run the Wilcoxon rank sum test on dummy variables. Significance levels are denoted by an asterisk, * for 10%, ** for 5% and *** for 1%.

	Buyer-Initiated (B)			Seller-Initiated (S)			Difference (B-S)	
PANEL A. DEAL VARIABLES	N	mean	median	N	mean	median	t-value	z-value
percentcash	260	0.476	0.403	183	0.442	0.321	0.7738	0.792
tender	260	0.308	0.000	183	0.251	0.000	1.2934	-
asset_related	260	0.654	1.000	183	0.667	1.000	-0.2797	-
hostile	260	0.046	0.000	183	0.000	0.000	2.9690***	-
unsolicited	260	0.073	0.000	183	0.005	0.000	3.4114***	-
competition	260	0.046	0.000	183	0.066	0.000	-0.8879	-
completed	260	0.923	1.000	183	0.945	1.000	-0.9177	-
rel_size	259	0.204	0.105	183	0.202	0.091	0.0629	0.6
toehold	260	0.019	0.000	183	0.016	0.000	0.2203	-
a_termfee	259	0.003	0.000	183	0.003	0.000	0.3181	1.19
t_termfee	255	0.048	0.043	177	0.057	0.046	-1.5353	-0.871
seller_financial	259	0.019	0.000	183	0.021	0.000	-0.1868	-
PANEL B. BUYER CHARACTERISTICS								
a_tobinq	260	2.920	2.110	183	2.640	1.940	1.03	1.5
a_book_lev	260	0.464	0.460	183	0.451	0.440	0.6238	0.885
a_cashflow	254	0.099	0.104	176	0.076	0.103	1.9441*	1.25
a_salesgrowth	250	0.280	0.103	176	0.324	0.125	-0.6012	-0.442
ln_a_mvequity	259	8.220	8.170	183	7.620	7.380	2.99***	3.20***
a_liquidity	260	0.492	0.502	183	0.459	0.460	1.54	1.43
a_PE	252	22.520	21.450	177	20.980	18.730	0.4055	1.17
a_ROE	253	0.123	0.140	175	-0.002	0.120	2.90***	2.32**
a_R&D	258	0.056	0.034	177	0.060	0.030	-0.5541	-0.005
a_capex	260	0.058	0.043	183	0.069	0.043	-1.5572	0.326
a_dividend	260	0.006	0.000	183	0.005	0.000	1.0644	1.52
PANEL C. TARGET CHARACTERISTICS								
t_tobinq	256	2.150	1.560	177	1.870	1.390	1.8476*	1.979**
t_book_lev	256	0.439	0.404	177	0.474	0.414	-1.2453	-0.666
t_cashflow	240	0.017	0.075	165	-0.055	0.049	2.4874**	2.745***
t_salesgrowth	237	0.179	0.098	165	0.152	0.036	0.5949	2.404**
ln_t_mvequity	255	5.620	5.570	177	4.900	4.850	4.45***	4.26***
t_liquidity	256	0.562	0.560	177	0.588	0.580	-1.0709	-1.18
t_cash	256	0.242	0.141	177	0.251	0.142	-0.3443	-0.374
t_current	252	2.940	2.330	174	3.360	2.330	-1.2511	-0.13
t_Altmanz	251	5.130	3.340	173	3.770	2.790	1.714*	2.77***
t_PE	235	11.960	13.300	169	8.260	6.350	1.3337	2.28**
t_ROE	240	-0.033	0.061	164	-0.099	0.017	1.28	2.164**
t_R&D	252	0.089	0.029	175	0.104	0.036	-1.0273	0.143
t_capex	256	0.064	0.046	177	0.064	0.042	-0.1132	0.648
t_dividend	260	0.003	0.000	183	0.004	0.000	-0.4351	0.738

1.5 Target firm analysis

1.5.1 Univariate analysis

As a first step, we compare mean premiums across initiation groups. The results are summarized in Table 1.3. Panel A of this table shows the results for *t_CAR*, and Panel B shows the results for *bidpremium*. In each panel, we test whether subsample premium means are equal to zero.

The main observation from this table is that buyer- and seller-initiated deals differ significantly in terms of premiums paid to the target firm. The simple relation between initiation and premium measures is positive: target firm returns are significantly higher if the deal is initiated by the buyer. In particular, *t_CAR* averages 32.1% in buyer-initiated deals and 20.9% in seller-initiated deals. The mean difference in premiums, 11.2 percentage points, is significant at the 1% level. The difference still persists across initiation groups when deals are further categorized with respect to method of payment and mode of acquisition.

Panel B of Table 1.3 shows sample averages of our second measure, *bidpremium*. There are two things to note from this panel. First, the levels of bid premiums are higher than *t_CAR*, as it includes run-ups and mark-ups in the target stock price. Second, significance levels of t-tests are lower relative to the *t_CAR* measure, which could reflect the volatility of the information environment over a longer time period.

The first row of Panel B reveals that the average bid premium is 56.59% in buyer-initiated deals and 36.6% in seller-initiated deals. The difference, 19.9 percentage points, is significant at the 1% level. In all equity deals, this difference jumps to a significant 38.5%, while there is no significance in difference in all cash deals.

Table 1.3

Abnormal returns of the merging firms with respect to initiation groups

We draw our sample from the SDC database using the following restrictions: deal value is greater than $5 million, both acquirer and target are public firms located in the US, form of transaction is either 'merger' or 'acquisition of majority interest', deal status is 'completed' or 'withdrawn', no financial or utility firms and the deal announcement date falls in between 1/1/1997 and 12/31/2006. This sample is then matched with CRSP and COMPUSTAT databases. Deal initiation data comes from the SEC filings of the merging firms. *t_CAR* (*a_CAR*) is the abnormal returns to the target (buyer) firm centered 5 days around the announcement of the merger. *synergy* is defined as the weighted average of buyer and target firm abnormal returns, where weights are determined by the market value of buyer and target firm equity calculated 6 trading days before the announcement of the merger. The normal returns are calculated using the market model with an estimation window of (-316,-64). *bidpremium* is the buy-and-hold return of the target firm stock starting at day -63 and ending at the deal closing day (or +126, if closing day is greater than +126). *all* is the whole dataset. *all equity* takes a value of one for deals in which 100% equity is used. *all cash* takes a value of one for deals in which 100% cash is used. *tender* takes a value of one for tender offer deals, all other offers are classified as a merger. Each sub-sample is tested against the null that average premiums in that sub-sample are equal to zero. For Panel A, C and D, t-values are estimated using cross-sectional and time series variation of abnormal returns. These calculations follow from Brown and Warner (1985). For Panel B, t-values are estimated using cross sectional variation only. Significance levels are denoted by an asterisk, * for 10%, ** for 5% and *** for 1%.

	N	B initiated	t-value	N	S initiated	t-value	Difference (B-S)	t-value
Panel A. *t_CAR*								
all	252	0.321***	52.133	181	0.209***	22.818	0.112***	10.172
all equity	77	0.262***	20.220	65	0.136***	8.920	0.125***	6.274
all cash	82	0.413***	38.919	58	0.287***	16.183	0.126***	6.122
tender	76	0.427***	38.136	46	0.262***	14.302	0.166***	7.725
merger	176	0.275***	38.068	135	0.191***	18.189	0.084***	6.616
Panel B. *bidpremium*								
all	260	0.5659***	13.071	183	0.3666***	8.2534	0.1992***	3.1303
all equity	79	0.6553***	5.6354	65	0.2695***	3.466	0.3857***	2.6352
all cash	87	0.5506***	10.0465	59	0.4381***	6.5012	0.1124	1.2979
tender	80	0.5827***	9.4933	46	0.4448***	7.002	0.1379	1.4638
merger	180	0.5583***	9.9064	137	0.3403***	6.1542	0.218***	2.7035
Panel C. *a_CAR*								
all	260	-0.0192***	-4.8492	183	-0.0203***	-3.7235	0.0011	0.1695
all equity	79	-0.0531***	-5.7808	65	-0.0444***	-3.8862	-0.0086	-0.5921
all cash	87	0.0036	0.6278	59	-0.0042	-0.5231	0.0079	0.7901
tender	80	0.0051	0.7482	46	0.0083	0.9049	-0.0032	-0.2857
merger	180	-0.0300***	-5.7296	137	-0.0300***	-4.4516	0	-0.0013
PANEL D. *synergy*								
all	262	0.0285***	7.529	186	0.0038	0.5077	0.0246***	2.881
all equity	79	-0.0049	-0.5927	68	-0.0204	-1.0912	0.0154	0.7552
all cash	88	0.0241***	4.4087	59	0.0113	1.4872	0.0127	1.3536

Table 1.3 continued

tender	82	0.0607***	8.3234	46	0.0222***	2.561	0.0384***	3.388
merger	180	0.0138***	2.8535	140	-0.0021	-0.2188	0.0159	1.4574

1.5.2 Multiple regression results

Univariate analysis suggest that target firms receive higher premiums in buyer-initiated deals. The remaining question is whether this difference in returns persists in a multiple regression analysis. To see how well initiation dummies explain *t_CAR* and *bidpremium* in cross-sections, we run several regressions controlling for the effects that are shown to influence these returns[23].

Table 1.4 summarizes multiple regression results for *t_CAR* and *bidpremium*. There are three different regressions for each dependent variable, where the regressions differ in specification of the initiation dummy variables.

As for the set of relevant control variables in the multiple regression, we include the percent of cash used in the deal (*percentcash*), a dummy for tender offer deals (*tender*), a dummy for same industry deals (*asset_related*), a dummy for large number of public competitors for the target (*competition*), a dummy for unsolicited deals (*unsolicited*), a dummy for eventually successfully completed deals (*completed*) and finally the relative size of the target to the buyer firm (*ln_rel_size*). With respect to the financial variables, we use Tobin's Q (*a_tobinq*), book leverage (*a_book_lev*) and cash flow (*a_cashflow*) measures for the buyer firm. We use a larger set of target firm controls, including Tobin's Q (*t_tobinq*), book leverage (*t_book_lev*), cash flow (*t_cashflow*), one year sales growth (*t_salesgrowth*), Altman's Z score (*t_Altmanz*), size (*ln_t_mvequity*), one year return on equity (*t_ROE*), R&D expenses (*t_R&D*),

[23] We analyze the effect of initiation on premiums using simple regression. There can be endogeneity concerns – premiums reversely affecting initiation decisions – but we have several arguments for not using a simultaneous equations (SEM) model. First, the question at hand does not seem to be a good fit for an SEM because we do not have a structural model to speak of. Second, if an SEM were written, it should include most of the deal variables as endogenous variables. For example, form of the deal (tender vs. merger) and premiums could also affect each other. An SEM should therefore include most of the deal variables, but this becomes infeasible as there are numerous variables to be included in such a model.

capital expenditures (*t_capex*) and dividend yield (*t_dividend*)[24]. Year and industry dummies are also included in the regression, though they are not reported.

Most of the variables included in the regression model have been previously shown to influence target firm premiums. The remaining variables, especially those for the target firms, are included to address potential concerns about the true effects of initiation dummies on premiums. For example, excluding growth variables will result in biased results if buyers tend to initiate deals with growing or growth-potential target firms and pay larger premiums to them. For this reason, we include proxies for the growth opportunities of the target firm, such as sales growth and R&D and capital expenses.

Table 1.4

Cross-sectional regression analysis of target firm abnormal returns

We draw our sample from the SDC database using the following restrictions: deal value is greater than $5 million, both acquirer and target are public firms located in the US, form of transaction is either 'merger' or 'acquisition of majority interest', deal status is 'completed' or 'withdrawn', no financial or utility firms and the deal announcement date falls in between 1/1/1997 and 12/31/2006. This sample is then matched with CRSP and COMPUSTAT databases. Deal initiation data comes from the SEC filings of the merging firms. *t_CAR* stands for cumulative abnormal returns to the target firm 5 days around the announcement of the merger. To calculate abnormal returns, we use the market model, parameters of which are estimated over (-316,-64). *bidpremium* is the buy-and-hold return of the target firm stock starting at day -63 and ending at the deal closing day (or +126, if closing day is greater than +126). *initiation* is 1 if the deal is classified as buyer-initiated, and 0 if seller-initiated. *initiation_b* is 1 if the deal is buyer-initiated and 0 otherwise. *initiation_s* is 1 if the deal is seller-initiated and 0 otherwise. Due to space limitations, the definition and calculation of deal and financial variables are explained in Appendix A.2. t-values are in parentheses, below the reported coefficients. Significance levels are denoted by an asterisk, * for 10%, ** for 5% and *** for 1%. Regressions include year and industry dummies (not reported).

	(1)	(2)	(3)	(4)	(5)	(6)
COEFFICIENT	*t_CAR*	*t_CAR*	*t_CAR*	*bidpremium*	*bidpremium*	*bidpremium*
initiation	**0.126*** **			**0.280*** **		
	(3.814)			**(3.820)**		
initiation_b		**0.0905*** **			**0.179*** **	
		(4.177)			**(3.167)**	
initiation_s			**-0.0863*** **			**-0.185*** **
			(-3.460)			**(-2.846)**
percentcash	0.0524	0.0493*	0.0517*	-0.163	-0.0696	-0.0648
	(1.131)	(1.821)	(1.901)	(-1.586)	(-0.983)	(-0.915)
tender	0.0943**	0.0919***	0.103***	-0.00689	-0.0509	-0.0285
	(2.177)	(3.426)	(3.848)	(-0.0720)	(-0.726)	(-0.407)

24 We exclude *hostility* dummy from our regressions, due to (i) its low frequency, and (ii) its high correlation with the *unsolicited* variable. Buyer firm size is also excluded, as it creates a set of linearly dependent variables together with relative size and target firm size (their logarithms).

Table 1.4 continued

asset_related	0.0548	0.035	0.0379*	0.0503	0.0936*	0.0994*
	(1.588)	(1.646)	(1.779)	(0.660)	(1.686)	(1.790)
competition	-0.0927	-0.104***	-0.114***	0.184	0.0688	0.0491
	(-1.209)	(-2.736)	(-3.014)	(1.084)	(0.695)	(0.497)
unsolicited	-0.0147	0.0384	0.0275	0.193	0.351***	0.327***
	(-0.183)	(0.924)	(0.655)	(1.087)	(3.233)	(2.990)
completed	-0.0239	-0.0161	-0.00808	0.109	0.368***	0.384***
	(-0.342)	(-0.487)	(-0.243)	(0.705)	(4.256)	(4.442)
ln_rel_size	-0.0269**	-0.0281***	-0.0309***	-0.0773***	-0.0730***	-0.0787***
	(-2.431)	(-4.307)	(-4.713)	(-3.159)	(-4.279)	(-4.606)
a_tobinq	-0.0109	0.00263	0.00235	0.0119	0.00611	0.0055
	(-1.015)	(0.785)	(0.696)	(0.503)	(0.697)	(0.626)
a_book_lev	-0.113	-0.0689	-0.0727	0.0875	-0.0563	-0.0647
	(-1.365)	(-1.502)	(-1.579)	(0.479)	(-0.470)	(-0.539)
a_cashflow	0.103	-0.057	-0.0435	0.503	0.0837	0.11
	(0.700)	(-0.890)	(-0.678)	(1.540)	(0.499)	(0.657)
t_tobinq	-0.0287	-0.0173**	-0.0180**	0.0613	-0.00789	-0.00939
	(-1.581)	(-1.965)	(-2.041)	(1.528)	(-0.344)	(-0.409)
t_book_lev	-0.168**	-0.0234	-0.0274	-0.173	-0.0679	-0.0748
	(-2.113)	(-0.540)	(-0.629)	(-0.989)	(-0.599)	(-0.659)
t_cashflow	-0.107	-0.0363	-0.0332	0.11	0.192	0.197
	(-1.053)	(-0.551)	(-0.502)	(0.488)	(1.116)	(1.141)
t_salesgrowth	0.0241	0.0226	0.0167	-0.301***	-0.146***	-0.159***
	(0.651)	(1.169)	(0.859)	(-3.683)	(-2.889)	(-3.125)
t_Altmanz	-0.00111	0.000111	0.0000167	-0.0146*	-0.0046	-0.00477
	(-0.297)	(0.061)	(0.009)	(-1.774)	(-0.966)	(-1.001)
ln_t_mvequity	0.00375	-0.0164**	-0.0154**	-0.0556**	-0.0512***	-0.0495***
	(0.305)	(-2.405)	(-2.254)	(-2.045)	(-2.874)	(-2.779)
t_ROE	-0.0155	0.0118	0.00929	0.0536	0.0466	0.0415
	(-0.445)	(0.614)	(0.480)	(0.693)	(0.925)	(0.823)
t_R&D	-0.0827	-0.0465	-0.0486	-0.161	0.281	0.275
	(-0.497)	(-0.442)	(-0.461)	(-0.437)	(1.021)	(1.001)
t_capex	0.301	0.215	0.228*	-0.0263	0.373	0.401
	(1.062)	(1.577)	(1.671)	(-0.0420)	(1.049)	(1.127)
t_dividend	0.683	0.667	0.998	-0.0908	-0.719	-0.021
	(0.537)	(0.685)	(1.019)	(-0.0323)	(-0.283)	(-0.00824)
Constant	0.634**	0.508*	0.592**	0.839	0.668	0.836
	(1.997)	(1.847)	(2.150)	(1.195)	(0.930)	(1.164)
Observations	372	796	796	372	796	796
R-squared	0.239	0.197	0.191	0.265	0.196	0.194

Regression results indicate that initiation has a significant effect on target firm premium measures, and this effect persists in different specifications of the econometric model. From regression (1) of Table 1.4, where only the *initiation* dummy variable is used, we see that target firm CAR's are 12.6 percentage points higher when the deal is initiated by the buyer. The effect of initiation is significant at the 1% level. As mentioned in Section 1.4, initiation data is missing for almost half of

the deals in our sample, resulting in a sample size of 372 when the *initiation* variable is used. Definitions of *initiation_b* and *initiation_s* let us increase the sample size significantly. The coefficient of *initiation_b* in regression (2) is 0.0905, implying that buyer-initiated deals earn an average of 9.05 percentage point higher abnormal returns relative to non-buyer-initiated deals. By construction, these non-buyer-initiated deals include seller-initiated deals and all other cases for which we have no initiation information. To see how seller initiation affects abnormal returns, we use *initiation_s* in regression (3). Target firm CAR's around the announcement day is 8.63 percentage points lower when the targets themselves initiate the deal. This coefficient is also significant at the 1% level.

Besides initiation variables, method of payment (*percentcash*), form of acquisition (*tender*), public competition for the target firm (*competition*), relative size of the target firm to the buyer firm (*ln_rel_size*), target firm Tobin's Q (*t_tobinq*) and its size (*ln_t_mvequity*) have strong explanatory power for target firm CAR's in regressions (2) to (3). The same industry deal dummy (*asset_related*) has weaker statistical power. Target firm abnormal returns are higher when the payment is in cash, which is consistent with existing findings. Received cash is not tax free for the target firm shareholders, so a premium should be paid to make them indifferent between cash and stock[25]. Consistent with Jensen and Ruback (1983), returns to the target firms are larger in tender offers (around 10 percentage points here). Target firms receive around 3.8 percentage point higher premiums if the buyer firm is in the same industry as the target firm. Public competition for target firms has a surprising negative effect (around -10 percentage points), which is contrary to earlier findings in the literature, such as Bradley, Desai, and Kim (1988). The competition measure is negatively correlated with deal closing and CAR, meaning that it is more likely that the announced deal will

[25] Travlos (1987).

not close successfully if there is competition for a target firm. In return, this results in lower announcement day premiums for the target. Relative size of the target firm compared to the buyer firm has a negative effect on target firm premiums: for every 10% increase in relative size, premiums go down by around 0.3 percentage points. There is mixed evidence on the sign of this variable, and Moeller, Schlingemann, and Stulz (2004) provide a brief discussion on this issue. Target firm's Tobin's Q measure also has a negative effect on CAR's: a unit change in Tobin's Q causes premiums to go down by almost 1.8 percentage points. Finally, our results suggest that, when the absolute size of the target firm goes up by 10%, premiums go down by around 0.15 percentage points. We should keep in mind that the relative size of the target firm is controlled for in these regressions. Hence, an increase in target size must be matched by an increase in buyer firm size. Therefore, we can infer that larger buyer firms are paying higher premiums to the target firms, as discussed in Moeller, Schlingemann, and Stulz (2004).

The results for regression (1) of Table 1.4 differ from those for regressions (2) to (3). Variables significant in those regressions become insignificant in (1), and vice versa. For example, *percentcash*, *asset_related*, *competition*, *t_tobinq* and *ln_t_mvequity* lose their effect on *t_CAR* while *t_book_lev* becomes significant. The difference between regression (1) and regressions (2) to (3) is the sample size. It is likely that the initiation sample is different than non-initiation (no information) sample. We discuss these issues in Section 1.9.3.

In columns (4) to (6), we report multiple regression results where *bidpremium* is used as the premium measure. As regressions (5) and (6) show, premiums paid to the target firms are 18 percentage points larger in buyer-initiated deals compared to non-buyer-initiated deals and 18.5 percentage points lower in seller-initiated deals compared to non-seller-initiated deals. These estimates are significant at the 1%

significance level. When the initiation dummy is used in the regression, as shown in (4), the difference in bid premiums becomes 28 percentage points. The t-value for this coefficient is 3.82 and it is significant at the 1% level.

Since bid premiums are calculated over longer time periods than are CAR's, they capture different aspects of premiums. As Table 1.4 shows, the important variables in explaining bid premiums are different than the variables explaining CAR's. Along with initiation dummies, unsolicited and completed dummies, relative size, sales growth and target firm size variables have significant effects on bid premiums. The same industry dummy again has weaker statistical power. The first point that comes to attention in these regressions is the effect of completion of the deal. As discussed in Bradley, Desai, and Kim (1983), positive abnormal returns to target firm stocks at the announcement date revert back to normal levels in ultimately unsuccessful deals. In other words, target firms' stock prices return to pre-bid levels if the deal fails to close. According to their findings, this adjustment can take between 6 and 24 months. Our bid premium measure truncates at 126 trading days, which corresponds to almost 6 months. This explains the magnitude and significance level of the *completed* dummy variable: bid premiums are larger by around 40 percentage points in successfully closed deals. The second point is that the coefficient on the *unsolicited* variable is around 0.35 and is uniformly significant across different specifications of the econometric model. In Schwert's (2000) analysis, which covers takeovers from 1975 to 1996, the unsolicited variable had a negative influence on bid premiums. More recent papers, such as Boone and Mulherin (2007), report positive and significant coefficients on the unsolicited variable, suggesting that the effect of hostility on premiums has changed over time. Finally, bid premiums go down by around 1.5 percentage points if sales growth goes up by 10 percentage points.

