MANUEL TEIXEIRA DE VASCONCELOS

Agency Costs, Firm Value, and Corporate Investment

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Manuel Teixeira de Vasconcelos

Agency Costs, Firm Value, and Corporate Investment

Agency Kosten, Ondernemingswaarde, en Bedrijfs Investeringen

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In memory of my grandfather Avô Manel,
who introduced me to the art of learning

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Manuel Teixeira de Vasconcelos
Rotterdam, The Netherlands
May, 2012

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Chapter 1

Introduction

Corporate finance is the subfield of economics that studies the choices made by corporations to finance their investments. Paradoxically, its origin as an academic field can be traced back to the seminal article of Modigliani and Miller (1958) showing that, in a frictionless market, firms' financing decisions do not impact corporate value, and corporate finance is thus largely irrelevant. Ever since, researchers in finance have focused on identifying the frictions that exist in capital markets which make firm value and firm investment depend on financing choices, having as ultimate goal the mitigation of the negative impact of these frictions in the economy. The possibility of increasing economic output by addressing the impact of market frictions on firm value and investment is what makes academics, corporations, governments, and investors care about corporate finance.

Relevant frictions in capital markets include the intervention of the government in the form of taxes, either at the corporate level (Modigliani and Miller (1963)) or at the personal level (Miller (1977)), and the existence of bankruptcy costs (Robichek and Myers (1966)) and adjustment costs (Jalilvand and Harris (1984)). However, what has long drawn the most interest from the academic community is the impact of information asymmetry. The difference in the information set of different parties can lead to adverse selection problems, in which the supplier of financing provides financing to corporations in terms that would be different in case it had access to managers' own private information. Adverse selection is behind pervasive economic phenomena such as credit rationing (Stiglitz and Weiss (1981)), and can lead, in extreme cases, to a complete market breakdown (Akerlof (1970)). Information asymmetry is also the underlying mechanism of, although not strictly necessary to, agency costs of outside financing, which are a market friction on their own. Agency costs arise from the separation of

ownership and control occurring when a firm obtains financing from external sources, giving rise to a classical moral hazard problem: managers do not act in the best interests of investors but rather take the actions that maximize their own utility (Jensen and Meckling (1976)). Agency costs of outside financing include the perks consumed by management or the costs associated with inefficient investment decisions that arise from the separation of ownership and control, such as underinvestment (Bertrand and Mullainath (2003); Myers (1977)), empire building (Jensen (1986)), risk-shifting (Jensen and Meckling (1976)), and short-termism (Stein (1989)). They also include the expenses undertaken in order to make outside financing possible (or less costly). The latter include monitoring costs, which are incurred by investors to ensure that their investment generates the expected returns (e.g., control systems such as debt covenants), and bonding costs, which are incurred by the firm to attract outside capital at a lower price (e.g., contractual commitment to hire auditors). Jensen and Meckling (1976) show that all the agency costs of outside financing are ultimately borne by the firm in the form of costlier access to outside finance, and it is thus in its interest to reduce them.

This thesis examines the mechanisms that are used by investors and managers to reduce the agency costs of outside financing and the impact of such costs on the investment decisions and value of firms. We use takeovers as the testing ground in the first two essays because they are often associated with concerns that managers are maximizing their utility rather than firm value (Morck et al. (1990)), taking advantage of being much better informed than outside shareholders (Moeller et al. (2007)). In chapter 2 we examine the use of voluntary disclosure as a tool to bridge the information gap between corporate insiders and shareholders. We contribute to an extensive literature in financial accounting that describes the motivations behind managerial disclosures by examining a specific context that has received little attention so far: the disclosure of synergy estimates in the context of mergers and acquisitions. In chapter 3 we focus on another tool to reduce agency costs of outside financing: monitoring by institutional owners. Despite a considerable literature on the intersection between ownership structure, corporate decision making, and firm value, the question of how incentives may affect large shareholders' monitoring and, consequently, managerial actions, remains largely unanswered. We aim at filling this gap in the literature by examining how stock liquidity, working as a monitoring incentive, impacts takeover decisions. Finally, in chapter 4 I study how the access to a new source of financing, through the issuance of publicly traded debt, affects corporate investment decisions. Agency costs are an important component of the total cost of outside financing, especially when the financing is obtained from dispersed investors, and I analyze whether the firm adjusts its investment policies taking such costs into account. In the remain-

der of this chapter, I will describe in more detail each of these studies.