Both the information asymmetry and the financial distress hypotheses predict that

target firms receive lower premiums when they initiate a merger. This means that the coefficient on the initiation dummy would be positive in a regression where the dependent variable is the target firm premium. However, the basic version of the financial distress hypothesis implies that targets in financial distress would receive lower premiums than targets that are not. Therefore, under this hypothesis, (i) if premiums were to be regressed on financial distress measures (such as Altman's Z), these measures would be economically and statistically significant, and (ii) if premiums were to be regressed on initiation variables alone, initiation variables would be significant, as they capture the effect of financial distress measures (omitted variable bias). We do not find evidence in favor of these claims. For instance, if the *initiation* variable is removed from regression (1), the coefficient on *t_Altmanz* is not significant. The primary reason is that there is little correlation between *t_Altmanz* and *t_CAR*. Liquid target firms (Altman Z scores greater than 3) receive 23.5% premiums, while illiquid firms (scores less than 3) receive 25%.

Another way to distinguish between the information asymmetry and the financial distress hypotheses is to introduce interaction variables in the above regressions. When an interaction variable, in the form of initiation*Altman's Z, is added to a regression, its regression coefficient measures how much the effect of initiation on target firm returns change with respect to their Altman's Z score. In other words, the interaction term lets us to observe the effect of each variable on the other's marginal effect on premiums. We re-run all of the six regressions with this extra interaction term and show the results in Table 1.5. In all regressions, except the second one, the interaction term has no statistically significant effect on the dependent variable. In the first regression, the coefficient of the interaction variable is -0.0064, and the initiation variable is 0.153. This means the premium difference between buyer and seller-initiated deals diminishes 0.0064 percentage points for every unit change in their

Altman's Z scores. In the fourth regression, where the dependent variable is the bid premium, the interaction variable has a coefficient of -0.012 and the initiation variable 0.329. These results tell us that only a minor portion of the premium difference is explained by the financial distress variable; otherwise the coefficient of the interaction variable would be a statistically significant larger number.

Table 1.5
Cross-sectional regression analysis of target firm abnormal returns with interaction variables

We draw our sample from the SDC database using the following restrictions: deal value is greater than $5 million, both acquirer and target are public firms located in the US, form of transaction is either 'merger' or 'acquisition of majority interest', deal status is 'completed' or 'withdrawn', no financial or utility firms and the deal announcement date falls in between 1/1/1997 and 12/31/2006. This sample is then matched with CRSP and COMPUSTAT databases. Deal initiation data comes from the SEC filings of the merging firms. t_CAR stands for cumulative abnormal returns to the target firm 5 days around the announcement of the merger. To calculate abnormal returns, we use the market model, parameters of which are estimated over (-316,-64). bidpremium is the buy-and-hold return of the target firm stock starting at day -63 and ending at the deal closing day (or +126, if closing day is greater than +126). initiation is 1 if the deal is classified as buyer-initiated, and 0 if seller-initiated. initiation_b is 1 if the deal is buyer-initiated and 0 otherwise. initiation_s is 1 if the deal is seller-initiated and 0 otherwise. All regressions contain the same controls as in Table 1.4 though they are not reported. t-values are in parentheses, below the reported coefficients. Significance levels are denoted by an asterisk, * for 10%, ** for 5% and *** for 1%. Regressions include year and industry dummies (not reported).

	(1)	(2)	(3)	(4)	(5)	(6)
COEFFICIENT	*t_CAR*	*t_CAR*	*t_CAR*	*bidpremium*	*bidpremium*	*bidpremium*
initiation	0.153***			0.329***		
	(3.99)			(3.88)		
*initiation * t_Altmanz*	-0.0064			-0.012		
	(-1.37)			(-1.15)		
initiation_b		0.113***			0.215***	
		(4.43)			(3.2)	
*initiation_b * t_Altmanz*		-0.0052*			-0.008	
		(-1.68)			(-0.99)	
initiation_s			-0.098***			-0.205***
			(-3.52)			(-2.82)
*initiation_s * t_Altmanz*			0.0032			0.0055
			(0.96)			(0.62)
t_Altmanz	0.0024	0.0007	-0.003	-0.008	-0.0036	-0.0053
	(0.54)	(0.4)	(-0.17)	(-0.8)	(-0.74)	(-1.1)
Observations	372	796	796	372	796	796
R-squared	0.243	0.199	0.192	0.267	0.196	0.194

1.6 Buyer firm analysis

In Section 1.5, we show that buyer-initiated deals result in higher payments to target firms, as measured by abnormal returns around the announcement of the merger and bid premiums. But does this mean that there is a wealth transfer from buyer firm shareholders to target firm shareholders in buyer-initiated deals? In other words, do buyer firms overpay when they initiate deals?

In Panel C of Table 1.3, we compare buyer firm CAR's across initiation groups, with respect to method of payment and form of acquisition. The full sample results suggest that buyer firms experience a negative 2% return in both buyer- and seller-initiated deals. In line with other papers in the literature, the use of stock in the merger results in a more negative reaction than using cash. As discussed in Myers and Majluf (1984), stock issuance of the better-informed managers could signal opportunistic motives behind the offer. We observe -5.3% abnormal returns in the buyer-initiated deals, when only stock is used as a method of payment. Similarly, in seller-initiated deals, buyers experience a 4.4% drop in their stock prices when they use all equity to pay the target firm shareholders. The form of acquisition seems to have a significant effect on buyer firm premiums, but initiation groups do not show any difference. In mergers, buyers experience a negative 3% abnormal return, while the returns are not distinguishable from zero in tender offers. In summary, initiation does not seem to have a significant effect on buyer firm abnormal returns, though we run multiple regressions nevertheless.

Multiple regression results are displayed in Table 1.6. We run three regressions, (1) to (3), using different initiation variables in each. The last regression, (4), excludes all initiation variables. Specification of our econometric model follows from earlier findings in the literature and also how well the variables fit into the regression.

Table 1.6

Cross-sectional regression analysis of buyer firm abnormal returns

We draw our sample from the SDC database using the following restrictions: deal value is greater than $5 million, both acquirer and target are public firms located in the US, form of transaction is either 'merger' or 'acquisition of majority interest', deal status is 'completed' or 'withdrawn', no financial or utility firms and the deal announcement date falls in between 1/1/1997 and 12/31/2006. This sample is then matched with CRSP and COMPUSTAT databases. Deal initiation data comes from the SEC filings of the merging firms. The dependent variable, *a_CAR* stands for cumulative abnormal returns to the buyer firm 5 days around the announcement of the merger. To calculate abnormal returns, we use the market model, parameters of which are estimated over (-316,-64). *initiation* is 1 if the deal is classified as buyer-initiated, and 0 if seller-initiated. *initiation_b* is 1 if the deal is buyer-initiated and 0 otherwise. *initiation_s* is 1 if the deal is seller-initiated and 0 otherwise. Due to space limitations, the definition and calculation of deal and financial variables are explained in Appendix A.2. t-values are in parentheses, below the reported coefficients. Significance levels are denoted by an asterisk, * for 10%, ** for 5% and *** for 1%. Regressions include year and industry dummies (not reported).

	(1)	(2)	(3)	(4)
COEFFICIENT	*a_CAR*	*a_CAR*	*a_CAR*	*a_CAR*
initiation	**-0.00247**			
	(-0.251)			
initiation_b		**-0.00152**		
		(-0.182)		
initiation_s			**-0.00393**	
			(-0.407)	
percentcash	0.0262*	0.0287***	0.0287***	0.0287***
	(1.917)	(2.769)	(2.768)	(2.768)
tender	0.0144	0.00927	0.00918	0.00909
	(1.132)	(0.899)	(0.894)	(0.886)
asset_related	0.00756	0.00489	0.00494	0.00486
	(0.726)	(0.594)	(0.600)	(0.590)
competition	-0.0197	0.0058	0.0062	0.00605
	(-0.804)	(0.392)	(0.421)	(0.411)
unsolicited	0.0308	0.0216	0.0208	0.0215
	(1.270)	(1.349)	(1.297)	(1.345)
completed	-0.00771	0.0115	0.0116	0.0114
	(-0.346)	(0.892)	(0.898)	(0.886)
ln_rel_size	-0.0116***	-0.0128***	-0.0129***	-0.0128***
	(-2.969)	(-4.242)	(-4.266)	(-4.249)
a_tobinq	0.00564*	-0.000991	-0.001	-0.000988
	(1.697)	(-0.752)	(-0.760)	(-0.751)
a_book_lev	-0.00682	0.0185	0.0184	0.0185
	(-0.281)	(1.054)	(1.046)	(1.052)
a_cashflow	0.0222	-0.0377	-0.0382	-0.0381
	(0.514)	(-1.156)	(-1.172)	(-1.171)
a_salesgrowth	-0.00713	0.00598	0.00602	0.00598
	(-1.122)	(1.121)	(1.128)	(1.121)
ln_a_mvequity	-0.00869**	-0.00786***	-0.00794***	-0.00790***
	(-2.325)	(-3.095)	(-3.130)	(-3.118)
a_R&D	-0.251***	-0.189***	-0.190***	-0.189***
	(-3.084)	(-3.634)	(-3.653)	(-3.646)
t_tobinq	0.00507	0.00361	0.0036	0.00362
	(1.051)	(1.188)	(1.187)	(1.192)
t_cashflow	0.0088	-0.0149	-0.0156	-0.0151
	(0.370)	(-0.770)	(-0.807)	(-0.781)
t_salesgrowth	-0.000499	0.00917	0.00898	0.00921
	(-0.0446)	(1.194)	(1.167)	(1.200)
t_Altmanz	-0.00257***	-0.00186***	-0.00186***	-0.00186***

Table 1.6 continued

	(-2.701)	(-3.039)	(-3.036)	(-3.040)
Constant	-0.106	-0.135	-0.13	-0.134
	(-1.157)	(-1.290)	(-1.236)	(-1.287)
Observations	370	794	794	794
R-squared	0.181	0.137	0.137	0.137

As Table 1.6 shows, initiation dummy variables have no explanatory power in explaining buyer firm CAR's. In regressions (1) to (3), initiation variables have a negative sign, meaning that buyer firm CAR's are lower in buyer-initiated deals, but their effects are not distinguishable from zero.

Out of all control variables, percent of cash used in the deal, relative size and Altman's Z score of target firms, and finally absolute size and R&D expenses of buyer firms are significant. As discussed above, buyer and target firm CAR's are larger when cash is used in the deal. Our results indicate that, if the percent of cash used in the deal increases by 10 percentage points, buyer firm CAR's go up by around 0.28 percentage points. Relative size of the target firm has a negative but smaller impact: every 10% increase in relative size of the target firm results in a 0.13 percentage points decline in buyer firm CAR's. As Moeller, Schlingemann, and Stulz (2004) show, larger buyer firms tend to overpay, and the sign of the buyer size variable is therefore negative. The coefficient of Altman's Z score is negative, meaning that buyer firms' abnormal returns are higher when they acquire financially distressed targets. In our regressions, the coefficient on buyer firm size is around -0.008, implying that every 10% increase in buyer firm size results in a 0.08 percentage points decline in buyer firm CAR's. The R&D variable is consistently significant in all different specifications of the model, so we include this measure into our model. A 10 percentage point increase in the R&D spending of buyer firms results in a 1.9 percentage point decline in returns. Our sample includes the deals consummated between 1997 and 1999, when valuations in the technology industry were very high.

Therefore, the most likely explanation of this coefficient is the low quality of acquisitions made by these cash rich high tech companies.

In summary, initiation does not seem to have an effect on buyer firm abnormal returns around the announcement of the deal. Target firms receive significantly higher premiums in buyer-initiated deals, but this extra payment does not seem to come out of buyer firms. If it did, we would have observed significantly lower premiums to buyer firms in buyer-initiated deals.

1.7 Synergies

If buyer firms do not overpay when they initiate the deal, then buyer-initiated deals could be more synergistic in nature, as target firms are paid more in those types of deals.

In Panel D of Table 1.3, we report synergy gains by initiation groups. For the entire sample of deals, synergies are 2.85% in buyer-initiated deals and 0.38% in seller-initiated deals. The difference in deal synergies is 2.46% and is statistically different from zero at the 1% level. Tender offer deals seem to be the driving force behind this result. In tender offers, the portfolio of merging firms earns 6% in buyer-initiated deals and 2.22% in seller-initiated deals. Tender offers have been shown to result in higher buyer and target firm abnormal returns, and hence higher synergies[26]. The relation between initiation, synergies and the use of tender offers can be best explained by the Berkovitch and Khanna (1991) model. The authors argue that buyer firms initiate a tender offer when there are high synergies between the merging firms. This way, they maximize their chances of acquiring the target, as they are more confident to win the auction resulting from the tender offer. Low synergy bidders

[26] Jensen and Ruback (1983).

prefer a bargaining (merger) process, due to the fact that they will lose the auction if a tender offer is launched. According to this hypothesis, a high synergy bidder initiates a deal using a tender offer. In line with this theory, we find higher synergies in tender offers (compared to mergers). Furthermore, we find higher synergies in buyer-initiated deals within tender offer deals.

Table 1.7
Cross-sectional regression analysis of synergies

We draw our sample from the SDC database using the following restrictions: deal value is greater than $5 million, both acquirer and target are public firms located in the US, form of transaction is either 'merger' or 'acquisition of majority interest', deal status is 'completed' or 'withdrawn', no financial or utility firms and the deal announcement date falls in between 1/1/1997 and 12/31/2006. This sample is then matched with CRSP and COMPUSTAT databases. Deal initiation data comes from the SEC filings of the merging firms. The dependent variable, *synergy*, stands for weighted average of buyer and target firm abnormal returns accumulated 5 days around the announcement day. The weights are calculated using the market value of equity of the merging firms 6 days before the announcement. To calculate abnormal returns, we use the market model, parameters of which are estimated over (-316,-64). *initiation* is 1 if the deal is classified as buyer-initiated, and 0 if seller-initiated. *initiation_b* is 1 if the deal is buyer-initiated and 0 otherwise. *initiation_s* is 1 if the deal is seller-initiated and 0 otherwise. Due to space limitations, the definition and calculation of deal and financial variables are explained in Appendix A.2. *highacq_q_lowtar_q* is 1 if the acquirer firm's Tobin's Q is greater than its industry average and target firm's Tobin's Q is below its industry average. For this variable, we classify industries using 4-digit SIC codes. t-values are in parentheses, below the reported coefficients. Significance levels are denoted by an asterisk, * for 10%, ** for 5% and *** for 1%. Regressions include year dummies (not reported).

	(1)	(2)	(3)	(4)
COEFFICIENT	*synergy*	*synergy*	*synergy*	*synergy*
initiation	**0.0219****			
	(2.166)			
initiation_b		**0.00603**		
		(0.455)		
initiation_s			**-0.0244**	
			(-1.624)	
percentcash	0.0360***	0.0394**	0.0404**	0.0396**
	(2.651)	(2.428)	(2.491)	(2.444)
tender	0.0169	0.0459***	0.0467***	0.0466***
	(1.272)	(2.783)	(2.849)	(2.841)
asset_related	0.0147	0.00895	0.00958	0.00912
	(1.430)	(0.706)	(0.757)	(0.720)
competition	-0.0351	-0.0440*	-0.0437*	-0.0451*
	(-1.465)	(-1.877)	(-1.875)	(-1.934)
unsolicited	0.0452*	0.00977	0.00612	0.0102
	(1.856)	(0.378)	(0.236)	(0.394)
completed	-0.00268	-0.0442**	-0.0424**	-0.0439**
	(-0.128)	(-2.195)	(-2.107)	(-2.182)
ln_rel_size	0.00998***	0.0102***	0.00990***	0.0101***
	(3.407)	(2.758)	(2.679)	(2.736)
ln_t_mvequity	-0.00515	-0.00970**	-0.0100***	-0.00948**
	(-1.519)	(-2.522)	(-2.620)	(-2.485)
highacq_q_lowtar_q	0.0108	-0.0162	-0.0163	-0.0162
	(0.802)	(-0.988)	(-0.995)	(-0.990)

Table 1.7 continued

t_book_lev	0.00618	-0.00347	-0.00219	-0.00402
	(0.321)	(-0.149)	(-0.0942)	(-0.173)
t_Altmanz	-0.00153**	-0.000978	-0.001	-0.00099
	(-2.111)	(-1.601)	(-1.646)	(-1.623)
Constant	0.15	0.24	0.244	0.245
	(1.479)	(1.357)	(1.388)	(1.390)
Observations	423	902	902	902
R-squared	0.148	0.086	0.089	0.086

Multiple regression results are displayed in Table 1.7. Our set of dependent variables includes all deal variables, size and book leverages of the target firms and a dummy variable that takes a value of 1 if a high Tobin's Q buyer merges with a low Tobin's Q target. We classify a firm's Tobin's Q as high if it is greater than the mean Tobin's Q in that firms' industry (defined by the 4-digit SIC code). The specification of this econometric model is intended to capture (i) the synergies created from market power or collusion versus synergies from reduction of cost of capital (i.e., conglomerates), using the variable *asset_related*[27] and (ii) the synergies created from the better use of target firm assets in place, using the variable *highacq_q_lowtar_q*[28]. In addition, we control for the leverage of the target firm, as low leverage levels could attract financial types of buyers rather than strategic buyers. As before, regressions in the table differ by the definition of the initiation variable. We use *initiation*, *initiation_b* and *initiation_s* in regressions (1) through (3), respectively. The last regression (4) is run without an initiation variable.

Only in regression (1) does the initiation variable show significance. When the deal is initiated by the buyer, synergies are on average 2.19 percentage points higher. This result is significant at the 5% level. However, regressions (2) and (3) fail to carry this result to samples where we distinguish buyer-initiated from non-buyer-initiated and seller-initiated from non-seller-initiated. The signs of these variables are as

[27] See Eckbo (1983) and Morck, Shleifer, and Vishny (1990) for a detailed exposition.
[28] Lang, Stulz, and Walkling (1989).

predicted, but their significance levels are now lower. Of the remaining variables, percent of cash, tender offer, competition and deal completion dummy variables, relative and absolute size of the target firm are significant. The same industry deal dummy (*asset_related*) has a positive sign, but its effect on synergies seems to be weak. Also, it looks like the match between high Q buyer and low Q target is unimportant for synergies.

1.8 Determinants of deal initiation

In previous sections, we showed that buyer- and seller-initiated deals differ in the premiums paid to the target firm shareholders and the synergies created in the deal. The next natural question is: what firm characteristics do we typically observe in buyer or seller-initiated deals? For example, what types of firms decide to sell themselves, even if there is no indication of interest? What types of buyers go for the target firms that are known to be on the market? The answers to these questions could be valuable in understanding differing bid premiums across initiation groups.

In order to explain initiation behavior, we need to consider the motives behind the decisions of merging firms. A target firm could decide to sell itself for several reasons. Fierce competition in the industry could lead to a declining business, hammering sales growth or profitability. In such deteriorating business conditions, a target firm could decide to seek alternatives to remaining independent. Serious litigation hurdles could be another reason to sell a business. The target firm could have a significant need for capital and be incapable of generating it on its own. Retirement or diversification could be good reasons for selling a private business. Finally, the market conditions could be very favorable for a sale. If the stock price of the firm appreciated beyond reasonable levels, a sale would be easily justified.

Product or geographical expansion is the first reason that comes to mind in considering buyer motivations for an acquisition. Buyer firms usually make acquisitions to fulfill a strategic plan, and expanding business in some direction can be a good reason for an acquisition. Buyer firms could also decide to acquire to reduce the competition (i.e., a key competitor) that they are facing. Their operations could generate unexpected levels of cash, and their best investment could be to acquire another business. Finally, market conditions or the current level of buyer firm stock price could be very suitable for an acquisition (alternatively, target firm stock price could trade at a discount in the market).

The relevance of some of the above reasons for buying/selling a business can be empirically tested. For example, if cash rich firms indeed acquire more often, then we can compare cash levels of acquiring and non-acquiring firms. This will test the cash holdings hypothesis. Other reasons, such as diversification motives of private business owners, are harder to test due to data availability. Owners do not report their reasons for selling/buying a business in SEC documents.

Note here that motivation for initiating a deal cannot be conceptually disentangled from the motivations to merge. If we were to predict targets and buyers, we would have used almost the same controls as we would for predicting initiation[29]. However, the set of targets (or buyers) that initiate a deal could be different than the set of firms that do not. In other words, initiation decisions could be a manifestation of unobservable reasons for a merger. For instance, if a firm privately knows that one of its competitors is developing a superior product, then it might start looking for potential buyers for its business before this information becomes public. As an outsider, a potential buyer may not have this information, but it might conclude that

[29] Morck, Shleifer, and Vishny (1989) and Comment and Schwert (1995) study the characterization of target firms.

the target firm has some adverse private information of which outsiders are unaware. Our goal is to uncover common measurable factors that lead to deal initiation decisions.

We wish to emphasize that we predict initiation conditionally: the goal is to find the likelihood of a buyer or a target firm initiating a deal, given that the firm is involved in a deal. An unconditional study however, would discover the probability of a target initiating a deal. The latter way is harder to pursue because of the low frequency of initiation data in the universe of all firms. This difficulty has been addressed by Palepu (1986) in a related context. Another obstacle to an unconditional study in our context is the number of layers the firms are sorted on. In the first layer, the firms are presumably sorted with respect to their merging decisions, and in the second, they are presumably sorted with respect to their deal initiation decisions. Focusing our analysis on merging firms will remove the first layer and yield a more homogenous set of firms for analyzing initiation decisions. We know that there are dissimilarities between merging and non-merging firms[30], so an unconditional analysis can fail to capture the true initiation effects.

The set of control variables include Tobin's Q, book leverage, cash flow, sales growth, liquidity, return on equity, capital expenditure and absolute sizes of buyer and target firms. We also include a dummy variable that takes a value of 1 if the buyer firm makes six or more acquisitions in our sample. Serial acquirers can use the same method every time they make an acquisition (e.g., always buy targets that are on the market); this dummy controls for this behavioral pattern.

[30] Sorensen (2000).

Table 1.8

Logistic regression model for predicting deal initiation

We draw our sample from the SDC database using the following restrictions: deal value is greater than $5 million, both acquirer and target are public firms located in the US, form of transaction is either 'merger' or 'acquisition of majority interest', deal status is 'completed' or 'withdrawn', no financial or utility firms and the deal announcement date falls in between 1/1/1997 and 12/31/2006. This sample is then matched with CRSP and COMPUSTAT databases. Deal initiation data comes from the SEC filings of the merging firms. There are three dependent variables; *initiation* is 1 if the deal is classified as buyer-initiated, and 0 if seller-initiated; *initiation_b* is 1 if the deal is buyer-initiated and 0 otherwise; *initiation_s* is 1 if the deal is seller-initiated and 0 otherwise. *multiple_acquisition_6* is 1 if the acquirer firm makes 6 or more deals in our sample and zero otherwise. Due to space limitations, the definition and calculation of deal and financial variables are explained in Appendix A.2. *t_ind2* takes a value of 1 if the target firm's 1-digit SIC code is 2. *year_98* is 1 if the deal is announced in year 1998. Remaining industry and year dummy variables are defined similarly. p-values are in parentheses, below the reported coefficients. Significance levels are denoted by an asterisk, * for 10%, ** for 5% and *** for 1%.

	(1)	(2)	(3)
COEFFICIENT	*initiation*	*initiation_b*	*initiation_s*
multiple_acquisition_6	-0.513	-0.568	-0.19
	(0.318)	(0.106)	(0.658)
a_tobinq	-0.0431	-0.0475	-0.0362
	(0.621)	(0.275)	(0.479)
a_book_lev	1.638**	0.463	-0.938*
	(0.018)	(0.277)	(0.064)
a_cashflow	1.869	2.479**	0.18
	(0.167)	(0.014)	(0.829)
a_salesgrowth	-0.0316	0.0854	0.0705
	(0.855)	(0.506)	(0.608)
a_liquidity	2.288***	1.490***	-0.892
	(0.002)	(0.002)	(0.109)
a_ROE	0.877**	0.164	-0.459**
	(0.030)	(0.335)	(0.025)
a_capex	-3.633	-1.651	1.636
	(0.134)	(0.325)	(0.266)
ln_a_mvequity	0.0156	0.144**	0.133**
	(0.851)	(0.011)	(0.038)
t_tobinq	0.014	-0.0327	-0.0712
	(0.923)	(0.673)	(0.473)
t_book_lev	-1.129*	-0.445	0.351
	(0.065)	(0.269)	(0.405)
t_cashflow	0.968	0.783	-0.504
	(0.192)	(0.177)	(0.354)
t_salesgrowth	0.0328	-0.17	-0.34
	(0.914)	(0.385)	(0.122)
t_Altmanz	-0.0252	-0.00696	0.0097
	(0.386)	(0.706)	(0.621)
t_ROE	-0.196	-0.15	-0.0479
	(0.486)	(0.416)	(0.815)
t_capex	1.103	0.727	-0.773
	(0.646)	(0.598)	(0.610)
ln_t_mvequity	0.319***	0.0283	-0.243***
	(0.002)	(0.660)	(0.001)
t_ind2	-0.226	-0.0335	-0.00905
	(0.776)	(0.947)	(0.986)
t_ind3	-0.323	-0.247	-0.182
	(0.656)	(0.604)	(0.707)

Table 1.8 continued

t_ind4	0.603	0.162	-0.559
	(0.457)	(0.770)	(0.363)
t_ind5	1.535	-0.326	-1.511**
	(0.108)	(0.562)	(0.030)
t_ind7	0.244	0.297	-0.22
	(0.744)	(0.534)	(0.648)
t_ind8	0.189	0.209	-0.00077
	(0.815)	(0.706)	(0.999)
year_98	1.062**	0.379	-0.665*
	(0.019)	(0.239)	(0.067)
year_99	0.902**	0.395	-0.789**
	(0.043)	(0.214)	(0.030)
year_00	0.404	0.0296	-0.48
	(0.414)	(0.935)	(0.216)
year_01	0.193	-0.161	-0.332
	(0.706)	(0.670)	(0.385)
year_02	1.679***	0.408	-1.167**
	(0.007)	(0.314)	(0.021)
year_03	0.306	-0.234	-0.329
	(0.584)	(0.579)	(0.431)
year_04	1.077*	0.139	-1.042**
	(0.069)	(0.721)	(0.029)
year_05	-0.0491	-0.257	-0.251
	(0.930)	(0.536)	(0.559)
year_06	0.371	-0.265	-0.553
	(0.538)	(0.528)	(0.232)
Constant	-3.192***	-2.972***	0.394
	(0.008)	(0.000)	(0.623)
Observations	373	794	794

Regression results are shown in Table 1.8. Each of the three columns in the table has different dependent variables: *initiation*, *initiation_b* and *initiation_s*. Let us first look at buyer firm characteristics. In regression (1), where the dependent variable is *initiation*, book leverage, liquidity and ROE of the buyer firm are significant. Maloney, McCormick, and Mitchell (1993) argue that managerial incentives are more aligned with shareholder incentives in high leverage firms. If we take buyer initiation as a good quality, then we can explain the sign of the leverage ratio in (1); managers maximizing shareholder value initiate their own deals rather than settle for the targets on the market. A 10 percentage point increase in buyer firm leverage leads to a 3.8

percentage point increase in predicted probability of buyer initiation[31]. Liquidity also has a positive sign on the probability of buyer initiation. Predicted probability of a buyer-initiated deal goes up by 5.4 percentage points when the liquidity of the buyer goes up by 10 percentage points. If efficient firms tend to generate high cash flows and accumulate cash more quickly, we would observe a positive coefficient of liquidity on initiation[32]. Similarly, financially strong firms have high ROE ratios, and they seem to start deals by themselves. In regression (2), cash flow and size have significant and positive coefficients. The literature contains evidence that buyer firms with excess cash flows are involved in worse acquisitions, but this finding is limited to low Q firms only[33]. Cash flow could also be high for high quality firms (with well-run managements and good investment opportunities), so the positive coefficient of cash flow (a marginal effect of 0.44) is not surprising in that regard. Similarly, the size of the buyer firm could be a proxy for the quality, even though there is evidence that larger firms tend to do worse acquisitions[34].

In regressions (1) to (3), we do not observe much explanatory power of target firm characteristics in predicting deal initiation. The size of the target firm seems to have a positive influence on buyer initiation; as the size of the target increases, the probability of buyer initiation goes up. Specifically, a 10% increase in the target firm size causes a 0.69 percentage point increase in the predicted probability of buyer initiation.

[31] These marginal effects are not reported in the table, as they can be calculated using the sample means of explanatory variables.
[32] On the other hand, Harford (1999) finds that cash rich firms do worse acquisitions.
[33] Lang, Stulz, and Walkling (1991).
[34] Moeller, Schlingemann, and Stulz (2004).

1.9 Discussion

1.9.1 Information leakage

When seller firms initiate a deal, they typically hire investment banks and contact several parties during the sale process, including buyer firms. If the market learns prior to the materialization of the deal that the target firm is seeking to sell itself, the difference in the announcement day abnormal returns has a very simple explanation; the deal is predicted in seller-initiated deals, and the market reaction around the announcement day is therefore small.

To test this hypothesis, we include in our regressions a run-up variable measuring the appreciation in the target firm stock price prior to the merger. As noted in Schwert (1996), on average target firm stock price starts to appreciate 60 days before the announcement of the merger. For that reason, we define the variable *t_runup* as the cumulative abnormal returns over (-63,-6) trading days relative to the merger announcement day and include it in our regressions. Furthermore, we create a dummy variable that takes a value of 1 if "Date Announced" (DA) and "Date Originally Announced" (DOA) fields in the SDC database match. DA is the first public disclosure of the intent to merge by the firms in that deal, while DOA is the date when the target company is first publicly disclosed as a possible takeover candidate. This dummy variable intends to capture whether a target firm had prior attempts to sell itself.

The mean run-up in the target firms' stock price is 10% in buyer-initiated deals and 11.5% in seller-initiated deals. These percentages are not statistically different from each other. Furthermore, adding the run-up variable and restricting our sample to the same DA and DOA deals do not change our regression results. The premiums paid to the target firm, measured by *t_CAR*, still show significant differences with respect

to the initiation groups[35]. The run-up variable has a negative but insignificant coefficient, while initiation dummy variables still have highly significant coefficients, with the same magnitudes as in Section 1.5.2. We therefore do not find any support for the information leakage hypothesis as explained above: the differences in abnormal returns are not due to sluggish target stock price appreciation in buyer-initiated deals prior to the deal announcement date.

1.9.2 Prediction of successful closing of takeover attempts

The sample of deals includes both completed and withdrawn deals. Therefore, it is possible to test whether deal initiation has any power in predicting successful closings of deals announced. It would be particularly interesting to see whether seller-initiated deals tend to close more often than buyer-initiated deals. Target firms receive significantly lower premiums in seller-initiated deals, so it is possible that the shareholders of these firms do not approve such deals proposed by managers. On the other hand, target managers willingly initiate merger talks in seller-initiated deals, and this decision could be the best option for target firm shareholders. Buyer-initiated deals provide greater premiums for target firm shareholders, though they can be unwelcome offers to target managers, especially if they are hostile.

Several papers in the literature have built models that predict successful closing of the deal, and our set of controls is a collection of the variables in these models[36]. These variables include deal and financial variables used in previous sections, as well as toehold and termination fees.

[35] Since the time periods over which *t_runup* and *bidpremium* variables are calculated partially overlap, we include *t_runup* as an explanatory variable only in CAR regressions.
[36] Our regressions directly include toehold [Betton and Eckbo (2000)], target and buyer firm termination fees [Officer (2003)], hostility [Schwert (2000)] and indirectly include buyer firm size [Moeller, Schlingemann, and Stulz (2004)].

Logistic regression results are summarized in Table 1.9. As in previous sections, each of the three regressions uses a different initiation dummy variable to predict successful closings of the announced deal. All regressions share a common dependent variable, *completed*, that takes a value of 1 if the announced deal is eventually completed.

Table 1.9

Logistic regression model for predicting successful closing of announced takeovers

We draw our sample from the SDC database using the following restrictions: deal value is greater than $5 million, both acquirer and target are public firms located in the US, form of transaction is either 'merger' or 'acquisition of majority interest', deal status is 'completed' or 'withdrawn', no financial or utility firms and the deal announcement date falls in between 1/1/1997 and 12/31/2006. This sample is then matched with CRSP and COMPUSTAT databases. Deal initiation data comes from the SEC filings of the merging firms. The dependent variable, *completed* is 1 if the announced deal closes successfully. *initiation* is 1 if the deal is classified as buyer-initiated, and 0 if seller-initiated. *initiation_b* is 1 if the deal is buyer-initiated and 0 otherwise. *initiation_s* is 1 if the deal is seller-initiated and 0 otherwise. *t_CAR* stands for cumulative abnormal returns to the target firm 5 days around the announcement of the merger. To calculate abnormal returns, we use the market model, parameters of which are estimated over (-316,-64). Due to space limitations, the definition and calculation of deal and financial variables are explained in Appendix A.2. p-values are in parentheses, below the reported coefficients. Significance levels are denoted by an asterisk, * for 10%, ** for 5% and *** for 1%. Regressions include year and industry dummies (not reported).

	(1)	(2)	(3)
COEFFICIENT	*completed*	*completed*	*completed*
initiation	**-1.545***		
	(0.088)		
initiation_b		**0.247**	
		(0.469)	
initiation_s			**0.59**
			(0.171)
t_CAR	-0.16	-0.838	-0.709
	(0.901)	(0.133)	(0.205)
percentcash	0.524	0.292	0.31
	(0.569)	(0.448)	(0.423)
tender	-0.282	0.854**	0.886**
	(0.758)	(0.042)	(0.034)
asset_related	0.759	0.780***	0.777***
	(0.258)	(0.008)	(0.008)
competition	-4.581***	-2.169***	-2.241***
	(0.000)	(0.000)	(0.000)
unsolicited	0.0445	-1.349***	-1.270***
	(0.967)	(0.001)	(0.002)
ln_rel_size	-0.748**	-0.530***	-0.533***
	(0.030)	(0.000)	(0.000)
toehold	1.212	-0.842	-0.882
	(0.534)	(0.157)	(0.135)
t_termfee	26.48**	22.19***	21.89***
	(0.015)	(0.000)	(0.000)
a_termfee	45.67	23.24*	23.03*

Table 1.9 continued

	(0.151)	(0.086)	(0.090)
a_tobinq	-0.00731	0.0534	0.0549
	(0.981)	(0.485)	(0.478)
a_cashflow	3.355	0.294	0.302
	(0.195)	(0.690)	(0.684)
t_tobinq	0.668	0.0426	0.0491
	(0.142)	(0.707)	(0.667)
t_cashflow	1.697	-0.27	-0.192
	(0.384)	(0.742)	(0.814)
t_salesgrowth	-0.975	-0.264	-0.271
	(0.125)	(0.234)	(0.223)
t_liquidity	-3.287*	-0.733	-0.798
	(0.082)	(0.282)	(0.243)
ln_t_mvequity	-0.124	0.124	0.132
	(0.598)	(0.185)	(0.160)
Constant	14.80***	12.99***	13.19
Observations	337	836	836

In regression (1), we find a coefficient of -1.54 for the *initiation* variable, which is significant at the 10% level. This coefficient translates to a -1.2 percentage point marginal effect of buyer initiation on the predicted probability of deal closing. That is, buyer-initiated deals have a 1.2 percentage point lower probability of closing than seller-initiated deals. However, regressions (2) and (3), where *initiation_b* and *initiation_s* variables are used, respectively, indicate that initiation has no effect in predicting closing of deals.

1.9.3 Comparison of initiation group with no-initiation group

As previous regressions indicate, there seem to be differences in initiation and no-initiation groups. That is, the sample of firms for which the initiation data could be found is potentially different than the sample of firms for which the initiation data cannot be found. For example, if these two groups were identical, we would expect similar magnitudes and significance levels for the control variables in regressions (1)

and (2) in Table 1.4[37]. However, this is not the case: the competition variable is significant in regression (2) but not in (1); book leverage of the target is significant in (1) but not in (2), etc. This suggests a potential sample switching problem, which we analyze in this section.

As a first step, we examine the source of missing data. The initiation data cannot be found due to two reasons: neither of the merging firms files forms with the SEC, or, even if they do, the documents do not specify which party initiated the deal. In 96 out of 504 no-initiation deals (19%) in our sample, merging firms do not file documents with the SEC. The reason for that could be (i) the deal was called off after the announcement (not completed) or (ii) merging firms need not file documents with SEC even if the deal is consummated[38]. In Table 1.10, we summarize deal and financial characteristics of merging firms with respect to initiation groups. The first column is for the "initiation group", the deals for which initiation data could be found. The next is for the "no-initiation group", which has two sub-groups: "no SEC document" and "no initiation data". The last column shows the differences in means across these subgroups. This table reveals much about the source of differences among initiation groups. First, "initiation" and "no SEC document" groups differ in terms of deal completion. 93.2% of the announced deals are completed in the first group, while only 34.3% in the latter. Apparently, the SDC database records the intention to merge, but merging firms do not file any documents with the SEC if the deal is called off. Also, in these types of deals, the magnitude of publicized competition is much higher (22.9% versus 5.4% in "initiation" group).

[37] The other possibility is the multicollinearity between initiation variables and other control variables. However, correlation tables indicate that this is unlikely.

[38] In Chapter 2 (Structuring the Transaction – Non-Tax Considerations) of their book, Kling and Nugent (2007) summarize the cases in which stockholder approval is needed in an acquisition. If a public acquirer is not issuing stock, or issuing less than 20% of its outstanding stock in a transaction, it need not obtain stockholder approval, hence it need not submit documents to SEC. Also, target firm shareholders need not vote in "short form" mergers.

Table 1.10

Deal and financial characteristics of merging firms with respect to their initiation data

We draw our sample from the SDC database using the following restrictions: deal value is greater than $5 million, both acquirer and target are public firms located in the US, form of transaction is either 'merger' or 'acquisition of majority interest', deal status is 'completed' or 'withdrawn', no financial or utility firms and the deal announcement date falls in between 1/1/1997 and 12/31/2006. This sample is then matched with CRSP and COMPUSTAT databases. Deal initiation data comes from the SEC filings of the merging firms. 'Initiation group' is the subsample of deals for which the deal initiator is identified. In 'no SEC document' group, the SEC documents of the merging firms could not be located in the EDGAR database. In 'no initiation data' group, the documents are located, but the deal initiator could not be identified in the text. Due to space limitations, the definition and calculation of deal and financial variables are explained in Appendix A.2. Significance levels are denoted by an asterisk, * for 10%, ** for 5% and *** for 1%.

	Initiation group		No-initiation group				Differences			
	N	initiation (I)	N	no SEC document (II)	N	no initiation data (III)	(I-II)	t-value	(I-III)	t-value
PANEL A: DEAL CHARACTERISTICS										
percentcash	443	0.461	96	0.327	408	0.358	0.134	2.67***	0.103	3.43***
tender	443	0.284	96	0.083	408	0.199	0.201	4.19***	0.086	2.92***
asset_related	443	0.659	96	0.583	408	0.642	0.076	1.40	0.017	0.518
hostile	443	0.027	96	0.072	408	0.017	-0.045	-2.21**	0.010	0.97
competition	443	0.054	96	0.229	408	0.090	-0.175	-5.71***	-0.036	-2.06**
unsolicited	443	0.045	96	0.302	408	0.046	-0.257	-8.43***	-0.001	-0.099
completed	443	0.932	96	0.343	408	0.946	0.589	17.19***	-0.014	-0.83
poison	443	0.020	96	0.021	408	0.002	-0.001	-0.032	0.018	2.42**
ln_rel_size	431	-2.650	93	-1.340	400	-2.330	-1.310	-6.34***	-0.320	-2.58***
PANEL B: BUYER CHARACTERISTICS										
a_tobinq	443	2.800	96	2.020	408	3.050	0.780	2.65***	-0.250	-0.94
a_book_lev	443	0.458	96	0.534	408	0.440	-0.076	-2.92***	0.018	1.16
a_cashflow	430	0.089	95	0.033	393	0.061	0.056	2.98***	0.028	2.79***
a_salesgrowth	429	0.460	95	0.378	392	0.480	0.082	0.34	-0.020	-0.131
ln_a_mvequity	442	7.970	95	6.930	408	7.670	1.040	4.39***	0.300	1.99**
a_liquidity	443	0.470	96	0.420	408	0.482	0.050	2.12**	-0.012	-0.28
PANEL C: TARGET CHARACTERISTICS										
t_tobinq	433	2.040	95	1.620	403	2.350	0.420	2.4**	-0.310	-2.02**
t_book_lev	433	0.453	95	0.494	403	0.440	-0.041	-1.29	0.013	0.63
t_cashflow	405	-0.012	91	0.029	377	-0.010	-0.041	-1.32	-0.002	-0.14
t_salesgrowth	411	0.217	92	0.386	379	0.229	-0.169	-1.16	-0.012	-0.171
ln_t_mvequity	432	5.320	94	5.590	400	5.340	-0.270	-1.35	-0.020	-0.094
t_liquidity	433	0.573	95	0.481	403	0.560	0.092	3.19***	0.013	0.70

Second, the complicated nature of the deal may preclude the availability of initiation data for deals with SEC documents. As mentioned in Section 1.4.1, deals can take very interesting forms, especially when many buyers are involved in the process. This is reflected in the *competition* variable, which shows differences among "initiation" and "no initiation data" groups. Only 5.4% of "initiation" group deals involve a second bidder, while this ratio is 9% in the "no initiation data" group. As the number of buyer firms competing for the same target increases, initiation data become harder to find.

1.9.4 Sarbanes-Oxley Act of 2002

There could be many different components of information asymmetry between buyers and sellers of a good. In the case of mergers and acquisitions, verifying the quality of the target firm could be a major consideration during the negotiation process. If buyer firms cannot reliably validate whether the certification put forth by target firms is correct, then they could choose to insure themselves by offering lower purchasing prices to the target firms.

SOX is intended to enhance the quality of disclosure practices of public firms[39]. Therefore, we would expect the information asymmetry between acquirer and target firms on the quality of documentation to be less severe after 2002 (assuming that SOX is effective). It is therefore legitimate to ask whether SOX had any effect on the premiums paid to the target firms with respect to initiation groups.

To test this hypothesis, we add several interaction terms to our previous regressions that measure the effect of initiation before and after 2002. Table 1.11

[39] This act enforces several rules such as external auditor independence, management responsibility for the accuracy and completeness of financial statements and more efficient internal control mechanisms.

summarizes our results. In regressions (1) to (3), we use *t_CAR* as our dependent variable and *bidpremium* in (4) to (6). The coefficients of the interaction terms (e.g., *init_after2002* in regression (1)) measure the additional effect of initiation after the act was passed in 2002. The interaction variables have negative and significant coefficients in regressions (4) and (5), meaning that the bid premium differences for buyer-initiated deals eroded after 2002. The remaining regressions show no significance for the interaction term, but the signs of these interaction variables are consistently negative (except when the *initation_s* variable is used).

Table 1.11
Cross-sectional regression analysis of target firm abnormal returns with time interaction variables

We draw our sample from the SDC database using the following restrictions: deal value is greater than $5 million, both acquirer and target are public firms located in the US, form of transaction is either 'merger' or 'acquisition of majority interest', deal status is 'completed' or 'withdrawn', no financial or utility firms and the deal announcement date falls in between 1/1/1997 and 12/31/2006. This sample is then matched with CRSP and COMPUSTAT databases. Deal initiation data comes from the SEC filings of the merging firms. *t_CAR* stands for cumulative abnormal returns to the target firm 5 days around the announcement of the merger. To calculate abnormal returns, we use the market model, parameters of which are estimated over (-316,-64). *bidpremium* is the buy-and-hold abnormal returns of the target firm stock starting 63 days before the announcement of the merger and ending at the deal closing date. If the deal closing day exceeds +126, we truncate the buy-and-hold period at this date. *initiation* is 1 if the deal is classified as buyer-initiated, and 0 if seller-initiated. *after2002* is 1 if the deal is announced after 2002. *init_after2002* is an interaction variable, where initiation is multiplied with a dummy variable taking a value of 1 for deals announced after 2002. *initiation_b* is 1 if the deal is buyer-initiated and 0 otherwise. *initiation_s* is 1 if the deal is seller-initiated and 0 otherwise. Due to space limitations, the definition and calculation of deal and financial variables are explained in Appendix A.2. t-values are in parentheses, below the reported coefficients. Significance levels are denoted by an asterisk, * for 10%, ** for 5% and *** for 1%. Regressions include industry dummies (not reported).