1.1 Voluntary Disclosure and Information Asymmetry

A potential solution to the problem of asymmetric information between managers and providers of capital is the voluntary disclosure of inside information. By sharing their private information with the market, managers can mitigate investors' concerns with moral hazard. However, in order for it to be effective, disclosure needs to be credible. Furthermore, it is not costless: there is the risk of revealing proprietary information to competitors (Dye (1986)) and of increased shareholder litigation in case any forecast that is disclosed does not materialize (Healy and Palepu (2001)).

In chapter 2 of this thesis we study the role of voluntary disclosure in mitigating information asymmetry by examining the motivations for bidding firms to disclose a synergy forecast when announcing a merger or acquisition. M&A is a setting in which the imbalance of information between managers and investors is more pronounced and in which agency concerns are of first-order importance (Moeller et al. (2007); Morck et al. (1990)). As such, managerial disclosure is likely to have an important role in this context. Our sample consists of 1,990 M&A deals over the period 1995 to 2008, of which 345 announce quantifiable synergy estimates.

Our results suggest that managers are more likely to disclose an estimate of the synergies expected from a deal when they have more precise information about it. More specifically, bidding firms are more likely to disclose synergy forecasts when the target firm operates in the same industry, when there have been more deals in the same industry in the recent past, when the deal is non-hostile, when there is less asymmetric information about the target's value, or when the target is domestic. This result is consistent with the theory of Verrecchia (1990) that, as the precision of information increases, the market exerts more pressure on the manager to disclose the information by discounting stock prices more sharply in the event the information is withheld. In addition, we find that disclosure is less likely when litigation risk is higher. Finally, we find that synergy disclosure is more likely to occur for equity-financed deals, supporting the hypothesis that managers resort to disclosure in order to alleviate the adverse selection problem that arises from using equity as the method of payment in a deal (Myers and Majluf (1984); Travlos (1987)).

We test the credibility of the disclosure by examining its impact on stock prices at the time

of the announcement of the takeover. After controlling for the endogeneity of the disclosure decision, synergy forecast disclosures result in approximately 5% higher bidder stock returns. This result is consistent with a signalling perspective of disclosure in which managers, by disclosing their synergy estimates, mitigate concerns with moral hazard being the driver behind their takeover decisions. Furthermore, we show that the market reaction to announcement is increasing on the synergy value that is disclosed, suggesting that the market is at least partly taking into account the estimates given by managers when assessing the value of the merged firm.

This chapter contributes to a small but growing literature on managerial synergy forecasts. Previous studies focus on the credibility of managerial synergy forecasts (Houston et al. (2001); Bernile and Bauguess (2011)) or on the association of forecasted synergy values with certain deal characteristics (Ismail (2011)), while our key research question is what drives the managers' decision to release synergy forecasts in the first place. On a broader level, our findings contribute to the literature on voluntary managerial disclosure by extending previous studies of managerial earnings forecasts to a type of disclosure that is a rare event in the life of a firm and that occurs at moments when the resolution of information asymmetry problems is of even greater importance.

1.2 Institutional Monitoring and Moral Hazard

An alternative mechanism that can be used to mitigate moral hazard and its implications in accessing external financing is monitoring by institutional shareholders. Ownership concentration by institutions that monitor managers can be a solution to the standard agency problems by reducing the free-riding problems that exist amongst dispersed shareholders (Shleifer and Vishny (1986)). However, there is little evidence on the role of monitoring incentives in the relation between institutional ownership and firm decisions and value (Becht et al. (2003)). In chapter 3 we study the role of stock liquidity as an incentive for monitoring following the large theoretical literature exploring this relation (Bhide (1993); Maug (1998); Edmans (2009)).

We use a sample of 2,601 acquisitions announced between January 1998 and December 2008 involving U.S. based firms and a publicly-listed bidder. We test the effect of stock liquidity on institutional monitoring by examining merger announcement returns. If stock liquidity works as an incentive (Faure-Grimaud and Gromb (2004)) or as an impediment (Bhide (1993)) for institutional monitoring, we should see a relation between it and the quality of the acquisi-

tions made by firms. To ensure that our results are not contaminated by revelations about the stand-alone value of bidders (Savor and Lu (2009)) or by the short-selling pressure of merger arbitrageurs (Mitchell et al. (2004)), we exclude acquisitions for public targets financed with equity.