	(1)	(2)	(3)	(4)	(5)	(6)
COEFFICIENT	*t_CAR*	*t_CAR*	*t_CAR*	*bidpremium*	*bidpremium*	*bidpremium*
initiation	**0.143*** **			**0.347*** **		
	(3.853)			**(4.115)**		
init_after2002	**-0.054**			**-0.296***		
	(-0.794)			**(-1.912)**		
after2002	-0.0366	-0.021	-0.0499**	0.197	0.111	0.008
	(-0.661)	(-0.809)	(-2.027)	(1.558)	(1.628)	(0.123)
initiation_b		**0.108*** **			**0.263*** **	
		(4.294)			**(3.979)**	
init_b_after2002		**-0.0572**			**-0.272****	
		(-1.219)			**(-2.200)**	
initiation_s			**-0.104*** **			**-0.212*** **
			(-3.592)			**(-2.771)**
init_s_after2002			**0.0541**			**0.126**
			(1.030)			**(0.905)**
percentcash	0.0593	0.0603**	0.0616**	-0.187*	-0.0798	-0.0777
	(1.344)	(2.286)	(2.324)	(-1.859)	(-1.147)	(-1.110)

Table 1.11 cont.

tender	0.0862**	0.0812***	0.0958***	0.0292	-0.0192	0.0156
	(2.067)	(3.084)	(3.643)	(0.307)	(-0.277)	(0.224)
asset_related	0.0527	0.0333	0.0363*	0.0606	0.0972*	0.102*
	(1.568)	(1.602)	(1.739)	(0.791)	(1.772)	(1.855)
competition	-0.0974	-0.106***	-0.116***	0.11	0.0403	0.0222
	(-1.328)	(-2.856)	(-3.112)	(0.661)	(0.411)	(0.226)
unsolicited	-0.0158	0.0359	0.0233	0.21	0.410***	0.379***
	(-0.202)	(0.878)	(0.564)	(1.179)	(3.793)	(3.476)
completed	-0.0139	-0.0221	-0.012	0.0617	0.361***	0.383***
	(-0.205)	(-0.687)	(-0.370)	(0.399)	(4.251)	(4.477)
ln_rel_size	-0.0271**	-0.0295***	-0.0316***	-0.0901***	-0.0804***	-0.0835***
	(-2.492)	(-4.626)	(-4.945)	(-3.647)	(-4.775)	(-4.939)
a_tobinq	-0.00679	0.0029	0.00243	0.0164	0.00854	0.00756
	(-0.646)	(0.883)	(0.736)	(0.685)	(0.986)	(0.867)
a_book_lev	-0.13	-0.0843*	-0.0833*	0.2	-0.019	-0.0186
	(-1.624)	(-1.871)	(-1.834)	(1.093)	(-0.160)	(-0.155)
a_cashflow	0.0218	-0.0781	-0.0627	0.513	-0.00213	0.0335
	(0.154)	(-1.243)	(-0.996)	(1.593)	(-0.0129)	(0.201)
t_tobinq	-0.0300*	-0.0141**	-0.0159**	0.0359	-0.018	-0.0226
	(-1.964)	(-2.103)	(-2.363)	(1.034)	(-1.016)	(-1.269)
t_book_lev	-0.173***	-0.0342	-0.0343	-0.106	-0.102	-0.103
	(-2.604)	(-0.904)	(-0.903)	(-0.700)	(-1.016)	(-1.024)
t_cashflow	-0.136	-0.0651	-0.0663	0.116	0.247	0.228
	(-1.420)	(-1.027)	(-1.045)	(0.530)	(1.474)	(1.361)
t_salesgrowth	0.0172	0.0106	0.00589	-0.325***	-0.152***	-0.162***
	(0.476)	(0.565)	(0.312)	(-3.949)	(-3.065)	(-3.239)
t_liquidity	-0.166*	-0.0485	-0.0317	-0.464**	-0.151	-0.112
	(-1.870)	(-0.940)	(-0.612)	(-2.296)	(-1.110)	(-0.819)
ln_t_mvequity	-0.00671	-0.0160**	-0.0142**	-0.0865***	-0.0592***	-0.0545***
	(-0.539)	(-2.362)	(-2.090)	(-3.053)	(-3.300)	(-3.037)
t_ROE	-0.0113	0.00942	0.00799	0.0693	0.0439	0.0451
	(-0.330)	(0.491)	(0.416)	(0.886)	(0.868)	(0.889)
t_R&D	-0.0468	-0.0639	-0.0689	0.264	0.591**	0.574**
	(-0.290)	(-0.623)	(-0.670)	(0.717)	(2.183)	(2.110)
t_capex	0.0125	0.148	0.172	-0.108	0.301	0.346
	(0.047)	(1.125)	(1.303)	(-0.179)	(0.867)	(0.990)
t_dividend	0.438	0.457	0.822	-0.378	-0.638	0.299
	(0.363)	(0.487)	(0.870)	(-0.138)	(-0.258)	(0.120)
Constant	0.814***	0.665**	0.715***	0.961	0.835	0.873
	(2.615)	(2.436)	(2.625)	(1.356)	(1.160)	(1.212)
Observations	380	817	817	380	817	817
R-squared	0.223	0.181	0.175	0.202	0.165	0.156

In regression (1), we see that buyer-initiated deals have 14.3 percentage points larger CAR's than seller-initiated deals before 2002, and only 8.9 (14.3-5.4) percentage points after 2002. When the variable *initiation_b* is used in regression (2), we see a 10.8 percentage point difference before 2002 and 5.1 (10.8-5.7) percentage points after 2002. The picture is very similar in regressions (4) and (5), where bid

premium is used as a dependent variable. The premium difference in regression (4) is 34.7 percentage points before 2002 and 5.1 after, while it is 26.3 and -0.9 percentage points, respectively, in regression (5).

As Table 1.12 shows, there is not a clear turnaround of simple sub-sample mean premiums after SOX. Premiums paid to the target firms in year 2004 are higher in seller-initiated deals. For all remaining years, including years after 2002, buyer-initiated deals dominate seller-initiated deals. We also note that sample sizes after 2002 shrink significantly, reducing the informational content of the data and increasing the sample variance.

Table 1.12

Premiums paid to target firms with respect to years and initiation groups

We draw our sample from the SDC database using the following restrictions: deal value is greater than $5 million, both acquirer and target are public firms located in the US, form of transaction is either 'merger' or 'acquisition of majority interest', deal status is 'completed' or 'withdrawn', no financial or utility firms and the deal announcement date falls in between 1/1/1997 and 12/31/2006. This sample is then matched with CRSP and COMPUSTAT databases. Deal initiation data comes from the SEC filings of the merging firms. The first column, N, shows number of buyer and seller-initiated deals with respect to years. *t_CAR* stands for cumulative abnormal returns to the target firm 5 days around the announcement of the merger. To calculate abnormal returns, we use the market model, parameters of which are estimated over (-316,-64). *bidpremium* is the buy-and-hold abnormal returns of the target firm stock starting 63 days before the announcement of the merger and ending at the deal closing date. If the deal closing day exceeds +126, we truncate the buy-and-hold period at this date. The numbers in the table are the means of these variables.

	N		*t_CAR*		*bidpremium*	
	Buyer-init.	Seller-init.	Buyer-init.	Seller-init.	Buyer-init.	Seller-init.
1997	31	30	0.23	0.14	0.58	0.29
1998	39	20	0.29	0.16	0.36	0.08
1999	51	21	0.34	0.2	0.81	0.63
2000	27	23	0.34	0.24	0.65	0.44
2001	20	28	0.47	0.26	0.45	0.4
2002	21	11	0.47	0.3	0.64	0.1
2003	15	19	0.43	0.25	0.91	0.73
2004	19	8	0.18	0.28	0.22	0.35
2005	19	12	0.27	0.12	0.47	0.22
2006	18	11	0.22	0.17	0.35	0.12

At first sight, the limited evidence on the decrease in bid premium differentials could be attributed to SOX, as it is one of the major events in financial markets that year. One can argue that SOX provided a more transparent environment for the due diligence process of buyer firms, removing the informational disadvantage. Thus,

there would be no reason for higher premiums paid to target firms in buyer-initiated deals after 2002. However, this statement comes with a caveat. The enactment of SOX in July 2002 follows the U.S. dot-com bubble and its subsequent collapse. The period before 2000 is characterized by high valuations and market volatility. Those kinds of market conditions could result in information asymmetries unrelated to frictions in documentation quality. Buyers could be extremely cautious about firms trying to sell themselves during this period, as this might be a strong signal for overvaluation. This could result in larger discounts in target firm premiums in seller-initiated deals.

In summary, we find some evidence that target firms received larger premiums in buyer-initiated deals before 2002, and not after 2002. It remains unclear whether this change can be attributed to SOX. There are several layers of information symmetry and SOX attempts to reduce only a subset of them. Because the enactment of SOX follows the burst of the dot-com bubble and the economic crises surrounding 9/11, it is hard to disentangle their effects on M&A markets.

1.10 Conclusion

This paper shows that target firms receive significantly lower premiums when they decide to sell themselves, without prior solicitations. Average premiums paid to target firms, measured by CAR's around announcement dates, are 12 percentage points lower in seller-initiated deals. Our conjecture is that buyer firms are suspicious of firms selling themselves, as self-sale brings the target firm's quality into question. We cannot fully test the liquidity hypothesis due to data availability. However, preliminary evidence against this hypothesis is found in target firms receiving significantly higher premiums in buyer-initiated deals compared to seller-initiated deals in the period of 1997 - 1999, a highly liquid period for market participants. As for the financial

distress hypothesis, we find that target firms are financially weaker in seller-initiated deals than in buyer-initiated deals, but being in financial distress does not affect the premiums paid to them.

Even though target firms are paid more in buyer-initiated deals, there is no overpayment from buyer firm shareholders to target firm shareholders in these types of deals. Buyer firms in both initiation groups experience an average of a 2% drop in their stock prices around the day of the merger announcement. We observe synergistic gains in buyer-initiated deals, especially when the buyer acquires the target in a tender offer.

Large, liquid and high return-on-equity buyer firms initiate deals more frequently. Larger target firms do not decide to sell themselves very often, relative to smaller target firms. There is some evidence that seller-initiated deals tend to close more often after they are publicly announced. This is most likely due to the consent of the target firm managers in this type of deal, as opposed to hostile deals in which there may be managerial resistance to the merger. Finally, we show that higher premiums paid to target firms in buyer-initiated deals weakened after 2002. Whether the Sarbanes Oxley Act of 2002 is the main cause of convergence in premiums across initiation groups remains an open question.

There are potential limitations to these findings. First, although the set of control variables is large and includes various deal and financial characteristics of the merging firms, it is possible that initiation dummies capture the effect of an omitted variable. Second, it is legitimate to question whether the results in this paper are applicable to different time periods. Information asymmetries could be manifested only in high valuation and volatility periods (such as the sample period considered), and this might be the primary cause for premium differences.

Deal initiation data could add new perspectives to the ongoing debates in several

areas of the M&A literature. For example, it would be interesting to examine the relationship between the level of private competition [Boone and Mulherin (2007)] and deal initiation in takeover markets. When a seller decides to sell itself, how many potential buyers do they contact? Does negotiation with a single buyer imply lower premiums? In buyer-initiated deals, do target firms usually contact other potential buyers after receiving an initial offer?

Another potentially interesting field able to make use of the deal initiation data could be earnings management. Erickson and Wang (1999) document earnings management practices of acquirers in stock-for-stock mergers. Is earnings management more common in buyer-initiated deals? Do target firms manage earnings before they decide to sell themselves? What other kinds of enhancements do target firms use prior to contacting potential buyers?

It would also be interesting to analyze the existence of premium differences across initiation groups for the set of firms that are excluded from our sample, such as financial institutions and (separately) utility firms. Private firms, which do not exist in our sample, could be an appropriate sample to test the information asymmetry hypothesis. For example potential buyers could be very cautious about a private firm selling itself rather than a public firm selling itself. Private firms are more likely to be opaque entities compared to public firms, releasing minimal information to outside.

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CHAPTER 2

CORPORATE FINANCING AND INVESTMENT DECISIONS WHEN INVESTORS HAVE INFORMATION THAT OTHER INVESTORS DO NOT HAVE

2.1 Introduction

One of the central questions in corporate finance is the optimality of investment and financing decisions of firms. In their seminal paper, Modigliani and Miller (1958) show that financing decisions of firms are irrelevant for maximizing firm value in frictionless markets. Several authors point out that the underlying assumptions leading to this result could be too strict in some cases, hence capital structure decisions of firms may matter for firm value. For example, Modigliani and Miller (1958) themselves recognize the trade-off between the tax advantage of debt financing and the financial distress costs it brings. Jensen and Meckling (1976) argue that the objectives of the managers and the shareholders do not always coincide, and financing decisions could mitigate or exacerbate such frictions.

In addition to the trade-off and agency hypothesis of corporate financing, Myers and Majluf (1984) (hereinafter MM) and Myers (1984) note that markets are not always characterized with perfect information. In particular, there are information asymmetries between the managers of the firm and outside investors which have significant consequences for the choice of financing. The managers of the firm have access to inside information and hence know more about the quality of the firm than outside investors. This adverse selection problem, as described in Akerlof (1970), results in a pecking order for financing: firms first use financing tools that are least

sensitive to asymmetric information and then move onto other sources of financing. The pecking order theory therefore suggests that firms use cash, then debt and finally equity to finance their operations.

In this paper, we add another layer of information asymmetry into the original MM model. We analyze financing decisions of firms when there is information asymmetry *among* the set of outside investors. In other words, we consider cases in which outside investors have differential information about the quality of the firm that they are investing in. Note here that the original MM model assumes that the set of outside investors are homogenous and the only information asymmetry is between the managers of the firm and outside investors. As in Agarwal and O'Hara (2007), we call the information asymmetry among the set of outside investors the extrinsic information asymmetry (EIA) and the information asymmetry between the firm and investors the intrinsic information asymmetry (IIA).

There are different ways to incorporate EIA in the original MM setup. It would be very convenient from the modelling perspective to assume that the investors have static heterogenous beliefs. However, it is more powerful and realistic to have investors that have differential information in equilibrium, rather than assuming it in the first place. We therefore use a model in which investors learn from every information source available to them and update their beliefs accordingly. The type of model used in this paper is first introduced by Grossman and Stiglitz (1980) and used in several other contexts (e.g. Easley and O'Hara (2004) and Veldkamp (2006)). Similar to these papers, there are two types of investors in our model: uninformed investors receive only public information about asset payoffs while informed investors receive additional private signals. Therefore, informed investors have a better estimate of the underlying payoff distribution than the uninformed. However, uninformed investors are not limited to public level information in forming their beliefs. They also

use the equilibrium price to learn about the private information held by the informed investors. In other words, the price that arises in this partially revealing rational expectations equilibrium reveals a portion of the private information held by informed investors.

The EIA between investors is measured by the proportion of the number of public signals to the total number of signals. If there is more private information available to informed investors, then the EIA between investors is higher. We prove that if the EIA measure is higher, then the equilibrium stock price is lower. This aspect of our model is very similar to the arguments put forth in Easley, Hvidkjaer and O'Hara (2002) and Easley and O'Hara (2004). If there is less public information available to uninformed investors, they hold less of the stock as they know that their information is not as accurate. The drop in their demand causes the equilibrium stock price to go down. This result has a direct implication for corporate financing. If a firm needs to finance a real investment project that costs a fixed amount, then financing it through equity would be more costly, as the firm needs to sell equity at a lower price. Therefore high EIA results in a low stock price, which in turn reduces the payoff of the firm from equity financing.

Introducing EIA into the MM model is important for several reasons. Most importantly, our paper shows how the EIA between investors affect the financing decisions of firms. In their empirical study, Agarwal and O'Hara (2007) show that firms with high EIA, measured by Probability of Informed Trading (PIN)[40], have higher leverage ratios. Using an index of information asymmetry, Bharath, Pasquariello and Wu (2006) provides empirical evidence that higher EIA leads to higher leverage ratios. Our paper thus provides a theoretical basis for their results.

Our paper is organized as follows. In Section 2.2, we explain the model in detail.

[40] For more on PIN, see Easley, Hvidkjaer and O'Hara (2002).

This includes firm's and investors' optimization problems, the information structure and the timing of events in this economy. We also show that a partially revealing rational expectations equilibrium exists for this economy. In Section 2.3, we go over our main result, which is the effect of EIA on financing decisions of firms. We discuss several aspects of our modelling choice in Section 2.4. Section 2.5 concludes the paper.

2.2 A model of extrinsic information asymmetry

Our model is based on three periods. In the first period, the firm chooses how many shares to issue and sell in the market, for the purpose of financing a real project. In the second period, investors form their optimal portfolios conditional on their information sets and the number of shares issued by the firm in the first period. In the last period, investors learn the realization of the random stock return and consume their terminal wealth. Besides the firm and investors, there is an investment bank providing consulting services to the firm in choosing the number of shares to issue in period one.

2.2.1 The firm

The firm faces a real investment project, which costs $E > 0$ dollars and returns a random $\tilde{b}$ dollars, net of E. The project can't be divided into smaller pieces. That is, the firm either invests E to finance the project or not at all. We assume that the firm has no internal resources or capacity to issue debt to finance the project. Therefore, equity financing is the only option for the firm. The firm has a net value of $a > 0$ dollars prior to investing in the project. $E$and a are known to all parties in the model, whereas the realization of $\tilde{b}$, denoted by b, is only known to the manager.

In period one, the firm hires an investment bank to determine how many shares it needs to sell in period two to finance the project. That is, the manager would like to find S, the number of shares to be sold in period two, such that the net proceeds from equity offering, $(1-\kappa)P(S)S$, equals E. Here, $P(S)$ is the stock price in period two when S shares are sold in the market, and $0 < \kappa < 1$ is the underwriting fee of the investment bank in percentage terms.

The firm maximizes the payoff of existing shareholders in the final period, $(E + a + b)(S_0 - S)$. The total number of shares, S_0, is normalized to 1. As a result, the manager faces the following problem in period one,

$$\begin{aligned} Max_{\{S\in\mathbb{R}\}}\Pi &= (E + a + b)(1 - S) \\ s.t\ (1-\kappa)P(S)S &= E \\ 0 < S &< 1 \end{aligned} \tag{2.1}$$

We denote the solution to this problem as S^*. Note here that the existing shareholders' payoff can be set in another way. If the firm issues new shares without taking away from the existing shareholders, then the objective function of the firm should be written as $(E + a + b)[S_0/(S_0 + S)]$. Our specification assumes that the total number of shares of the firm is fixed at S_0, meaning that the existing shareholders sell a portion of their shares to raise capital in the market. While these two objective functions are technically different from each other, there is little conceptual distinction between the two. We use the one in (2.1) due to its technical ease.

2.2.2 Investors

In the beginning of the second period, each investor learns S^*, the number of shares the firm is selling. Combining this information with their knowledge of E, a and signals on $\tilde{b}$, they form their optimal portfolios. Investors, all of whom have Constant

Absolute Risk Aversion (CARA) utility functions, are of two types; informed and uninformed. There is a total of $N > 0$ investors and $0 < \lambda < 1$ proportion of them are informed[41]. The investors are identical except for their information sets. Uninformed investors receive a total of $I_1 > 0$ independent public signals about $\tilde{b}$. Given b, these signals are distributed normal; $s_i|b \sim N(b, 1/\gamma)$ where $\gamma > 0$ is the precision of the signal. In addition to the I_1 public signals, informed investors receive $I_2 - I_1 > 0$ independent private signals. Let $\alpha = I_1/I_2$ denote the proportion of signals that are public. The common prior for $\tilde{b}$ is, $\tilde{b} \sim N(\bar{b}, 1/\rho)$, with $\rho > 0$.

There are two assets in the market; the riskless asset and the stock of the firm. Each investor is endowed with $W_0 > 0$ amount of the riskless asset. The riskless asset pays off 1 dollar for each dollar invested, while the risky stock pays off a random $E + a + \tilde{b}$ dollars[42]. The difference between informed and uninformed investors' portfolios comes through $\tilde{b}$; informed investors have better information about the distribution of $\tilde{b}$, as they receive more signals than the uninformed investors.

The investors' problems are,

$$\begin{aligned} &\mathrm{Max}_{\{\mathrm{d,m}\in\mathbb{R}\}}\mathrm{E}\{\mathrm{e}^{-\delta \mathrm{W}_1}|\mathrm{I}\} \\ &\mathrm{s.t}\ \mathrm{P}(\mathrm{S}^*)\mathrm{d} + \mathrm{m} \le \mathrm{W}_0 \\ &\mathrm{ud} + \mathrm{m} \ge \mathrm{W}_1 \end{aligned} \tag{2.2}$$

where d and m are the amount of stock and the riskless asset the investors' demand, respectively. $P(S^*)$ is the stock price given that the manager decides to issue S^* number of shares in period one, I is the information set of the investor, $\delta > 0$ is the risk aversion coefficient and $u = E + a + \tilde{b}$ is the random stock payoff that is realized in period three.

[41] We assume that λ is exogenous throughout our analysis: endogenous information acquisition is not studied in this paper.

[42] If instead we use the other specification of the firm's objective function where the total number of shares outstanding is increasing in the number of new shares issued, then the per share stock payoff depends on the number of new shares issued, which makes the investors' problem more complicated.

Investors are on the demand side for the firm's stock. The supply side consists of the firm and noise traders. Without noise traders, uninformed investors can extract the private signals of the informed investors from the equilibrium price, resulting in a fully revealing rational expectations equilibrium. Therefore, we assume that there is a random noisy supply of stock (per capita) in period two, $\tilde{x} \sim N(\bar{x}, 1/\eta)$ with $\bar{x}, \eta > 0$, in addition to the S^* shares issued by the firm in the first period. Note here that the realization of this random variable, as well as all public and private signals are known by the firm in period one.

2.2.3 Equilibrium

We start with the definition of the equilibrium for this model.

Definition 2.1 Given parameters $(W_0, \lambda, \alpha, \delta, \kappa, a, E, \bar{x}, \bar{b}, \gamma, \rho, \eta)$, the tuple (d_I^*, d_U^*, S^*) and $P(S^*) > 0$ constitute a "two-period equilibrium" if,

(i) d_I^* (respectively d_U^*) solves informed agents' (uninformed agents') problems in the second period, (2.2), conditional on their information set and $P(S^*)$,

(ii) S^* solves the firm's problem in the first period, (2.1), conditional on its information set,

(iii) the stock market clears in the second period.

Since the players in this model take actions in turn, the firm in period one and investors in period two, we can show the existence of equilibrium period by period. It is more intuitive to start with period two.

2.2.3.1 Period 2

In the beginning of period two, investors learn the realization of all public signals for b, how many shares the firm is selling (S^*), the total cost of the investment (E) and the current value of the firm (a). In addition to these, informed investors also receive their private signals. Note here that learning about S^* and E implies by (2.1) that investors know the realization of $P(S^*)$. This does not provide investors with new information as they reach this equilibrium price after trading their shares in the market. The important point is that investors take $P(S^*)$ as given.

The combination of a CARA utility function with a normal distribution results in a neat use of the moment generating function for a normal distribution. The solution to (2.2) becomes,

$$d|I = \frac{E\{u|I\} - P(S^*)}{\delta Var\{u|I\}} \tag{2.3}$$

The advantage of this stock demand function is that it does not depend on investors' wealths. Hence, our results are purely a consequence of differential information between investors.