We find that acquiring firms with lower stock liquidity earn higher abnormal returns at the announcement of a takeover, especially when institutions are more likely to collect private information on the firm's actions. This effect is concentrated on firms with potentially higher agency costs, as measured by lower managerial ownership (Jensen and Meckling (1976)) and lower product market pressure (Titman and Wessels (1988)). These results are consistent with the view of Bhide (1993) that stock liquidity reduces the incentives for institutions to monitor management because it makes exit less costly relative to intervening in the firm, thereby allowing managers to make less value-creative acquisitions.

Further evidence is given by our ex-post analysis of the acquiring firm. We find that the probability of withdrawal of a deal is decreasing on announcement returns and is higher when there is a negative announcement return, as expected if managers "listen to the market" (Luo (2005)). However, this relation only holds in the subsamples with lower stock liquidity, consistent with our hypothesis that for those firms there is a stricter monitoring of managers by institutions. Further, we find that the negative relation between announcement returns and CEO turnover reported by Lehn and Zhao (2006) is also only present in the subsample with lower stock liquidity. Finally, we report that stock liquidity is negatively associated with the operating performance of the firm after the takeover. Overall these results provide strong evidence that ex-post monitoring by institutions is dependent on the firm's stock liquidity.

We contribute to a growing literature on the role of stock liquidity on firm value and shareholders' monitoring. Fang et al. (2011) find, consistent with our study, that higher stock liquidity leads to a decrease in firm innovation through an increase in stock ownership by non-active institutions, who have a short-term focus. Contrasting results are obtained by Bharath et al. (2010), who, using a different setting, show that there is a positive relation between stock liquidity and firm value in the presence of blockholders. They argue that the reduction in the cost of exit by blockholders caused by an increase in stock liquidity puts more pressure on managers to exert more effort ex-ante and avoid such exit. This chapter is different from their paper in that we focus on a specific managerial action (takeovers), where we believe that monitoring is of greater importance. Furthermore, we show that the importance of monitoring also depends on the context of the firm and on its governance. Edmans et al. (2011) find that

an increase in stock liquidity is associated with an increase in the probability that hedge funds acquire a stake in a firm, and that such purchase triggers positive abnormal stock returns. However, conditional on having purchased a stake in the firm, they find that higher stock liquidity is associated with a lower likelihood of direct intervention by the hedge fund, which is consistent with our finding of a negative relation between stock liquidity and institutional monitoring.

1.3 Source of Financing and Corporate Investment

In the previous two chapters we focus on mechanisms that can be used to mitigate agency costs of outside financing. In chapter 4 I instead examine how firm investment changes when there is an increase in the agency costs of outside financing. I do so by studying the relation between the level of corporate investment and a firm's use of the public debt market.

I use a panel of U.S. firms between the beginning of 1986 and the end of 2008 and I collect information on their access to the bond market. The main sample consists of 84,556 firm-year observations. I measure level of investment by looking at both capital expenditures and corporate takeovers. Nini et al. (2009) show that creditors are averse to firms' investments, as these investments can be made to increase equityholders' expected payoff at the expense of debtholders (Jensen and Meckling (1976)). Given that, as explained before, equityholders ultimately bear the agency costs of debt, it is in their interest to commit ex-ante not to expropriate debtholders' wealth, thereby ensuring better access to financing in the future (Almeida et al. (2011)). Consequently, I hypothesize that firms accessing the bond market reduce their level of investment in order to encourage relatively uninformed investors to hold their debt on more favorable terms. This change in firm behavior might be necessary because alternative mechanisms to reduce agency costs of debt, such as monitoring, become weaker when switching from borrowing from financial intermediaries to borrowing from financial markets (Chava and Roberts (2008); Diamond (1991)). The alternative hypothesis is that firms having access to the bond market increase their investment level because of a reduction in financial constraints (e.g., Whited (1992)).

I find that accessing the public debt market is associated with a significant reduction in the level of capital expenditures and takeovers, especially for firms with higher credit risk. Firms tapping the bond market also become less likely to violate debt covenants, reduce the level of payouts to equityholders, and increase cash holdings. The evidence is consistent with

the hypothesis that firms adjust their decisions when borrowing repeatedly from less-informed investors in order to reduce agency costs of debt and guarantee future access to financing.

This chapter adds to the recent literature on the importance of debtholders in corporate governance, which has so far focused on bank debt as a result of its stricter covenants and easier renegotiation (Chava and Roberts (2008); Nini et al. (2009); Nini et al. (2010)). I provide evidence that, in a contracting framework with less monitoring and higher information asymmetry, the existence of debt claims held by dispersed investors leads the firm to change its investment decisions. This self-imposed change in behaviour is meant to reduce agency costs of debt, and is aimed at encouraging uninformed investors to hold the firm's debt on more favourable terms. In a broader sense, this chapter extends to debt financing the analysis made by Asker et al. (2011) of the differences in investment behavior between private firms and stock market listed firms. Similarly to them, I find that firms with publicly-listed securities have lower levels of investment and have a weaker relation between investment and investment opportunities. While Asker et al. (2011) show that in equity markets it is managerial myopia the main driver of the change in investment behavior, I offer evidence that in debt markets it is the agency costs of debt that lead to the lower investment level of the firms with traded securities.

Chapter 2

Synergy Disclosures in Mergers and Acquisitions*

2.1 Introduction

When engaging in a merger or acquisition, managers have the option to publicly release a forecast of the synergies associated with their planned deal. Approximately one-fifth of the deal announcements between U.S. public firms over the period 1995 to 2008 include a forecasted synergy value released by bidder management. This chapter investigates the factors driving bidders' decision to release a synergy value estimate at the time of the deal announcement.

A key finding of the M&A literature is that, while takeovers are beneficial for target-firm shareholders, wealth effects for bidding-firm shareholders are on average zero or negative.[1] One possible explanation for negative bidder announcement returns is that bidding firms tend to overpay for the target, either due to agency problems (Jensen and Meckling (1976); Jensen (1986)) or behavioral biases (Roll (1986)). We hypothesize that bidder managers use synergy forecast announcements to signal their shareholders that they are not overpaying for the deal, and as such obtain a more favorable stock price reaction upon the deal announcement. We

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[1] Martynova and Renneboog (2008) and Eckbo (2009) provide literature surveys on target and bidder announcement returns.

therefore predict that synergy disclosures are more often used when there is higher information asymmetry between shareholders and managers about the synergy value of an announced deal.

The literature on voluntary disclosure suggests a number of other factors that may influence bidders' decisions to disclose synergy information. Verrecchia (1990) argues that managers' threshold for disclosing information is lower when the available information is more precise. The underlying intuition of this "information quality" rationale is that, as the precision of information increases, the market exerts more pressure on the manager to disclose the information by discounting stock prices more sharply in the event the information is withheld. We therefore predict synergy disclosures to be more likely when managers are able to calculate synergies more accurately. Verrecchia (1983) and Dye (1986) argue that disclosure decisions may be affected by firms' reluctance to harm their competitive position. Projected synergy values may provide valuable information to competitors regarding the bidder's intended post-merger strategy. Shareholder litigation risk can also reduce incentives to provide disclosure of forward-looking information (Healy and Palepu (2001)). We thus predict a negative impact of proprietary costs and of shareholder litigation risk on bidders' propensity to disclose synergy estimates.

We examine these predictions using a sample of 1,990 M&A deals involving U.S. public bidder and target firms over the period 1995 to 2008. We hand-collect publicly-disclosed information related to each of these deals, and find that 345 or 17% of the transaction announcements are accompanied with a synergy estimate provided by bidder management. We henceforth label these deals "disclosing deals". Our empirical analysis consists of two parts. In the first part, we examine the deal and firm characteristics driving the synergy disclosure decision through a set of probit regressions. In the second part, we examine the impact of synergy disclosures on bidder stock returns around deal announcements. If synergy disclosures are able to mitigate shareholders' concerns regarding bidder overpayment, we should observe a positive impact of synergy disclosures on bidder stock returns. Alternatively, if shareholders perceive synergy disclosures as cheap talk by managers trying to motivate an overpriced deal, we may observe a neutral or even negative impact of synergy disclosures. The impact of synergy disclosures on bidder stock returns is therefore an empirical question.

The probit analysis of synergy disclosure determinants provides little evidence consistent with our signaling hypothesis. That is, we do not find that synergy disclosures are more likely when there is high information asymmetry about synergy value. Instead, consistent with Verrecchia (1990) information quality rationale, our findings suggest that managers' likelihood

to disclose synergy forecasts increases significantly with the level of precision with which they can predict synergies. More particularly, bidding firms are more likely to disclose synergy forecasts when the target firm operates in the same industry, when there have recently been more deals in the same industry, when the deal is non-hostile, and when there is less asymmetric information about the target's value. An extension of our analysis to cross-border transactions corroborates this intuition. Synergy disclosures are significantly less likely in cross-border transactions, which tend to be surrounded with high uncertainty for bidding-firm managers.