The informed investors use both public and private signals to update their beliefs on $\tilde{b}$. Since a normal distribution is conjugate to itself, the posterior of $\tilde{b}$, after receiving all I_2 signals is:

$$\tilde{b}_I \sim N\left(\frac{\bar{b}\rho + \left(\sum_{i=1}^{I_2} s_i\right)\gamma}{\rho + I_2\gamma}, \frac{1}{\rho + I_2\gamma}\right) \tag{2.4}$$

where $\tilde{b}_I$ stands for the informed investors' posterior. Therefore, their demand for the risky asset is,

$$d_I = \frac{E + a + \frac{\bar{b}\rho + \left(\sum_{i=1}^{I_2} s_i\right)\gamma}{\rho + I_2\gamma} - P(S^*)}{\delta\left(\frac{1}{\rho + I_2\gamma}\right)} = \frac{\bar{b}\rho + \left(\sum_{i=1}^{I_2} s_i\right)\gamma - (P(S^*) - E - a)(\rho + I_2\gamma)}{\delta} \tag{2.5}$$

Uninformed investors have two sources of information to update their beliefs on $\tilde{b}$;

public information (I_1 public signals) and the equilibrium price function they conjecture:

$$P(S^*) = c_1(E + a) + c_2\bar{b} + c_3\sum_{i=1}^{\alpha I_2} s_i + c_4\sum_{i=\alpha I_2+1}^{I_2} s_i - c_5 x + c_6\bar{x} - c_7(\frac{S^*}{N}) \qquad (2.6)$$

where c_i's are coefficients to be determined after solving for equilibrium.

Uninformed investors create the signal θ from this function,

$$\theta = \frac{P(S^*) - (c_1(E+a) + c_2\bar{b} + c_3\sum_{i=1}^{\alpha I_2} s_i) + (c_5 - c_6)\bar{x} + c_7(\frac{S^*}{N})}{c_4(1-\alpha)I_2} \qquad (2.7)$$

$$= \frac{\sum_{i=\alpha I_2+1}^{I_2} s_i}{(1-\alpha)I_2} - \frac{c_5}{c_4(1-\alpha)I_2}(x - \bar{x})$$

Using the right hand side of (2.7), it can be seen that $\theta|b \sim N(b, 1/\rho_\theta)$ where,

$$\rho_\theta = [\frac{1}{\gamma(1-\alpha)I_2} + \frac{1}{(\frac{c_4(1-\alpha)I_2}{c_5})^2\eta}]^{-1} \qquad (2.8)$$

Applying Bayes rule twice - using I_1 public signals and then θ - gives the posterior of uninformed investors as,

$$\tilde{b}_U \sim N(\frac{\bar{b}\rho + (\sum_{i=1}^{\alpha I_2} s_i)\gamma + \theta\rho_\theta}{\rho + \alpha I_2\gamma + \rho_\theta}, \frac{1}{\rho + \alpha I_2\gamma + \rho_\theta}) \qquad (2.9)$$

So their demand for the risky asset is,

$$d_U = \frac{E + a + \frac{\bar{b}\rho + (\sum_{i=1}^{\alpha I_2} s_i)\gamma + \theta\rho_\theta}{\rho + \alpha I_2\gamma + \rho_\theta} - P(S^*)}{\delta(\frac{1}{\rho + \alpha I_2\gamma + \rho_\theta})} \qquad (2.10)$$

$$= \frac{\bar{b}\rho + (\sum_{i=1}^{\alpha I_2} s_i)\gamma + \theta\rho_\theta - (P(S^*) - E - a)(\rho + \alpha I_2\gamma + \rho_\theta)}{\delta}$$

Solving for the equilibrium from here involves equating stock demand to the stock supply.

Proposition 2.2 A partially revealing rational expectations equilibrium exists in period two, with the following equilibrium price function:

$$P(S^*) = c_1(E + a) + c_2\bar{b} + c_3\sum_{i=1}^{\alpha I_2} s_i + c_4\sum_{i=\alpha I_2+1}^{I_2} s_i - c_5 x + c_6\bar{x} - c_7(\frac{S^*}{N})$$

where

$$c_1 = 1,\ c_2 = \frac{\rho/\delta}{\text{Den}} > 0,\ c_3 = \frac{\gamma/\delta}{\text{Den}} > 0,\ c_4 = \frac{\frac{\lambda\gamma}{\delta} + \frac{(1-\lambda)\rho_\theta}{\delta(1-\alpha)I_2}}{\text{Den}} > 0,\ c_5 = \frac{1 + \frac{(1-\lambda)\rho_\theta}{(1-\alpha)I_2}\frac{1}{\lambda\gamma}}{\text{Den}} > 0$$

$$c_6 = \frac{\frac{(1-\lambda)\rho_\theta}{(1-\alpha)I_2}\frac{1}{\lambda\gamma}}{\text{Den}} > 0,\ c_7 = \frac{1}{\text{Den}} > 0$$

$$\text{Den} = \frac{1}{\delta}[\lambda(\rho + \gamma I_2) + (1-\lambda)(\rho + \gamma\alpha I_2 + \rho_\theta)] > 0$$

$$\rho_\theta = [\frac{1}{\gamma(1-\alpha)I_2} + \frac{1}{(\frac{\lambda\gamma(1-\alpha)I_2}{\delta})^2\eta}]^{-1} > 0$$

Proof. See Appendix B.

2.2.3.2 Period 1

The manager of the firm can alter the stock price that arises in the second period by changing S in the first period. Since the firm needs to raise a fixed amount of capital from the investors, there is a negative relation between the number of shares issued and the share price. The constraint in the firm's problem reflects this fact.

In order to solve its problem, the firm needs to know the equilibrium stock price that will arise in period two if it issues S shares in period one. We assume that the investment bank has the necessary expertise and the experience to figure this out for the firm. It might be better to think of roadshows performed by the investment banks in the IPO or SEO process for justifying this assumption.

Given the price function $P(S)$, the firm's problem is to solve $(1-\kappa)P(S)S = E$ while maximizing the objective function in (2.1).

Proposition 2.3 There exists a unique solution to the firm's problem in the first period, (2.1),

$$S^* = \frac{-B+\sqrt{B^2-4AC}}{2A}$$

if,

(a) $B^2 \geq 4AC$

(b) $S^* < 1$

where

$$A = -\frac{c_7}{N}$$

$$B = c_1(E+a) + c_2\bar{b} + c_3\sum_{i=1}^{\alpha I_2} s_i + c_4\sum_{i=\alpha I_2+1}^{I_2} s_i - c_5 x + c_6\bar{x}$$

$$C = -\frac{E}{(1-\kappa)}$$

Proof. See Appendix B.

In accordance with Definition 2.1, we can combine the results in Proposition 2.2 and 2.3 to claim that an overall rational expectations equilibrium exists for the economy if the necessary conditions are satisfied.

Proposition 2.4 A "two-period equilibrium" exists, provided that the conditions in Proposition 2.3 are satisfied.

Proof. Follows directly from Proposition 2.2 and Proposition 2.3.

2.3 Extrinsic information asymmetry and financing decisions

We completed the setup of our model in the previous section. As Proposition 2.4

shows, a two period equilibrium exists for this economy conditional on appropriate parameter values. We are now ready to examine the relation between extrinsic information asymmetry and the payoff to the firm from equity financing. α, the proportion of signals that are public, measures the extrinsic information asymmetry between informed and uninformed investors. As α goes up, informed investors receive fewer private signals about the net investment payoff, pushing their information set closer to uninformed investors'. Note here that a comparative static exercise with α keeps the total number of signals, I_2, constant. This means that the total amount of information available to outside investors, hence the intrinsic information asymmetry between the firm and the outsiders, is the same. Difficulties arise when one tries finding proxies for extrinsic and intrinsic information asymmetries to test this prediction using data.

The firm's objective is to maximize the payoff to the existing shareholders. As long as the firm raises the required capital to finance the project, the old shareholders are better off by selling a small number of shares at a high price, as this maximizes the number of shares retained by them. The effect of extrinsic information asymmetry has its primary impact in period two, when the shares of the firm are traded in the market. Therefore, the crucial endogenous variable that should be followed is the equilibrium stock price. If extrinsic information asymmetry among investors depresses the equilibrium stock price in period two, then the firm has to issue more shares to raise the required amount. In this sense, our model very much resembles the one in Easley and O'Hara (2004). The authors' comparative static objective in this paper is to identify the parameters that alter the equilibrium cost of capital, which is basically the expected payoff minus the expected stock price. Their comparative static result also heavily depends on the equilibrium stock price.

Showing the effect of α on the firm's objective function is simply a comparative

static exercise. Rather than performing this exercise for a particular economy in which the random signals have been realized, we show the effect of extrinsic information asymmetry on the *expected* payoff to the firm. This expected payoff could be interpreted as the payoff of the firm when this economy is repeated many times. Since our objective is to describe how firms' financing decisions change due to systematic differences in information, this choice seem to be more appropriate. To be more concrete, we state the firm's problem for this "average" economy as:

$$\begin{aligned} &\mathrm{Max}_{\{E\{S\}\in\mathbb{R}\}}\Pi = (E + a + b)(1 - E\{S\}) \\ &s.t\ (1-\kappa)E\{P(S)\}E\{S\} = E \\ &0 < E\{S\} < 1 \end{aligned} \tag{2.11}$$

The investors' problem is the same as in (2.2). Lemma 2.5 below proves that there exists a solution for this "average" economy.

Lemma 2.5 There exists a unique solution to the firm's problem in (2.11),

$$E\{S^*\} = \frac{(E+a+\bar{b}-\frac{\bar{x}}{Den})-\sqrt{(E+a+\bar{b}-\frac{\bar{x}}{Den})^2-4\frac{1}{N(Den)}\frac{E}{(1-\kappa)}}}{2\frac{1}{N(Den)}}$$

if,

(a) $(E + a + \bar{b} - \frac{\bar{x}}{Den})^2 > 4\frac{1}{N(Den)}\frac{E}{(1-\kappa)}$

(b) $0 < E\{S^*\} < 1$

Proof. See Appendix B.

We are now ready to do comparative statics to show the effect of extrinsic information asymmetry on the firm's expected payoff. We also show in Proposition 2.6 below how this expected payoff is affected by other parameters in the model.

Proposition 2.6 If an equilibrium exists for the economy defined in (2.11), the firm's expected payoff is higher if,

(i) The proportion of public signals, α, is higher

(ii) The total number of signals, I_2, is higher

(iii) The number of investors in the economy, N, is higher

(iv) The proportion of informed traders, λ, is higher

(v) The precision of signals, γ, is higher

(vi) The precision of the noisy supply, η, is higher

(vii) The precision of the prior of the investment return, ρ, is higher

(viii) The net value of the firm, a, is higher

(ix) The mean of the prior of the investment return, $\bar{b}$, is higher

(x) The mean of the noisy supply, $\bar{x}$, is lower

(xi) The risk aversion coefficient of investors, δ, is lower

(xii) The investment bank commission rate, κ, is lower.

Proof. See Appendix B.

As this proposition shows, the firm is better off when there is less extrinsic information asymmetry among investors. To understand this result better, suppose that for a given economy one of the private signals available to informed investors becomes public information. Informed investors' stock demand is not affected by this change as they still possess superior information about the project payoff. However, uninformed investors' demand for stock changes. They still extract a portion of informed investors' private information through the equilibrium price, but now they know the realization of one of the signals that became public. Having a better assessment of the payoff distribution, uninformed investors demand more of the risky stock pushing the overall demand for stock higher and this results in an increase in the

stock price. A higher stock price is better for the firm, because it reduces the number of shares to be issued to finance the project.

An increase in the total number of signals raises the stock demands of both informed and uninformed investors, resulting in an increase in the expected stock price. The per capita supply of shares, S/N decreases in N, therefore an increase in the total number of investors reduces the supply of the stock, pushing the expected stock price higher. An increase in the proportion of informed traders in the market leads to a more informative equilibrium price for uninformed investors, leading to a higher equilibrium stock price. The interpretations of the remaining comparative static results are left for the reader. We provide the comparative statics results in Table 2.1 below.

Table 2.1
Comparative Statics

Parameter	**The sign of the marginal effect of the parameter on firm's expected payoff from equity financing**
α	+
I_2	+
N	+
λ	+
γ	+
η	+
ρ	+
a	+
$\bar{b}$	+
$\bar{x}$	-
δ	-
κ	-

2.4 Discussion

2.4.1 Our modelling choice for incorporating extrinsic information asymmetry

There could be many ways to incorporate extrinsic information asymmetry in an economic model. In order to understand the reason as to why we chose this particular setup, we start with the MM model and extend it piece by piece.

The MM model assumes risk neutral and homogeneous investors, where each investor has the same information set. Furthermore, the state space is discrete rather than continuous. Extrinsic information asymmetry could be introduced in this simple model by assuming investors with heterogenous beliefs. If the state space consists of only the "good" and the "bad" state, each investor could have his own beliefs over these states. For example, an optimistic investor could think that the probability of a good state is $2/3$, while a pessimistic investor could think that it is $1/3$. With risk neutral investors that have no budget constraints, there would be no equilibrium in this model. At least one investor would think that the price is wrong, and would demand an infinite amount of stock. This particular investor would be the one whose belief is not incorporated in the stock price. We could potentially solve this problem by introducing wealth constraints, but then our results would depend on the magnitude of the wealth constraints. Another problem with heterogeneous beliefs (with common knowledge) is that all investors are aware of each others' beliefs. For example in the example above, the optimistic investor knows that the pessimistic investor thinks that the likelihood of the good state is $2/3$. Similarly, the pessimistic investor knows about the optimistic investor's beliefs. In a sense, investors agree to disagree on the probability distribution over the two states: they do not update their own beliefs even if they perfectly know what others think. While this type of static beliefs could be appropriate for some cases, we believe that financial markets are better characterized

by investors who update their information after observing others' actions. If Warren Buffet's actions or beliefs were fully observable by investors in the market, then most investors would update their own beliefs rather than ignore them completely.

Because of these reasons, we need a non-static information updating model to show the effect of extrinsic information asymmetry on firm's financing policies. A candidate of this type of models is the one introduced in Grossman and Stiglitz (1980). This type of model lets investors update their beliefs using the observables in the economy. This is the primary reason for our modelling choice.

On the other hand, our choice of modelling brings in several complexities that are not present in the simple MM model. Most importantly, the firm's investment decision is static unlike in the MM model. It is possible in their setup that a firm's decision to issue equity signals to the investors that the firm's prospects is not good (the bad state). This means that issuing equity reveals valuable information held by the firm to the investors. In our model, this is not easy to do. If the firm has the choice of undertaking the investment, i.e. the firm can choose to finance the project with equity or not undertake the project at all, then equity financing should reveal information on the realization of the net project payoff, b, to the investors. Since the state space is continuous, this brings a truncation of the priors held by the investors. Truncated normal distributions do not have appealing analytical solutions, which makes the model quite complicated. Therefore, our model prohibits investors learning from the actions of the firm.

2.4.2 The relation between intrinsic and extrinsic information asymmetry

As mentioned earlier, EIA is defined as the information asymmetry among outside investors while the IIA is defined as the information asymmetry between the firm and

the outside investors. As in our model, we assume that the firm always knows more than the outside investors: the firm learns about the realization of the random project payoff, while investors have their own priors for the distribution of the project payoff. With this assumption, it becomes clear that extrinsic information asymmetry is simply a general case of intrinsic information asymmetry. It is conceivable to question what this generalization adds to the MM model. After all, extrinsic information asymmetry could be incorporated in an intrinsic information asymmetry model by creating a representative investor whose beliefs reflect all of the existing beliefs in the economy. Then it would be enough to look at the intrinsic information asymmetry between the representative investor and the firm.

Even though this argument is consequentially correct, extrinsic information asymmetry brings fresh perspectives to the theory originated by Myers and Majluf (1984). It goes into the source of the information asymmetry concept and provides a more realistic depiction of it. It would be naive to assume that every investor in the market has the same information set. Some investors know more and some investors know less about firms' prospects. Market participants also learn from the actions of each other, constantly updating their information sets. It is important to include these facts into our models because they provide a better understanding of market mechanics, which is quite valuable for policy recommendations. Our model lets us measure the exact effect of extrinsic information asymmetry on the financing choices of firms. Firms with high extrinsic information asymmetry could take actions, such as improving their disclosure practices, to reduce this information asymmetry. If disclosure is costly, what is the optimal amount of disclosure? What is the point where marginal benefit of increased disclosure equals the marginal cost of increased disclosure? Our model could potentially be extended to answer these types of questions.

2.5 Conclusion

In this paper, we present a modification of the MM model with investors having differential information on project payoffs. Uninformed investors know only about the public information while informed investors held extra private information in addition to the public information. We show that a partially revealing rational expectations equilibrium exists for this economy where uninformed investors rationally update their beliefs by using the equilibrium price they observe. On the other hand, the firm sells stock to these investors to finance a real project it faces. The objective of the firm is to maximize the wealth of its existing shareholders meaning that the firm prefers to sell a small number of shares at a higher price to minimize dilution. We show that when the EIA among investors is high, the trading price of the firm's equity is low. Therefore the firm needs to sell more shares at this depressed price to finance the project. This makes the existing shareholders worse off.

There are limitations to our model. The original MM model lets investors rationally update their beliefs by observing firm's investment or financing decisions. In a special MM model, the firm undertakes the investment only in bad states, so the act of investment signals to the investors that the state is bad. In our model, investors do not rationally update their beliefs when they observe the firm investing. If they do, their beliefs should follow the distribution of a truncated normal, and this makes the analytical solution quite complicated.

Our model could potentially be extended to analyze the relation between disclosure decisions of firms and their choice of financing. If the EIA between investors increases the cost of equity financing, then firms that need equity financing could disclose more information to reduce the EIA between investors.

In other words, firms decide jointly on their disclosure and financing decisions. This would be an interesting empirical test of our model.

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CHAPTER 3

PAST STOCK PERFORMANCES OF THE MERGING FIRMS AND THE GAINS FROM TAKEOVERS

3.1 Introduction

This paper aims to accomplish two goals. The first one is to show the matching characteristics of the merging firms in M&A deals based on their financial ratios. The second one is to pick a rather underemphasized variable among the set of such characteristics, past stock returns (psr[43]) of the merging firms, and examine its role in explaining their abnormal returns around the announcement of the merger to the public.

It is important to understand which types of acquirers match with what types of targets for two reasons. From the perspective of a merger arbitrageur, whose objective is to predict takeover targets and profit from buying their stock cheap before the merger announcement and selling them afterwards at a higher acquisition price, it might be an important piece of information to know the types of firms a buyer firm could possibly match with. Conditional upon making an acquisition, matching characteristics could reduce the set of possible targets the buyer can acquire, hence improve the prediction accuracy of the merger arbitrageur. Second, establishing the evidence on matching characteristics provides a strong incentive to understand endogenous matching models recently emerging in the finance literature. This strand of literature argues that the matching process inherent in markets could lead to severe

[43] As we discuss in Section 3.2, we measure psr as the stock returns in the year prior to the merger announcement date, in excess of the industry returns that the firm belongs to. We use Fama-French 49 industry classifications in calculating abnormal returns.

estimation biases. For example, Sorensen (2007) argues that there are two components to estimating whether a private firm with a venture capital (VC) partner will end up doing an initial public offering (IPO). The first component is the direct effect of the experience of the VC on the IPO rate, and the second one is the fact that more experienced VC's tend to invest in better firms, hence the IPO rate is a natural cause of the quality of the firm. He argues that this matching process – experienced VC's investing in better firms – has a significant portion of the IPO rate. Our objective here is to show that such a matching process also takes place in the M&A markets. Buyer and target firms presumably match based on some characteristics which we aim to discover[44].

Our analysis shows that financial characteristics of the merging firms are indeed highly correlated. Market caps, psr's, Tobin's Q ratios, cash flows, cash holdings of the merging firms are significantly and highly positively correlated. Firms tend to merge with firms that resemble themselves. Our deduction here is that the endogenous matching process between merging firms leads to a correlation between financial characteristics. If this matching process causes a correlation between such observables, it is very likely that there is a correlation between unobservables that are excluded from analysis.

Past stock returns of the merging firms is an important matching characteristic, which we explore intensively in this paper. It has been used in Morck, Shleifer and Vishny (1990) to analyze managerial incentives in making acquisitions, in Hayward and Hambrick (1997) to measure CEO hubris, and Rosen (2006) to distinguish firm specific momentum from industry momentum in explaining abnormal returns of the merging firms. Having established the relationship between psr's of the merging firms,

[44] The endogenous matching idea has been explored in at least two papers in the finance literature. Akkus (2008) analyzes the underpricing in IPO markets while Park (2008) analyzes M&A activity in the mutual fund industry.

our objective here is to consider *both* of the merging firm's psr's in explaining each firm's abnormal returns around the merger announcement date.

We consider several hypotheses to explain the effect of merging firms' psr's on their event day returns. For the buyer firm, the neoclassical hypothesis (labeled as H.A.1) predicts that value creating firms are more likely to spill their efficiencies to the firms that they acquire. Therefore, acquirers that performed well in the recent past should make better acquisitions, leading to positive stock price reactions at their merger announcement dates. On the other hand, loser firm managers demonstrate inability to run their firms efficiently as evidenced by their recent stock returns, hence their acquisition decisions should also be destroying value. The same line of reasoning is put forth by Lang, Stulz and Walkling (1989), but their way of measuring managerial efficiency is based on Tobin's Q ratio rather than psr. Both measures have advantages over the other, but the main advantage of psr is that it is a flow variable rather than a stock variable like Tobin's Q, so it is a better measure of how the managers did just before the merger announcement. On the other hand, being a stock variable, Tobin's Q could potentially be polluted by corporate decisions made much earlier.

Roll's (1986) hubris hypothesis predicts just the opposite of the neoclassical hypothesis: managers could build hubris due to their superior performance and overestimate their abilities in running other businesses (H.A.2). This results in acquisitions that do not maximize shareholder value, causing a drop in the share value at the announcement date. For loser firm managers, stopping the losing streak is the priority for their survival, meaning that they should exert more effort to maximize shareholder value and merge with a partner that could turn the trend around.

The final hypothesis for acquirers works in the same direction as the hubris hypothesis, but for a different reason. The overvaluation hypothesis (H.A.3) claims

that when the stock prices of firms increases to unsustainable levels, such firms could decide to take advantage of their high valuations to acquire other companies. The relative acquisition price of other firms would significantly be lower when these overvalued firms use their stock as a currency to pay the target firm shareholders. Hence, overvalued buyer firms do not miss this opportunity and go for an acquisition not because the merger maximizes value but because targets are undervalued compared to the acquirers. Target firm managers are aware of this overvaluation but they accept it nevertheless, as buyer firm managers bribe them by extra compensation from the completion of the merger or continued employment at the acquired firm. Shleifer and Vishny (2003) discuss the details of this hypothesis in another context to explain why mergers happen in waves. Note here that this hypothesis assumes that markets are not always efficient: market values could deviate from their fundamental values significantly.