As predicted, we also find that firms' propensity to disclose is negatively influenced by shareholder litigation risk. Moreover, our results indicate that disclosing deals are significantly more likely to be financed with equity. Equity financing is consistently found to induce significantly more negative bidder announcement returns than cash financing, since it may signal that the bidding firm is overvalued (Travlos (1987)). Thus, while we obtain little evidence of higher asymmetric information related to synergy values, our probit results do suggest that disclosing deals may suffer from higher adverse selection problems related to bidding-firm value, and are as such likely to induce more negative bidder announcement returns ex ante. Bidding firms may use synergy forecasts to alleviate these predicted negative announcement returns.

Our analysis of bidder announcement returns corroborates this intuition. After controlling for the endogeneity of the synergy disclosure decision, we find that synergy disclosures significantly reduce the negativity of bidder announcement returns. To give a sense for magnitude, combining deal announcements with a synergy forecast announcement results in approximately 5% higher bidder announcement returns. We also find that bidder stock price reactions are increasing in the amount of the forecasted synergies accruing to bidding-firm shareholders, suggesting that shareholders consider the forecasted information value relevant and credible. An analysis of long-term buy-and-hold returns indicates that shareholders do not over- or under-react to synergy disclosures. Together, the probit and announcement returns analyses suggest that synergy disclosures mainly serve to obtain a more favorable market reception for deals that would otherwise induce highly negative bidder announcement returns. The main deterrents of managerial synergy disclosures are lack of precise information on synergy values, and shareholder litigation risk.

This chapter contributes to a small but growing literature on managerial synergy forecasts. Using a sample of 41 large U.S. bank mergers, Houston et al. (2001) examine the impact of

synergy forecasts on announcement-period stock returns and analysts' reports. Their evidence suggests that costs savings projections are considered credible, while this is not the case for revenue enhancement projections. Bernile and Bauguess (2011) examine 3,935 M&A deals between U.S. public bidder and target firms, of which 23% are combined with insider projections of synergies. Their key question is whether these projections reflect real operational synergies. Their analysis suggests that announcement-period stock returns are more favorable for deals including forecasts, with the magnitude of the reaction increasing in both the predicted and the surprise component of the forecasted synergy value. Ismail (2011) analyzes the impact of the magnitude of synergy forecasts on takeover premiums and payment form. He uses a sample of 336 M&A deals between U.S. public bidder and target firms, all of which are accompanied by managerial synergy forecasts. His results indicate that, whereas synergy values do not explain takeover premiums, larger projected synergy values result in a larger equity fraction in the payment offered. While these studies focus either on the credibility of managerial synergy forecasts (Houston et al. (2001); Bernile and Bauguess (2011)) or on the association of forecasted synergy values with certain deal characteristics (Ismail (2011)), our key research question is what drives bidder management's decision to release synergy forecasts in the first place.

This chapter is also related to Devos et al. (2009), who analyze Value Line synergy forecasts for 264 large mergers. Their evidence suggests that mergers mainly generate gains by improving resource allocation, rather than by reducing tax payments or increasing the market power of the combined firm. We differ from this study by analyzing the determinants of synergy value disclosures directly provided by bidder management, rather than the components of synergy forecasts provided by analysts.

On a broader level, our findings contribute to the literature on voluntary managerial disclosure. Previous studies use disclosure ratings or self-constructed disclosure measures, which may be subject to endogeneity issues (Healy and Palepu (2001)). Some studies examine managerial earnings forecasts (e.g., Lennox and Park (2006)). Similar to management earnings forecasts, voluntary synergy forecasts present the advantage that the exact timing of the disclosure can be identified, which enables us to conduct powerful tests of motivations for, and consequences of, voluntary disclosure. However, while managerial earnings forecasts are typically recurring events, synergy forecasts are rare events in the life of a firm, involve a long forecasting horizon, and occur at moments when the resolution of information asymmetry problems is very important.

The remainder of this chapter proceeds as follows. Section 2.2 discusses our testable predictions on the determinants of voluntary synergy disclosures, and motivates the associated empirical proxies. Section 2.3 describes the data set. Section 2.4 provides empirical results on the determinants of voluntary synergy disclosures. Section 2.5 analyzes the impact of synergy disclosure on bidder stock returns. Section 2.6 concludes.

2.2 Testable Predictions and Empirical Proxies

In this section, we discuss the different determinants of synergy disclosures suggested by the literature and develop the empirical proxies for each determinant.