We do not find compelling evidence for the first two hypotheses. High psr acquirers do not experience significantly different returns from the low psr ones. Their payments to target firms also do not differ from each other. That is, premiums received by target firms do not depend on the psr's of the acquiring firms. However, our analysis supports the overvaluation hypothesis. High psr firms use stock more often as a payment, and experience lower abnormal returns at the merger announcement date.

The influence of target firm psr's on announcement day returns could be explained by two hypotheses. The financial distress hypothesis (H.T.1) predicts that financially distressed firms face significant uncertainty about the fate of their firms. Predicting a possible bankruptcy, the managers could avoid being involved in such a process by selling their firms to outsiders at a relative discount. Bris, Welch and Zhu (2006) discusses direct and indirect costs of bankruptcy, and claim that such bankruptcy costs

could amount to significant proportions. In addition, there could be stand alone incentives for target firm managers to sell their firms to avoid being fired (Gilson (1989)), or receive bonus payments as a result of a successful acquisition (Hartzell, Ofek, Yermack (2004)). If low target firm psr is a measure that predicts financial distress, then we should observe a positive relation between target firm psr and abnormal returns around the event date.

The second hypothesis relates to the valuation of target firms (H.T.2). If for some reason, the market value of a firm's stock drops below its fundamental value, then acquiring this firm would result in long-run profits for the acquirer firm. If the undervaluation is common knowledge among the set of firms, then target firms with low psr's are more likely to be acquired. Since the undervaluation is common knowledge, competition among the set of bidders would raise the acquisition price well above the ongoing market price, meaning higher announcement day returns to the target firm stock. The valuation hypothesis could be related to the "dogs of the dow" investment strategy. Under this trading strategy, stocks with high dividend yields (dividend per share divided by the stock price) should have excess returns in the long run due to the conjecture that dividends paid by firms follow a more consistent path than the fluctuating stock prices, hence high dividend yields indicate a bottom stock price for the underlying security. Even though Hirschey (2003) provides counter evidence for the viability of this strategy, the "dogs of the dow" concept could be more pertinent in our context. Since our focus is on takeover markets where controlling shares of target firms are traded in chunks, the lack of arbitrage is a more relevant concept. It is much harder to replace an inefficient management through an acquisition than executing trades in the stock market to profit from a mispricing. Managers have anti-takeover tools such as poison pills, staggered boards or white knight options to deter a possible acquisition. In addition, acquirers should also factor

into account the direct and indirect costs of acquisition, such as investment bank fees, registration fees, possible takeover battles, lawsuits, etc. In summary, acquisition as a disciplining device for managers is a limited tool that can not remove inefficiencies completely: firms could be undervalued relative to their potential values due to their managers' inefficiencies.

Our evidence supports the valuation hypothesis above. Target firms that have high (low) psr's receive 26.2% (38.7%) premiums around the merger announcement date. Such low psr target firms get extra premiums when they are acquired by high psr buyer firms.

The plan of the paper is as follows. Section 3.2 describes the dataset, explains the construction of variables used in the analysis and summarizes the data. In Section 3.3, we show the matching characteristics of the merging firms based on their financial data. Sections 3.4 and 3.5 present the results of our regression models that link psr's and event date buyer and target firm abnormal returns, respectively. Section 3.6 concludes the paper.

3.2 Data

3.2.1 Sample formation

Sample formation is completed in two steps. In the first step, we identify the sample of firms that are involved in M&A activity by filtering through the SDC database with the following restrictions:

- Date Announced is between 1/1/1980 and 12/31/2003;
- Deal Value is greater than $10M;
- Both the acquirer and target firms are public firms based in the United States;
- The deal status is "completed";

- Neither party to the merger is a financial firm or a utility;
- The form of the transaction is either "merger" or "acquisition of majority interest";
- The target firm has not been involved in merger talks with other buyer firms in the last three years before the merger announcement[45].

In the second step, we match the sample from first step with the Center for Research in Security Prices (CRSP) and COMPUSTAT databases. We get the price data from the CRSP database and the accounting data of the merging firms from the COMPUSTAT database. Since there is not a perfect match between the three, the resulting sample after matching reduces in number to 749.

3.2.2 Construction of variables

We divide the set of variables into three groups; psr variables, event date return variables and deal and financial characteristics of the merging firms.

3.2.2.1 Past stock return (psr) variables

We estimate past stock returns of the merging firms one and two and a half years before the announcement of the merger. For the one year psr we calculate,

$$psr_{\mathrm{i}} = \prod_{\mathrm{t}=-315}^{-63}(1+\mathrm{R_{i,t}}) - \prod_{\mathrm{t}=-315}^{-63}(1+\mathrm{R_{ind\,,t}})$$

where $R_{i,t}$ is the daily return to firm i's stock at date t, and $R_{ind,t}$ is the daily return to the industry firm i belongs to. Calculation of returns starts roughly 15 months before (day -315) the merger announcement date and ends at three months (day -63) before.

[45] This paper analyzes the past stock returns of the merging firms. Having prior merger talks with other firms raise target firms' stock price in anticipation of a merger, hence results in an artificial high psr. To prevent such incorrect entries, we search through the *whole* SDC database for other attempted mergers three years before each merger and delete mergers in which the target firm is involved in such merger talks.

The three months period between day -63 and day 0, usually referred as the "run-up" is not included in the returns estimation. We use Fama-French 49 industry definitions and use corresponding daily returns that are available on Kenneth French's website[46]. For the two and a half year psr, we calculate returns between -756 and -63 days relative to the merger announcement. We do not calculate psr if the time series data in CRSP do not conform to the above specifications (i.e. if there is less than 252 daily returns available for calculating one year psr).

3.2.2.2 Event date return variables

We measure the impact of the merger announcement on the merging firm's stock price by finding the abnormal returns in excess of the expected returns. As in the previous section, we take the industry returns around the merger announcement as the expected returns for that firm. We choose an 11 day window size, and start accumulating abnormal returns five days before to five days after the announcement of the merger. Specifically,

$$\mathrm{CAR}_{\mathrm{i}}^{\mathrm{k}} = \sum_{\mathrm{t}=-\mathrm{k}}^{\mathrm{k}} \mathrm{AR}_{\mathrm{i,t}}$$

$$\mathrm{AR}_{\mathrm{i,t}} = \mathrm{R}_{\mathrm{i,t}} - \mathrm{R}_{\mathrm{ind\,,t}}$$

where 2k+1 is the event window size (k=5). Different specifications of k yield similar results so they are not reported in the paper. $R_{i,t}$ and $R_{ind,t}$ are defined as in the previous section.

[46] http://mba.tuck.dartmouth.edu/pages/faculty/ken.french/index.html

3.2.2.3 Deal and financial variables

Reactions to merger announcements have been extensively examined in the M&A literature, basically to assess the resulting wealth creation or transfers from mergers. Several firm and deal characteristics are shown to influence cross sections of abnormal returns which we discuss below. In Appendix C, we show the formulation of these variables.

Method of Payment

Travlos (1987) shows that buyer firm cumulative abnormal returns are negative if the buyer firm uses its stock as payment to the target firm, and are not significantly different from zero if it uses cash. The main explanation for this evidence comes from an asymmetric information hypothesis. As Myers and Majluf (1984) argue, an information asymmetry between managers and investors may cause a discount in the stock price of the firm. Good quality firms should therefore be reluctant to issue stock, as they know that their shares are undervalued in the market. Hence, there will be a negative reaction when a buyer firm announces a stock purchase of a target firm.

Form of Acquisition

As Jensen and Ruback (1983) shows, buyer firm CAR's are positive in tender offers and negative in mergers. For target firms, both tender and merger deals result in positive CAR's, but they are larger in tender offers than in mergers. A theory about the form of acquisition type is provided by Berkovitch and Khanna (1990), who shows in a theoretical model that high synergy bidders initiate tender offers as they are confident that they will win the auction process resulting from the tender offer, while low synergy bidders choose to merge with the target firm as this negotiating process will increase their chances of acquiring the target.

Asset Relatedness

Diversification motives can have an impact on buyer firm CAR's, as shown by Morck, Shleifer, and Vishny (1990). Buyer firm CAR's are positive when the merging firm assets are related (focusing mergers) and negative when they are not (diversifying mergers, a.k.a. conglomerates). Human capital risk, discussed in detail by Amihud and Lev (1981) for the M&A case, can provide incentives to buyer firm managers to acquire unrelated businesses as such actions will reduce their employment risk. In a perfect capital market, this managerial motive to acquire unrelated businesses does not apply to the shareholders of the firm. Therefore the announcement of a diversifying merger is perceived as a violation of managerial and shareholder alignment of interests.

Another managerial motive for conglomerate mergers is explained by Shleifer and Vishny (1989). When poor performance threatens the employment of a manager, he has an incentive to enter into new businesses which he might be better at. Therefore managers may be willing to overpay for such targets at the expense of shareholders.

Relative Size

Asquith, Bruner and Mullins (1983) is the first paper to show that the size of the target firm relative to the buyer has explanatory power for buyer and target firm CAR's. However, there is no agreement in the literature on the sign of this effect. Asquith, Bruner, and Mullins (1983) and Servaes (1991) find a positive relationship between buyer firm CAR's and relative size, while Travlos (1987) find the opposite. On the other hand, target firm CAR's have a positive relationship with relative size in Davidson and Cheng (1997) and negative in Lang, Stulz and Walkling (1989). This disparity in the sign of the relative size is explained by Fuller, Netter and Stegemoller (2002). For buyer firm CAR's, the relation is positive when the target is private and negative when the target is public. They continue to argue that public acquisitions tend

to be made using stock, and as explained in Moeller, Schlingemann and Stulz (2004), downward sloping demand curves for stock result in a decline in prices. Therefore, as the size of the target firm increases, the stock payment and thus the stock issuance is getting larger, which causes a drop in the buyer firm's stock price.

Buyer Firm Size

Moeller, Schlingemann and Stulz (2004) finds that larger buyer firms make worse acquisitions than smaller firms, in terms of CAR measured around the announcement day of the merger. They claim that managerial incentives are more aligned with shareholders' in smaller firms, as managerial stock ownership tends to be higher. Similarly, Roll (1986)'s hubris hypothesis is more likely to hold in larger firms. To support their hypothesis, they show that larger firms tend to overpay for targets, and tend to complete deals more successfully.

Buyer Firm Leverage

Buyer firm leverage also explains cross sections of abnormal returns, as shown by Maloney, McCormick and Mitchell (1993). Buyer firm CAR's are larger when buyer firm leverage is higher. Leverage can mitigate the problems between managers and shareholders[47], therefore the quality of the acquisitions by levered firms will be higher.

Tobin's Q

There are two papers that examine the effects of Tobin's Q on buyer and target firm abnormal returns. Using successful tender offers, Lang, Stulz and Walkling (1991) shows that buyer firm CAR's increase when a high Q buyer acquires a low Q target. For all other matches, the effect on CAR is weak. Servaes (1991) expands this dataset to include both successful merger and tender offer deals and verifies that the CAR's are higher for high Q buyers than low Q buyers. For target firms, CAR's are higher

[47] Lang, Stulz and Walkling (1991) gives a summary of papers that explain how leverage mitigates such incentive problems.

when the target firm has lower Q ratios. Lang, Stulz and Walkling (1991) interprets Tobin's Q as the quality of the management of the firm. If the same resources are managed by higher quality managers, which lead to better use of target assets, then the gains will be larger from the acquisition.

3.2.3 Data summary

Table 3.1 summarizes the variables used in the analysis (see Appendix C for variable definitions). Target firms enjoy on average, 28.9% returns around the merger announcement date while acquirer firm stocks do not appear to be affected by the merger announcement.

Target firms experience 2.2% lower returns compared to similar firms in their industry, one year before the merger announcement date. Due to positive outliers, the median psr is lower at -17.4% (Wilcoxon signed-rank test indicate that the median one year psr is statistically different than zero at the 1% level). On average, target firms are bad performers in the stock market, which could be an important factor from the shareholders perspective to decide to sell the company to another party. On the other hand, acquirers perform quite well in the stock market compared to their peers; the median psr one year before the merger is 3.9% while the median psr two and a half years before the merger is 22.2%.

Acquirers are much larger than target firms (median market capitalizations are $1,323M vs. $97M) and they have higher Tobin's Q ratios (medians 1.84 vs. 1.43, and a matched sign-rank test indicate that the medians are statistically different at 1% level).

Table 3.1
Data Summary

This table summarizes key variables used in the analysis. Return and psr variables are defined in Section 3.2.2, deal and financial characteristic variables are defined in Appendix C. The word "a" at the beginning of the variable name stands for the acquirer and "t" for the target firm.

	N	mean	median	std dev	min	max
Panel A. Return variables						
t_CAR5	749	0.289	0.242	0.302	-1.025	2.561
a_CAR5	749	0.001	-0.002	0.1	-0.38	0.486
Panel B. psr variables						
t_psr1	699	-0.022	-0.174	1.345	-1.403	27.412
a_psr1	726	0.182	0.039	0.728	-1.169	10.548
t_psr3	518	-0.0124	-0.333	1.724	-2.51	15.75
a_psr3	634	0.651	0.222	2.658	-3.373	53.52
Panel C. Deal variables						
percentcash	749	0.351	0	0.444	0	1
tender	749	0.295	0	0.456	0	1
asset_related	749	0.59	1	0.492	0	1
relative size	746	0.216	0.083	0.364	0	3.746
unsolicited	749	0.019	0	0.136	0	1
Panel D. Financial characteristics						
a_tobinq	745	2.628	1.848	2.909	0.473	38.478
a_book_leverage	745	0.46	0.451	0.23	0.006	2.173
a_mvequity	746	10900.5	1323.9	34991.9	7.255	559162.4
t_tobinq	724	2.045	1.433	2.112	0.153	28.395
t_book_leverage	724	0.456	0.414	0.296	0.019	2.964
t_mvequity	724	355.12	97.71	810.26	2.499	8505.9

3.3 Matching characteristics of the merging firms

The decision to acquire or sell a company is a very significant corporate event. In such important times, either side of the transaction, acquirers and target firms, consult with their investment banks and advisers to find the top match and structure the best deal for their companies. Even though there are many different reasons and motivations to acquire or sell a company, there could be common considerations while searching for a potential merger partner. We acknowledge that the merger process has financial, operational and economical aspects, however our goal here is to show how financial characteristics of the merging firms relate to each other. In Table 3.2 below, we list several financial characteristics and calculate the sample correlation between the acquirer and the target firm for that characteristic. Several financial characteristics,

such as market value of equity, cash holdings, liquidity ratios and R&D expenditures of the merging firms, are significantly correlated. The other financial variables, except one year sales growth and return on equity, are also significantly correlated to each other.

Most of these variables could capture the same underlying quality of the merging firms. For example, a firm having good investment opportunities would have high psr, Tobin's Q and sales growth. If this company is a mature and large firm, this good investment opportunity set could translate into high cash flows and low leverage. Therefore it may be natural to observe high correlations between these variables, as the underlying unobservable investment opportunities set is correlated. Nevertheless, our table clearly shows that there is a positive relation between financial characteristics of the merging firms. Firms match with firms that are similar to themselves. For example, a larger firm is more likely to acquire a larger firm, or a high psr target firm is more likely to be acquired by a high psr firm.

Table 3.2
Sample correlations of financial characteristics between merging firms

This table depicts the sample correlations of several financial characteristics of the merging firms. psr variables are defined in Section 3.2.2.1, and the remaining variables are defined in Appendix C. Significance levels are denoted by an asterisk, * for 10%, ** for 5% and *** for 1%.

Variable	**No of observations**	**Sample correlation**
psr1	677	0.248***
psr3	456	0.257***
tobinq	720	0.281***
ln_mvequity	721	0.497***
book_leverage	720	0.23***
cash_flow	593	0.258***
sales_growth1	723	0.027
cash holdings	724	0.446***
liquidity	724	0.571***
rd_exp	693	0.485***
cap_ex	707	0.405***
ROE	732	0.027

Table 3.2 shows the simple correlation between financial variables. We also run

multivariate regressions to obtain the partial correlations between variables, after controlling for other financial characteristics. We control for the size of the merging firms in these regressions, and obtain similar results.

Our point in this section is the following. As evidenced in Table 3.2, there is a significant correlation between the financial characteristics of the merging firms. The matching process between firms is not random; for example, large buyer firms tend to acquire large firms.

This suggests that unobserved variables (not observed by the econometrician) that have significant influence in the matching process could also be correlated. If so, we must correct our regressions for this endogenous matching, as discussed in Sorensen (2007).

3.4 Matching characteristics based on psr

We now explore the psr variable in more detail. Since psr is a continuous variable, categorizing it into discrete parts, such as top and bottom deciles could make the analysis easier. We take the 10^{th} and 90^{th} percentile of acquirer and target psr's and label firms as losers if their psr's are below the former and label them as winners if their psr's are above the latter. Then we create four other groups based on psr's of merging firms. Winner_winner is a dummy variable taking a value of one if both acquirer and target are winners, winner_loser is a dummy variable taking a value of one if the acquirer is a winner and the target is a loser, and so on. We list these variables in Panel A of Table 3.3 below.

An acquirer firm is classified as a winner if its psr exceeds 0.79, and classified as a loser if its psr falls behind -0.36. Given this classification, winner acquirers are superior firms, generating 165% abnormal returns in the year before the merger

announcement. On the other hand, acquirer losers fail to keep up with their industry and lose 56% in stock value compared to their peers. Winner and loser acquirers do not differ in terms of their stock price reactions to the merger announcement; their respective CAR's are 0.8% and 0.1%.

Winner and loser target firms are classified similarly; a winner target experiences 57% returns above its industry average while a loser target stock price results in a 68% decline. In contrast to the acquirers, winner and loser target firms experience differing returns on the event date; winner targets receive 26.2% premiums on the merger announcement date while losers receive 38.7%.

It is also possible to do the same analysis with respect to double grouping, which results in four discrete groupings of firms with respect to their psr's. As could be guessed by the positive correlation between their psr's, it is much more common to observe matches within the same type of merging firms. There are 16 firms in the winner_winner and 19 firms in the loser_loser groups, while there are only three firms in the winner_loser and one firm in the loser_winner group. Acquirers' CAR in the winner_winner group is larger than that of in the loser_loser group (6.7% vs. 2.5%) while it is the reverse for target firms (30% vs. 41.5%).

To check whether our results are robust to the original definition of winners and losers, we also categorize firms using the 25^{th} and 75^{th} percentiles of the corresponding psr variables and show them in Panel B of Table 3.3. The much larger sample size for winner and loser dummy variables confirms the results in Panel A.

Table 3.3

Data summary with respect to past stock returns

This table summarizes psr, CAR, percent cash and Tobin's Q measures of merging firms with respect to the past stock returns of the merging firms. The variable psr is defined in Section 3.2.2.1, CAR variable in Section 3.2.2.2, percent cash and Tobin's Q variables in Appendix C. Except the N column, the numbers represent the mean value of the variable for that subgroup.

	Definition	**N**	**psr**		**CAR**		**Percent cash**	**Tobin's Q**	
Panel A. Top and Bottom 10%			**acquirer**	**target**	**acquirer**	**target**		**acquirer**	**target**
a_winner	*psr_a* > 0.79	73	1.65	0.606	0.008	0.256	0.201	4.308	2.988
a_loser	*psr_a* < -0.36	73	-0.56	-0.437	0.001	0.315	0.283	2.004	1.734
t_winner	*psr_a* > 0.57	70	0.543	1.9	0.029	0.262	0.367	4.122	3.185
t_loser	*psr_a* < -0.68	70	-0.08	-0.87	-0.002	0.387	0.371	2.518	1.662
winner_winner	*a_winner* and *t_winner*	16	1.91	2.94	0.067	0.299	0.125	6.045	3.905
winner_loser	*a_winner* and *t_loser*	3	1.26	-0.81	0.061	0.714	0	4.149	1.403
loser_winner	*a_loser* and *t_winner*	1	-0.51	1.37	0.062	0.143	0	2.254	1.768
loser_loser	*a_loser* and *t_loser*	19	-0.62	-0.82	0.025	0.415	0.196	1.837	1.321
Panel B. Top and Bottom 25%									
a_winner	*psr_a* > 0.33	186	0.95	0.194	0.001	0.277	0.235	3.513	2.361
a_loser	*psr_a* < -0.14	182	-0.36	-0.276	-0.004	0.278	0.337	2.029	1.937
t_winner	*psr_a* > 0.11	176	0.346	0.93	0.008	0.227	0.329	2.895	2.362
t_loser	*psr_a* < -0.44	177	-0.021	-0.68	-0.015	0.367	0.368	2.563	1.704
winner_winner	*a_winner* and *t_winner*	59	1	1.14	0.015	0.244	0.246	3.502	2.588
winner_loser	*a_winner* and *t_loser*	30	0.67	-0.66	-0.012	0.366	0.211	4.448	1.843
loser_winner	*a_loser* and *t_winner*	25	-0.3	0.65	0.004	0.225	0.283	1.837	2.061
loser_loser	*a_loser* and *t_loser*	67	-0.42	-0.7	-0.017	0.332	0.209	1.962	1.795

3.4.1 Announcement date returns for buyer firms

To test the hypotheses explained in Section 3.1, we run two regressions with different dependent variables. In the first one, we directly include the continuous psr variables of the merging firms. In the second one, we use the four discrete groupings of the psr variables.

The coefficient of buyer firm psr is close to zero in regression (1) in Table 3.4, with no statistical significance. This means that there is no evidence for the neoclassical hypothesis. If it were true, winner acquirers, who create value should be making better acquisitions than loser firms. We also do not find supporting evidence for the hubris hypothesis; loser buyers are not bad acquirers. Since these forces work in the opposite direction, it may also be the case that their effects cancel each other, leading to insignificant regression coefficients overall.

The psr's of target firms have a significant explanatory power for the event day returns. In regression (1), target psr has a coefficient of 0.021, meaning that every 10% increase in psr of target firms result in a 0.21% increase in the event date returns for buyer firms (1,174.3% when compounded for an annual rate). In other words, buyer firms are better off acquiring firms that performed well in the recent past.

In regression (2), where discrete matching dummy variables are used, winner acquirer winner target matching results in a significant boost for the dependent variable. When a winner acquirer buys a winner target firm, buyer firms experience 10% higher returns at the announcement date of the merger, compared to the base case (here the base case is the average buyer firm CAR's of all other discrete combinations). The other discrete matches have no effect on buyer firm CAR's.

Table 3.4
Regression analysis for explaining buyer firm CAR's.

This table summarizes regression results to explain buyer firm returns around the merger announcement date. The calculation of the dependent variable, a_CAR, is explained in Section 3.2.2.2, psr variables in Section 3.2.2.1, the matching variables (e.g. win_win_90_1) in Table 3.2, and the remaining deal and financial variables in Appendix C. Significance levels are denoted by an asterisk, * for 10%, ** for 5% and *** for 1%. t-values are reported in parenthesis, under the slope coefficients.

	(1)	(2)
a_psr1	-0.002	
	(-0.26)	
t_psr1	0.021***	
	(3.92)	
win_win_90_1		0.107***
		(4.12)
win_los_90_1		0.066
		(1.21)
los_los_90_1		0.02
		(0.87)
los_win_90_1		0.074
		(0.79)
percentcash	0.005	0.007
	(0.43)	(0.62)
tender	0.03***	0.031***
	(2.86)	(2.95)
asset_related	0.002	0.002
	(0.25)	(0.21)
ln_relative_size	-0.014***	-0.013***
	(-4.46)	(-4.28)
a_tobinq	0	0
	(0.01)	(0.14)
ln_a_mvequity	-0.015***	-0.014***
	(-5.13)	(-4.73)
a_book_leverage	0.023	0.024
	-1.18	(1.22)
a_cash	(0.041)	-0.048**
	(-1.85)	(-2.15)
t_tobinq	0.001	0.002
	(0.32)	(0.69)
Constant	0.057***	0.045**
	(2.89)	(2.25)
Observations	646	646
R-squared	0.09	0.1

The evidence for the overvaluation hypothesis is provided by papers analyzing methods of payment in mergers and acquisitions, like Travlos (1987), Martins (1996), Faccio and Masulis (2005). In our dataset, we confirm these results. Panel A of Table 3.3 shows that winner acquirers are more likely to pay with stock than in cash (20% vs. 28% cash payment). In the sample of mergers that are consummated with all cash,

the average psr of acquirers is 5.6%, while it is 24% for the sample of deals that are consummated with all stock. In all cash deals, the mean price reaction to the merger announcement for acquirer stock is 1.5% vs. -0.7% in all stock deals. This means that firms that experience recent stock price increases tend to make acquisitions with stock, which leads to negative price reaction at the merger announcement date. However, the effect of psr on event date returns is not significant once the method of payment is controlled for in our regressions in Table 3.4.

3.4.2 Announcement date returns for target firms

Regression results are shown in Table 3.5. As in the previous section, we run two regressions with differing methods of measuring the impact of psr's on the announcement day returns. Controlling for factors that are known to influence the dependent variable, psr's of merging firms have no effect on target firms' abnormal returns at the event date. Even though target firm CAR's increase with buyer firm psr's and decrease with their own psr, their effects are not statistically significant.

However in regression (2), loser target firms receive significantly larger premiums than other groups. If a winner buyer acquires a loser target, the target receives 42% higher premiums. When a loser target is acquired by a loser buyer, it receives 16.6% more premiums than the others. Both effects are significant at the 1% level significance level, with t statistics of 2.53 and 2.32, respectively. It is therefore apparent that loser target firms receive higher premiums, and the premium is even higher if the buyer is a winner.

Our empirical work provides no evidence for the financial distress hypothesis. The cash holdings of winner and loser targets are about the same (25% of total assets), and most importantly loser targets do not receive lower premiums than winner targets. In

contrast, our findings are consistent with the valuation hypothesis (H.T.2), which claims that target firms having a lower market valuation than their fundamental values could still get their intrinsic value in an acquisition. The primary mechanism for this result is probably due to competition in the takeover markets.

Table 3.5
Regression analysis for explaining target firm CAR's.

This table summarizes regression results to explain target firm returns around the merger announcement date. The calculation of the dependent variable, t_CAR, is explained in Section 3.2.2.2, psr variables in Section 3.2.2.1, the matching variables (e.g. win_win_90_1) in Table 3.2, and the remaining deal and financial variables in Appendix C. Significance levels are denoted by an asterisk, * for 10%, ** for 5% and *** for 1%. t-values are reported in parenthesis, under the slope coefficients.

	(1)	(2)
a_psr1	0.031	
	(1.42)	
t_psr_1	-0.016	
	(-0.93)	
win_win_90_1		0.112
		(1.41)
win_los_90_1		0.423**
		(2.53)
los_los_90_1		0.166**
		(2.32)
los_win_90_1		-0.071
		(-0.25)
percentcash	0.052	0.063
	(1.53)	(1.87)
tender	0.08**	0.075**
	(2.48)	(2.34)
asset_related	0.005	0.003
	(0.22)	(0.13)
ln_relative_size	-0.043***	-0.039***
	(-4.45)	(-4.07)
a_tobinq	0.005	0.006
	(0.79)	(0.94)
ln_a_mvequity	-0.004	0
	(-0.41)	(0.01)
a_cash	0.125	0.114
	(1.79)	(1.63)
t_tobinq	-0.029***	-0.031***
	(-3.39)	(-3.72)
t_cash	0.003	0.003
	(0.05)	(0.06)
Constant	0.17***	0.155***
	-3.13	(2.86)
Observations	646	646
R-squared	0.13	0.14

3.5 Conclusion

Our paper analyzes matching characteristics of firms based on their financial data. We find a positive relationship between acquirer and target firm characteristics: firms choose to merge with firms that resemble themselves. This means that the sample of mergers we observe in real life is a result of a matching process which could potentially embed correlated unobserved variables.

We also consider three hypotheses that link psr's of acquirer firms with their abnormal returns around the merger announcement date. We do not find evidence in favor of the neoclassical hypothesis (H.A.1) which claims that firms with superior performance are better value creators and hence their acquisition decisions are better than the others. There is also little evidence of the hubris hypothesis (H.A.2) which predicts worse acquisitions by winner acquirers due to the conjecture that their managers could be prone to overconfidence. We find evidence for the third hypothesis (H.A.3) like other papers in the literature, with well performing buyer firms using stock as a method of payment more often than the other acquirers.

Our analysis focuses on two claims on the target side. The first hypothesis is related to the effect of a possible financial distress on corporate decisions: loser firm managers could sell their companies at a discount to avoid such costs. Our analysis does not support this claim. On the contrary, we find that targets with low psr's receive higher premiums compared with others, which is consistent with our final hypothesis (H.T.2).

We should not forget that announcement day returns reflect two types of information: the gains from the takeover and the quality/state of the merging firms. The evidence presented in this paper should be evaluated keeping this fact in mind.

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APPENDIX A

APPENDIX FOR CHAPTER 1

A.1 Calculation of return variables

We estimate market model parameters $(\hat{\alpha}, \hat{\beta})$ by running an OLS regression in the estimation period.

$$R_{i,t} = \alpha_i + \beta_i R_{m,t} + \varepsilon_{i,t}$$

where $R_{i,t}$ is the return to firm i at day t, $R_{m,t}$ are the returns to the value-weighted CRSP market portfolio at day t, and $\varepsilon_{i,t}$ is the zero mean constant variance error term. Following Schwert (2000), we set the estimation period as (-316,-64) trading days relative to the announcement day of the merger (day 0). Then, abnormal returns in the event period are calculated as

$$CAR_i^k = \sum_{t=-k}^{k} AR_{i,t}$$

$$AR_{i,t} = R_{i,t} - (\widehat{\alpha_i} + \widehat{\beta_i} R_{m,t})$$

where 2k+1 is the event window size, $AR_{i,t}$ the abnormal returns to firm i on day t and CAR_i^k is the cumulative abnormal returns to firm i in the event window.

The bid premium is the abnormal returns in the target firm stock starting 63 trading days before the event date and ending at the deal closing date, unless it exceeds +126. Specifically, we calculate the bid premium (*bidpremium*) as

$$bidpremium_i = \prod_{t=-63}^{\min\{+126,\ \text{closing}\}} (1 + R_{i,t}) - \prod_{t=-63}^{\min\{+126,\ \text{closing}\}} (1 + R_{m,t})$$

A.2 Calculation of deal and financial variables

The table below explains the construction of deal and financial variables used in this paper. Unless otherwise stated, deal and financial variables are calculated using the most recent annual balance sheets (at the financial year end prior to the merger announcement). The word "a" at the beginning of the variable name stands for the acquirer and "t" for the target firm.

	VARIABLE NAME	PROXY	COMPUSTAT DATA ITEM
PANEL A. DEAL VARIABLES			
Method of Payment	*percentcash*	percent of total payments to the target firm that is in cash	
Form of Acquisition	*tender*	1 if tender offer	
Asset Relatedness	*asset_related*	1 if 2-digit SIC codes of the merging firms match	
Hostility	*hostile*	1 if the deal is classified as hostile	
	unsolicited	1 if the deal is classified as unsolicited	
Competition	*competition*	1 if number of bidders publicly competing for the target is greater than 1	
Deal Completion	*completed*	1 if the announced deal successfully closes	
Relative Size	*ln_rel_size*	(Log of) market value of equity of the target firm divided by that of the buyer firm, evaluated 60 days before the merger announcement	
Toehold	*toehold*	1 if the percent of target shares held by the buyer firm at the time of the deal announcement is larger than 5%	
Termination Fees	*a_termfee*	termination fee for the target divided by the market value of equity of the target firm	
	t_termfee	termination fee for the buyer divided by the market value of equity of the buyer firm	
Financial Seller	*financial_seller*	1 if there is a financial sponsor on the sell side (intended to capture venture capital and private equity funds)	
Family Ownership	*family_seller*	1 if there is a significant (more than 20%) family ownership in the target firm	

Appendix A.2 continued

PANEL B. FINANCIAL VARIABLES[48]			
Tobin's Q	*a_tobinq, t_tobinq*	market value of assets divided by the book value of assets	[(MV of assets)/ #6] [49]
Leverage	*a_book_lev, t_book_lev*	book value of debt divided by the book value of assets	[(#181+#10-#35)/ #6]
Cash Flow	*a_cashflow, t_cashflow*	operating income before depreciation minus interest expense, taxes, preferred dividends and common dividends, normalized by the book value of assets	[#13-#15-(#16-#Δ35)- #19-#21]/#6
Sales Growth	*a_salesgrowth, t_salesgrowth*	1 year growth in the sales of the company	$[\#12_t-\#12_{t-1}]/\#12_{t-1}$
Size	*ln_a_mvequity, ln_t_mvequity*	(Log of) the inflation-adjusted market value of equity	ln[#25*#199]
Liquidity	*a_liquidity, t_liquidity*	current assets divided by book value of total assets	#4/#6
Cash Holdings	*t_cash*	Cash and short term investments divided by total assets	#1/#6
Current Ratio	*t_current*	Current assets divided by current liabilities	#4/#5
Altman's Z Score	*t_Altmanz*	1.2*(Working capital/T. Assets) + 1.4*(Retained earnings/T.Assets) + 3.3*(EBIT/T.Assets) + 0.6*(MV Equity/BV Debt) + 0.999*(Sales/T.Assets)	1.2*[(#4-#5)/ #6] + 1.4*[#36/#6] + 3.3*[(#170+#15)/ #6] + 0.6*[#25*#199/#181] + 0.999*[#12/#6]
Price/Earnings	*a_PE, t_PE*	stock price divided by the earnings per share	#24/#58
Return on Equity	*a_ROE, t_ROE*	net income divided by last year's stockholder's equity	$\#172_t/\#60_{t-1}$
R&D Expenses	*a_R&D, t_R&D*	research and development expenditures divided by book value of total assets	#46/#6
Capital Expenditures	*a_capex, t_capex*	capital expenditures divided by book value of total assets	#128/#6
Dividend Ratio	*a_dividend, t_dividend*	dividend per share divided by stock price	#26/#199

[48] Some of the financial variables are truncated to exclude outliers: *a_salesgrowth* at +10, *t_salesgrowth* at +5, *t_PE* at -100 and +100, *a_PE* at -200 and +200, *a_ROE* and *t_ROE* at -5 and +5.

[49] MV of assets = [#181+#10-#35+(#25*#199)]. If #10 is not available, we use #56 instead. Calculations follow Fama and French (2002).

APPENDIX B

APPENDIX FOR CHAPTER 2

B.1 Proof of Proposition 2.2

Equating per capita demand to per capita supply,

$$\lambda d_I + (1-\lambda) d_U = \frac{S^*}{N} + x$$

$$\lambda\left(\frac{\bar{b}\rho + (\sum_{i=1}^{I_2} s_i)\gamma - (P(S^*) - E - a)(\rho + I_2\gamma)}{\delta}\right) + (1-\lambda)\frac{\bar{b}\rho + (\sum_{i=1}^{\alpha I_2} s_i)\gamma + \theta\rho_\theta - (P(S^*) - E - a)(\rho + \alpha I_2\gamma + \rho_\theta)}{\delta} = \frac{S^*}{N} + x \quad \text{(B.1)}$$

Combining the terms and substituting θ from the right hand side of (2.7) yields,

$$\begin{aligned} 0 = &-P(S^*)\left[\frac{\lambda}{\delta}(\rho + I_2\gamma) + \frac{1-\lambda}{\delta}(\rho + \alpha I_2\gamma + \rho_\theta)\right] + (E+a)\left[\frac{\lambda}{\delta}(\rho + I_2\gamma)\right. \\ &\left. + \frac{1-\lambda}{\delta}(\rho + \alpha I_2\gamma + \rho_\theta)\right] + \bar{b}\left[\frac{\lambda}{\delta}\rho + \frac{1-\lambda}{\delta}\rho\right] \\ &+ \sum_{i=1}^{\alpha I_2} s_i\left[\frac{\lambda}{\delta}\gamma + \frac{1-\lambda}{\delta}\gamma\right] + \sum_{i=\alpha I_2+1}^{I_2} s_i\left[\frac{\lambda}{\delta}\gamma + \frac{1-\lambda}{\delta}\frac{\rho_\theta}{(1-\alpha)I_2}\right] \\ &- x\left[1 + \frac{1-\lambda}{\delta}\frac{\rho_\theta c_5}{c_4(1-\alpha)I_2}\right] + \bar{x}\left[\frac{1-\lambda}{\delta}\frac{\rho_\theta c_5}{c_4(1-\alpha)I_2}\right] - \frac{S^*}{N} \end{aligned} \quad \text{(B.2)}$$

Using the projected price function,

$$\frac{c_4}{c_5} = \frac{\frac{\lambda}{\delta}\gamma + \frac{1-\lambda}{\delta}\frac{\rho_\theta}{(1-\alpha)I_2}}{1 + \frac{1-\lambda}{\delta}\frac{\rho_\theta c_5}{c_4(1-\alpha)I_2}} \Rightarrow \frac{c_4}{c_5} = \frac{\lambda\gamma}{\delta} \quad \text{(B.3)}$$

Plugging c_4/c_5 into ρ_θ,

$$\rho_\theta = \left[\frac{1}{\gamma(1-\alpha)I_2} + \frac{1}{(\frac{\lambda\gamma(1-\alpha)I_2}{\delta})^2\eta}\right]^{-1} \quad \text{(B.4)}$$

B.2 Proof of Proposition 2.3

To find S^*, we solve,

$$P(S)S = \frac{E}{(1-\kappa)} \quad \text{(B.5)}$$

$$\begin{aligned} &c_1(E+a) + c_2\bar{b} + c_3\sum_{i=1}^{\alpha I_2} s_i + c_4\sum_{i=\alpha I_2+1}^{I_2} s_i - c_5 x + c_6\bar{x} - c_7\left(\frac{S}{N}\right)]S = \frac{E}{(1-\kappa)} \\ &-\left[\frac{c_7}{N}\right]S^2 + \left[c_1(E+a) + c_2\bar{b} + c_3\sum_{i=1}^{\alpha I_2} s_i + c_4\sum_{i=\alpha I_2+1}^{I_2} s_i - c_5 x + c_6\bar{x}\right]S \\ &-\left[\frac{E}{(1-\kappa)}\right] = 0 \end{aligned}$$

Renaming the terms,

$$A = -\frac{c_7}{N} \tag{B.6}$$

$$B = c_1(E+a) + c_2\bar{b} + c_3\sum_{i=1}^{\alpha I_2} s_i + c_4\sum_{i=\alpha I_2+1}^{I_2} s_i - c_5 x + c_6\bar{x}$$

$$C = -\frac{E}{(1-\kappa)}$$

Inspection shows that $A < 0$ and $C < 0$. Since $P(S^*) > 0$, we have $B > 0$. The last line in (B.5) is a second order, one unknown equation that have two roots,

$$S_1^* = \frac{-B+\sqrt{B^2-4AC}}{2A}; S_2^* = \frac{-B-\sqrt{B^2-4AC}}{2A} \tag{B.7}$$

Our interest is in real roots, therefore $B^2 \geq 4AC$ must be satisfied. Furthermore, using the signs of A, B and C, we see that $0 < S_1^* < S_2^*$.The firm is better off selling small number of shares at a higher price, which means that S_1^* is the solution to the manager's problem.

Part (b) follows from the second constraint of the manager's problem; $S_1^* < 1$.

B.3 Proof of Lemma 2.5

The expected amount of stock issue in period 1, $E\{S^*\}$, can be found by solving $E\{P(S)\}E\{S\} = E/(1-\kappa)$. Using the fact that $E\{s_i\} = E\{E\{s_i|b\}\} = E\{b\} = \bar{b}$, $E\{P(S)\}$ can be written as,

$$E\{P(S)\} = E\{c_1(E+a) + c_2\bar{b} + c_3\sum_{i=1}^{\alpha I_2} s_i + c_4\sum_{i=\alpha I_2+1}^{I_2} s_i - c_5 x + c_6\bar{x} - c_7(\frac{S}{N})\}$$

$$= E\{E + a + \frac{\rho}{Den}\bar{b} + \frac{\gamma}{Den}\sum_{i=1}^{\alpha I_2} s_i + \frac{\lambda\gamma + \frac{(1-\lambda)\rho_\theta}{(1-\alpha)I_2}}{Den}\sum_{i=\alpha I_2+1}^{I_2} s_i - \frac{\delta + \frac{(1-\lambda)\rho_\theta}{(1-\alpha)I_2}\frac{\delta}{\lambda\gamma}}{Den}x$$

$$+ \frac{\frac{(1-\lambda)\rho_\theta}{(1-\alpha)I_2}\frac{\delta}{\lambda\gamma}}{Den}\bar{x} - \frac{1}{Den}(\frac{S}{N})\}$$

$$= E + a + \bar{b} - \frac{1}{Den}(\bar{x} + \frac{E\{S\}}{N}) \tag{B.8}$$

where $Den = \frac{1}{\delta}[\lambda(\rho + \gamma I_2) + (1-\lambda)(\rho + \gamma\alpha I_2 + \rho_\theta)]$ and $\rho_\theta = [\frac{1}{\gamma(1-\alpha)I_2} + \frac{1}{(\frac{\lambda\gamma(1-\alpha)I_2}{\delta})^2\eta}]^{-1}$. This means that $E\{S^*\}$ solves

$$E + a + \bar{b} - \frac{1}{Den}(\bar{x} + \frac{E\{S^*\}}{N})]E\{S^*\} - \frac{E}{(1-\kappa)} = 0 \qquad \text{(B.9)}$$

The solution to (B.9) is (taking the smaller root due to the firm's objective function),

$$E\{S^*\} = \frac{(E+a+\bar{b}-\frac{\bar{x}}{Den}) - \sqrt{(E+a+\bar{b}-\frac{\bar{x}}{Den})^2 - 4\frac{1}{N(Den)}\frac{E}{(1-\kappa)}}}{2\frac{1}{N(Den)}} \qquad \text{(B.10)}$$

which is the expression in the lemma. For a real root, we assume $(E + a + \bar{b} - \frac{\bar{x}}{Den})^2 - 4\frac{1}{N(Den)}\frac{E}{(1-\kappa)} \geq 0$. To exclude double roots (to apply the Implicit Function Theorem in Proposition 2.6) we assume strict inequality, which gives condition (a). Condition (b) follows from the manager's problem.

B.4 Proof of Proposition 2.6

Before starting the proofs, note that we rule out the case where $(E + a + \bar{b} - \frac{\bar{x}}{Den})^2 - 4\frac{1}{N(Den)}\frac{E}{(1-\kappa)} = 0$ which implies by (B.10), $\frac{2E\{S\}}{N(Den)} - (E + a + \bar{b} - \frac{\bar{x}}{Den}) = 0$. Therefore assuming $(E + a + \bar{b} - \frac{\bar{x}}{Den})^2 - 4\frac{1}{N(Den)}\frac{E}{(1-\kappa)} > 0$ as in Lemma 2.5(a), we see that $E\{S\} < \frac{(E+a+\bar{b}-\frac{\bar{x}}{Den})}{2\frac{1}{N(Den)}}$. This inequality is used frequently in the proof. Also remember by Proposition 2.2 that $Den = \frac{1}{\delta}[\lambda(\rho + \gamma I_2) + (1-\lambda)(\rho + \gamma\alpha I_2 + \rho_\theta)]$ and $\rho_\theta = [\frac{1}{\gamma(1-\alpha)I_2} + \frac{1}{(\frac{\lambda\gamma(1-\alpha)I_2}{\delta})^2\eta}]^{-1} = [\gamma^{-1}(1-\alpha)^{-1}I_2^{-1} + \delta^2\lambda^{-2}\gamma^{-2}(1-\alpha)^{-2}I_2^{-2}\eta^{-1}]^{-1}$.

(i) $\frac{\partial E\{\Pi\}}{\partial\alpha} = \frac{\partial E\{(E+a+b)(1-S)\}}{\partial\alpha} = (E + a + b)(-\frac{\partial E\{S\}}{\partial\alpha})$. To find $\frac{\partial E\{S\}}{\partial\alpha}$, we apply the Implicit Function Theorem in equation (B.9) in Lemma 2.5. Taking the derivative of (B.9) with respect to α,

$$\frac{\partial E\{S\}}{\partial\alpha} = \frac{\frac{\partial Den}{\partial\alpha}\frac{E\{S\}}{(Den)^2}[\frac{E\{S\}}{N} + \bar{x}]}{\frac{2E\{S\}}{N(Den)} - (E+a+\bar{b}-\frac{\bar{x}}{Den})} \qquad \text{(B.11)}$$

By the note above, the denominator of (B.11) is always negative. Since the rest of the numerator is always positive, $\frac{\partial Den}{\partial \alpha}$ determines the sign of $\frac{\partial E\{S\}}{\partial \alpha}$.

$$\frac{\partial Den}{\partial \alpha} = \frac{(1-\lambda)}{\delta}(\gamma I_2 + \frac{\partial \rho_\theta}{\partial \alpha}) \tag{B.12}$$

In addition,

$$\frac{\partial \rho_\theta}{\partial \alpha} = -\gamma I_2 \frac{1+2\delta^2\lambda^{-2}\gamma^{-1}(1-\alpha)^{-1}I_2^{-1}\eta^{-1}}{(1+\delta^2\lambda^{-2}\gamma^{-1}(1-\alpha)^{-1}I_2^{-1}\eta^{-1})^2} \tag{B.13}$$

$$\gamma I_2 + \frac{\partial \rho_\theta}{\partial \alpha} = \gamma I_2(1+\delta^{-2}\lambda^2\gamma(1-\alpha)I_2\eta)^{-2} > 0$$

This means that $\frac{\partial Den}{\partial \alpha} > 0 \Rightarrow \frac{\partial E\{S\}}{\partial \alpha} < 0 \Rightarrow \frac{\partial E\{\Pi\}}{\partial \alpha} > 0$.

(ii) Same as (v).

(iii) $\frac{\partial E\{\Pi\}}{\partial N} = \frac{\partial E\{(E+a+b)(1-S)\}}{\partial N} = (E+a+b)(-\frac{\partial E\{S\}}{\partial N})$. To find $\frac{\partial E\{S\}}{\partial N}$, we apply the Implicit Function Theorem in equation (B.9) in Lemma 2.5. Taking the derivative of (B.9) with respect to N,

$$\frac{\partial E\{S\}}{\partial N} = \frac{\frac{(E\{S\})^2}{(Den)N^2}}{\frac{2E\{S\}}{N(Den)} - (E+a+\bar{b}-\frac{\bar{x}}{Den})} \tag{B.14}$$

By the note above, the denominator of (B.14) is always negative. Since the rest of the numerator is always positive, $\frac{\partial E\{S\}}{\partial N} < 0 \Rightarrow \frac{\partial E\{\Pi\}}{\partial N} > 0$.

(iv) $\frac{\partial E\{\Pi\}}{\partial \lambda} = \frac{\partial E\{(E+a+b)(1-S)\}}{\partial \lambda} = (E+a+b)(-\frac{\partial E\{S\}}{\partial \lambda})$. To find $\frac{\partial E\{S\}}{\partial \lambda}$, we apply the Implicit Function Theorem in equation (B.9) in Lemma 2.5. Taking the derivative of (B.9) with respect to λ,

$$\frac{\partial E\{S\}}{\partial \lambda} = \frac{\frac{\frac{\partial Den}{\partial \lambda}\frac{E\{S\}}{(Den)^2}[\frac{E\{S\}}{N}+\bar{x}]}{}}{\frac{2E\{S\}}{N(Den)} - (E+a+\bar{b}-\frac{\bar{x}}{Den})} \tag{B.15}$$

The denominator of (B.15) is always negative. Since the rest of the numerator is always positive, $\frac{\partial Den}{\partial \lambda}$ determines the sign of $\frac{\partial E\{S\}}{\partial \lambda}$.

$$\frac{\partial Den}{\partial \lambda} = \frac{1}{\delta}[I_2\gamma(1-\alpha) + ((1-\lambda)\frac{\partial \rho_\theta}{\partial \lambda} - \rho_\theta)] \tag{B.16}$$

$$= \frac{1}{\delta}[I_2\gamma(1-\alpha) + (\frac{\delta^2\lambda^{-2}\gamma^{-2}(1-\alpha)^{-2}I_2^{-2}\eta^{-1}(2(1-\lambda)\lambda^{-1}-1)-\gamma^{-1}(1-\alpha)^{-1}I_2^{-1}}{\rho_\theta^{-2}})]$$

$$= \frac{1}{\delta}[\frac{\delta^2\lambda^{-2}\gamma^{-2}(1-\alpha)^{-2}I_2^{-2}\eta^{-1}(2(1-\lambda)\lambda^{-1}+1)+\delta^4\lambda^{-4}\gamma^{-3}(1-\alpha)^{-3}I_2^{-3}\eta^{-2}}{\rho_\theta^{-2}}] > 0$$

This means that $\frac{\partial Den}{\partial \lambda} > 0 \Rightarrow \frac{\partial E\{S\}}{\partial \lambda} < 0 \Rightarrow \frac{\partial E\{\Pi\}}{\partial \lambda} > 0$.

(v) $\frac{\partial E\{\Pi\}}{\partial \gamma} = \frac{\partial E\{(E+a+b)(1-S)\}}{\partial \gamma} = (E+a+b)(-\frac{\partial E\{S\}}{\partial \gamma})$. To find $\frac{\partial E\{S\}}{\partial \gamma}$, we apply the Implicit Function Theorem in equation (B.9) in Lemma 2.5. Taking the derivative of (B.9) with respect to γ,

$$\frac{\partial E\{S\}}{\partial \gamma} = \frac{\frac{\partial Den}{\partial \gamma}\frac{E\{S\}}{(Den)^2}[\frac{E\{S\}}{N}+\bar{x}]}{\frac{2E\{S\}}{N(Den)}-(E+a+\bar{b}-\frac{\bar{x}}{Den})} \tag{B.17}$$

The denominator of (B.17) is always negative. Since the rest of the numerator is always positive, $\frac{\partial Den}{\partial \gamma}$ determines the sign of $\frac{\partial E\{S\}}{\partial \gamma}$.

$$\frac{\partial Den}{\partial \gamma} = \frac{1}{\delta}[\lambda I_2 + (1-\lambda)(\alpha I_2 + \frac{\partial \rho_\theta}{\partial \gamma})] \tag{B.18}$$

Also,

$$\frac{\partial \rho_\theta}{\partial \gamma} = -\frac{-\gamma^{-2}(1-\alpha)^{-1}I_2^{-1}-2\delta^2\lambda^{-2}(1-\alpha)^{-2}I_2^{-2}\gamma^{-3}\eta^{-1}}{[\gamma^{-1}(1-\alpha)^{-1}I_2^{-1}+\delta^2\lambda^{-2}\gamma^{-2}(1-\alpha)^{-2}I_2^{-2}\eta^{-1}]^2} > 0 \tag{B.19}$$

This means that $\frac{\partial Den}{\partial \gamma} > 0 \Rightarrow \frac{\partial E\{S\}}{\partial \gamma} < 0 \Rightarrow \frac{\partial E\{\Pi\}}{\partial \gamma} > 0$.

(vi) $\frac{\partial E\{\Pi\}}{\partial \eta} = \frac{\partial E\{(E+a+b)(1-S)\}}{\partial \eta} = (E+a+b)(-\frac{\partial E\{S\}}{\partial \eta})$. To find $\frac{\partial E\{S\}}{\partial \eta}$, we apply the Implicit Function Theorem in equation (B.9) in Lemma 2.5. Taking the derivative of (B.9) with respect to η,

$$\frac{\partial E\{S\}}{\partial \eta} = \frac{\frac{\partial Den}{\partial \eta}\frac{E\{S\}}{(Den)^2}[\frac{E\{S\}}{N}+\bar{x}]}{\frac{2E\{S\}}{N(Den)}-(E+a+\bar{b}-\frac{\bar{x}}{Den})} \tag{B.20}$$

The denominator of (B.20) is always negative. Since the rest of the numerator is always positive, $\frac{\partial Den}{\partial \eta}$ determines the sign of $\frac{\partial E\{S\}}{\partial \eta}$.

$$\frac{\partial Den}{\partial \eta} = \frac{(1-\lambda)}{\delta}\frac{\partial \rho_\theta}{\partial \eta} \tag{B.21}$$

$$\frac{\partial \rho_\theta}{\partial \eta} = -\frac{-\delta^2\lambda^{-2}(1-\alpha)^{-2}I_2^{-2}\gamma^{-2}\eta^{-2}}{[\gamma^{-1}(1-\alpha)^{-1}I_2^{-1}+\delta^2\lambda^{-2}\gamma^{-2}(1-\alpha)^{-2}I_2^{-2}\eta^{-1}]^2} > 0$$

This means that $\frac{\partial Den}{\partial \eta} > 0 \Rightarrow \frac{\partial E\{S\}}{\partial \eta} < 0 \Rightarrow \frac{\partial E\{\Pi\}}{\partial \eta} > 0$.

(vii) $\frac{\partial E\{\Pi\}}{\partial \rho} = \frac{\partial E\{(E+a+b)(1-S)\}}{\partial \rho} = (E+a+b)(-\frac{\partial E\{S\}}{\partial \rho})$. To find $\frac{\partial E\{S\}}{\partial \rho}$, we apply the Implicit Function Theorem in equation (B.9) in Lemma 2.5. Taking the derivative of (B.9) with respect to ρ,

$$\frac{\partial \mathrm{E\{S\}}}{\partial \rho} = \frac{\frac{\partial \mathrm{Den}}{\partial \rho}\frac{\mathrm{E\{S\}}}{(\mathrm{Den})^2}\left[\frac{\mathrm{E\{S\}}}{\mathrm{N}} + \bar{\mathrm{x}}\right]}{\frac{2\mathrm{E\{S\}}}{\mathrm{N(Den)}} - (\mathrm{E} + \mathrm{a} + \bar{\mathrm{b}} - \frac{\bar{\mathrm{x}}}{\mathrm{Den}})} \tag{B.22}$$

The denominator of (B.22) is always negative. Since the rest of the numerator is always positive, $\frac{\partial Den}{\partial \rho}$ determines the sign of $\frac{\partial E\{S\}}{\partial \rho}$.

$$\frac{\partial \mathrm{Den}}{\partial \rho} = \frac{1}{\delta} > 0$$

This means that $\frac{\partial Den}{\partial \rho} > 0 \Rightarrow \frac{\partial E\{S\}}{\partial \rho} < 0 \Rightarrow \frac{\partial E\{\Pi\}}{\partial \rho} > 0$.

(viii) $\frac{\partial E\{\Pi\}}{\partial a} = (1 - E\{S\}) + (E + a + b)(-\frac{\partial E\{S\}}{\partial a})$. To find $\frac{\partial E\{S\}}{\partial a}$, we apply the Implicit Function Theorem in equation (B.9) in Lemma 2.5. Taking the derivative of (B.9) with respect to a,

$$\frac{\partial \mathrm{E\{S\}}}{\partial \mathrm{a}} = \frac{\mathrm{E\{S\}}}{\frac{2\mathrm{E\{S\}}}{\mathrm{N(Den)}} - (\mathrm{E} + \mathrm{a} + \bar{\mathrm{b}} - \frac{\bar{\mathrm{x}}}{\mathrm{Den}})} \tag{B.23}$$

The denominator of (B.23) is always negative. Since the numerator is always positive, $\frac{\partial E\{S\}}{\partial a} < 0 \Rightarrow \frac{\partial E\{\Pi\}}{\partial a} > 0$.

(ix) $\frac{\partial E\{\Pi\}}{\partial \bar{b}} = (E + a + b)(-\frac{\partial E\{S\}}{\partial \bar{b}})$. To find $\frac{\partial E\{S\}}{\partial \bar{b}}$, we apply the Implicit Function Theorem in equation (B.9) in Lemma 2.5. Taking the derivative of (B.9) with respect to $\bar{b}$,

$$\frac{\partial \mathrm{E\{S\}}}{\partial \bar{\mathrm{b}}} = \frac{\mathrm{E\{S\}}}{\frac{2\mathrm{E\{S\}}}{\mathrm{N(Den)}} - (\mathrm{E} + \mathrm{a} + \bar{\mathrm{b}} - \frac{\bar{\mathrm{x}}}{\mathrm{Den}})} \tag{B.24}$$

The denominator of (B.24) is always negative. Since the numerator is always positive, $\frac{\partial E\{S\}}{\partial \bar{b}} < 0 \Rightarrow \frac{\partial E\{\Pi\}}{\partial \bar{b}} > 0$.

(x) $\frac{\partial E\{\Pi\}}{\partial \bar{x}} = \frac{\partial E\{(E+a+b)(1-S)\}}{\partial \bar{x}} = (E + a + b)(-\frac{\partial E\{S\}}{\partial \bar{x}})$. To find $\frac{\partial E\{S\}}{\partial \bar{x}}$, we apply the Implicit Function Theorem in equation (B.9) in Lemma 2.5. Taking the derivative of (B.9) with respect to $\bar{x}$,

$$\frac{\partial \mathrm{E\{S\}}}{\partial \bar{\mathrm{x}}} = \frac{-\frac{\mathrm{E\{S\}}}{\mathrm{Den}}}{\frac{2\mathrm{E\{S\}}}{\mathrm{N(Den)}} - (\mathrm{E} + \mathrm{a} + \bar{\mathrm{b}} - \frac{\bar{\mathrm{x}}}{\mathrm{Den}})} \tag{B.25}$$

The denominator of (B.25) is always negative. Since the numerator is always negative, $\frac{\partial E\{S\}}{\partial \bar{x}} > 0 \Rightarrow \frac{\partial E\{\Pi\}}{\partial \bar{x}} < 0$.

(xi) $\frac{\partial E\{\Pi\}}{\partial \delta} = \frac{\partial E\{(E+a+b)(1-S)\}}{\partial \delta} = (E + a + b)(-\frac{\partial E\{S\}}{\partial \delta})$. To find $\frac{\partial E\{S\}}{\partial \delta}$, we apply the Implicit Function Theorem in equation (B.9) in Lemma 2.5. Taking the derivative of

(B.9) with respect to δ,

$$\frac{\partial \mathrm{E\{S\}}}{\partial \delta} = \frac{\frac{\partial \mathrm{Den}}{\partial \delta}\frac{\mathrm{E\{S\}}}{(\mathrm{Den})^2}[\frac{\mathrm{E\{S\}}}{\mathrm{N}}+\bar{\mathrm{x}}]}{\frac{2\mathrm{E\{S\}}}{\mathrm{N(Den)}}-(\mathrm{E}+\mathrm{a}+\bar{\mathrm{b}}-\frac{\bar{\mathrm{x}}}{\mathrm{Den}})} \tag{B.26}$$

The denominator of (B.26) is always negative. Since the rest of the numerator is always positive, $\frac{\partial Den}{\partial \delta}$ determines the sign of $\frac{\partial E\{S\}}{\partial \delta}$.

$$\frac{\partial \mathrm{Den}}{\partial \delta} = -\frac{\lambda}{\delta^2}(\rho + \mathrm{I}_2\gamma) - \frac{1-\lambda}{\delta^2}(\rho + \alpha \mathrm{I}_2\gamma + \rho_\theta) + \frac{1-\lambda}{\delta}\frac{\partial \rho_\theta}{\partial \delta}) \tag{B.27}$$

Also,

$$\frac{\partial \rho_\theta}{\partial \delta} = -\frac{2\delta\lambda^{-2}\gamma^{-2}(1-\alpha)^{-2}\mathrm{I}_2^{-2}\eta^{-1}}{[\gamma^{-1}(1-\alpha)^{-1}\mathrm{I}_2^{-1}+\delta^2\lambda^{-2}\gamma^{-2}(1-\alpha)^{-2}\mathrm{I}_2^{-2}\eta^{-1}]^2} < 0 \tag{B.28}$$

This means that $\frac{\partial Den}{\partial \delta} < 0 \Rightarrow \frac{\partial E\{S\}}{\partial \delta} > 0 \Rightarrow \frac{\partial E\{\Pi\}}{\partial \delta} < 0$.

(xii) $\frac{\partial E\{\Pi\}}{\partial \kappa} = \frac{\partial E\{(E+a+b)(1-S)\}}{\partial \kappa} = (E+a+b)(-\frac{\partial E\{S\}}{\partial \kappa})$. To find $\frac{\partial E\{S\}}{\partial \kappa}$, we apply the Implicit Function Theorem in equation (B.9) in Lemma 2.5. Taking the derivative of (B.9) with respect to κ,

$$\frac{\partial \mathrm{E\{S\}}}{\partial \kappa} = \frac{-\frac{\mathrm{E}}{(1-\kappa)^2}}{\frac{2\mathrm{E\{S\}}}{\mathrm{N(Den)}}-(\mathrm{E}+\mathrm{a}+\bar{\mathrm{b}}-\frac{\bar{\mathrm{x}}}{\mathrm{Den}})} \tag{B.29}$$

The denominator of (B.29) is always negative. Since the numerator is always negative, $\frac{\partial E\{S\}}{\partial \kappa} > 0 \Rightarrow \frac{\partial E\{\Pi\}}{\partial \kappa} < 0$.

Graphical Solution

Most of the comparative static results can be shown using a graph. The equilibrium quantity of stock sold by the manager in period one, $E\{S^*\}$, can be found by solving $(1-\kappa)E\{P(S^*)\}E\{S^*\} = E$, which is $E\{P(S^*)\} = \frac{E}{E\{S^*\}(1-\kappa)}$. The right hand side (RHS) of the equation is a non-linear decreasing function of $E\{S^*\}$, while the left hand side (LHS) is a linear decreasing function of $E\{S^*\}$ (see the last line in (B.8)). The graph below (part (a)) shows the equilibrium points, provided that these two curves intersect, i.e. an equilibrium exist. As mentioned in the proof of Lemma 2.5, the manager chooses $E\{S_1^*\}$ since the payoff to old shareholders is higher with low number of shares sold at a higher price.

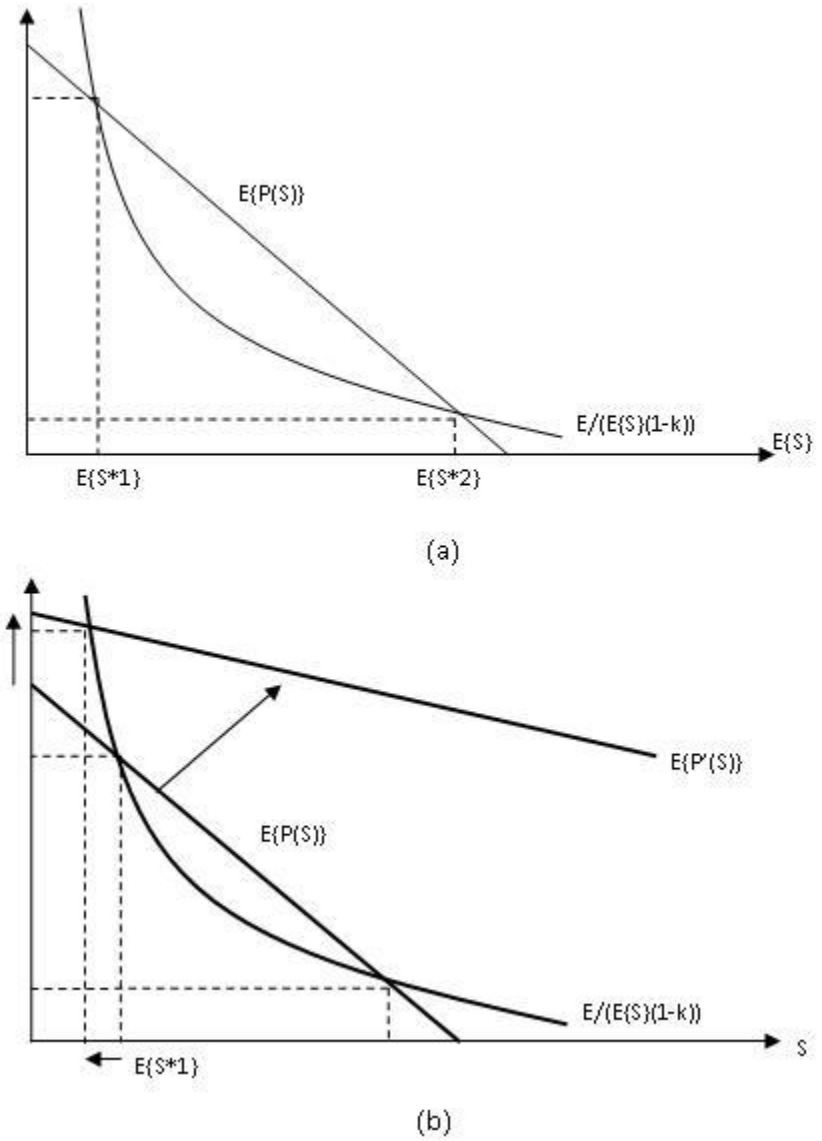

Figure B.1
Graphical representation of comparative statics

Suppose for example that α increases. RHS of the equation is not affected by this change. The LHS, which is $E + a + \bar{b} - \frac{1}{Den}(\bar{x} + \frac{E\{S\}}{N})$, is affected through Den. As shown in the algebraic proof, $\frac{\partial Den}{\partial \alpha} > 0$. This suggests that the intercept and the slope of the LHS increase. This leads to a shift in the line as shown in Figure B.1(b). As a result, $\frac{\partial E\{S_1^*\}}{\partial \alpha} < 0$, which means that $\frac{\partial E\{\Pi\}}{\partial \alpha} > 0$.

APPENDIX C

APPENDIX FOR CHAPTER 3

The table below explains the construction of deal and financial variables used in this paper. Unless otherwise stated, deal and financial variables are calculated using the most recent annual balance sheets (at the financial year end prior to the merger announcement). The word "a" at the beginning of the variable name stands for the acquirer and "t" for the target firm.

	VARIABLE NAME	PROXY	COMPUSTAT DATA ITEM
PANEL A. DEAL VARIABLES			
Method of Payment	*percentcash*	percent of total payments to the target firm that is in cash	
Form of Acquisition	*tender*	1 if tender offer	
Asset Relatedness	*asset_related*	1 if 2-digit SIC codes of the merging firms match	
Hostility	*unsolicited*	1 if the deal is classified as unsolicited	
Relative Size	*ln_relative_size*	(Log of) market value of equity of the target firm divided by that of the buyer firm, evaluated 60 days before the merger announcement	
PANEL B. FINANCIAL VARIABLES			
Tobin's Q	*a_tobinq, t_tobinq*	market value of assets divided by the book value of assets	[(MV of assets) / #6] [50]
Leverage	*a_book_leverage, t_book_leverage*	book value of debt divided by the book value of assets	[(#181+#10-#35) / #6]
Size	*ln_a_mvequity, ln_t_mvequity*	(Log of) the inflation-adjusted market value of equity	ln[#25*#199]
Cash Holdings	*a_cash, t_cash*	Cash holdings divided by the book value of assets	#1 / #6
Cash Flow	*a_cashflow, t_cashflow*	operating income before depreciation minus interest expense, taxes, preferred dividends and common dividends, normalized by the book value of assets	[#13-#15-(#16-#Δ35)- #19-#21]/#6

[50] MV of assets = [#181+#10-#35+(#25*#199)]. If #10 is not available, we use #56 instead. Calculations follow Fama and French (2002).

Appendix C continued

Sales Growth	*a_salesgrowth, t_salesgrowth*	1 year growth in the sales of the company	$[\#12_t-\#12_{t-1}]/\#12_{t-1}$
Liquidity	*a_liquidity, t_liquidity*	current assets divided by book value of total assets	#4/#6
Return on Equity	*a_ROE, t_ROE*	net income divided by last year's stockholder's equity	$\#172_t/\#60_{t-1}$
R&D Expenditures	*a_rd_exp, t_rd_exp*	R&D expenditures divided by book value of total assets	#46/#6
Capital Expenditures	*a_cap_ex, t_cap_ex*	Capital expenditures divided by book value of total assets	#128/#6