2.2.1 Synergy Disclosure as a Signal of Synergy Value

Our research topic lies at the intersection of two strands of literature: the M&A literature, and the literature on voluntary disclosure. Within the M&A literature, it is a stylized fact that bidder announcement returns tend to be neutral or negative in acquisitions of public targets (see Martynova and Renneboog (2008) and Eckbo (2009) for reviews of the literature). One often-cited reason for these observed bidding-firm announcement returns is that the stock market perceives M&A deals as neutral or bad investments (Jarrell and Poulsen (1989)). Rational shareholders know that bidder managers may be overpaying because they pursue objectives other than shareholder value maximization (Jensen and Meckling (1976); Jensen (1986); Morck et al. (1990); Moeller et al. (2005)), or because they overestimate their ability to manage the target firm (Roll (1986)). We hypothesize that bidding-firm managers use synergy disclosures to signal that they are not overpaying for the deal, and as such obtain a more favorable stock price reaction upon the deal announcement.

This "signaling" hypothesis relies on the assumption that bidding-firm managers aim to maximize short-term stock prices. If not, they could simply wait until the market understands the true value of the synergies. Verrecchia (2001) states several reasons for managers to be concerned with their firms' current stock prices. First, executive compensation contracts are incomplete. It is easier to reward managers based on current stock price performance. Moreover, managers may not be around to reap the benefits of long-term stock price increases. Second, the firm may intend to issue equity(-linked) securities in the near future. Third, anecdotal evidence suggests that maximizing current stock prices may simply be heuristic behav-

ior on the manager's part. The signaling hypothesis yields the prediction that the synergy disclosure decision is positively influenced by information asymmetry about synergy values between bidder managers and shareholders. Higher information asymmetry increases bidder managers' need to mitigate a highly negative stock market reception of the deal by closing the information gap with their shareholders.

To capture bidders' need for signaling synergy values through voluntary synergy disclosures, we construct a set of proxies for shareholders' uncertainty about the true synergy value. Appendix A includes a detailed description of all explanatory variables used in this chapter. In line with Servaes and Zenner (1996), we assume that the information asymmetry problem is smaller for deals between firms in the same industry. For such deals, it may be easier for shareholders to evaluate the associated synergies. We also expect information asymmetry about synergy values to be smaller when the deal has been preceded by a large number of other deals targeted at the same industry. Observing these previous deals could make it easier for bidder shareholders to evaluate the synergy values associated with the proposed transaction. To capture uncertainty regarding synergy value faced by bidder shareholders, we therefore include a Same Industry dummy variable equal to one for deals between firms in the same industry, and an Industry Liquidity Index measuring the number of M&A transactions in the target's industry over the year prior to the transaction (calculated as in Schlingemann et al. (2005)).

Although voluntary synergy disclosures are hypothesized to reduce asymmetric information with respect to the value of synergies rather than with respect to stand-alone company values, we also test whether the level of asymmetric information related to target and bidder values influences the disclosure decision. The reason is that information asymmetry regarding the stand-alone values of the involved companies can make it harder for shareholders to evaluate the benefits resulting from combining these two entities. We use two widely-adopted measures for information asymmetry about firm value, i.e., stock return volatility (Target Volatility and Bidder Volatility) and firm size (Target Total Assets and Bidder Total Assets). Asymmetric information should be higher for target and bidder firms with a higher volatility and smaller total assets.

To obtain further insights on synergy disclosure motives, we also analyze the impact of synergy disclosures on bidder stock returns around the deal announcement date. If bidders use synergy disclosures as a signaling tool, and the signal is credible, we expect bidder announcement returns to be positively influenced by the synergy disclosure decision, and increasing in

the value of the projected synergies. However, shareholders may also perceive synergy disclosures as cheap talk used by managers to motivate overpaid deals.[2] As such, synergy disclosure may have no impact, or even a negative impact, on bidder announcement returns. The impact of synergy disclosures on bidder announcement returns is thus an empirical question.

2.2.2 Synergy Disclosure and Information Quality

While the M&A literature suggests a signaling motive for firms to engage in voluntary synergy disclosures, theoretical models on voluntary information disclosure suggest that information quality may guide firms' decision to disclose synergies.[3] Early disclosure models (Grossman and Hart (1980); Milgrom (1981)) imply that, when shareholders have rational expectations, managers should fully disclose all available information that can be credibly communicated. The reason is that shareholders equate withheld information with the worst possible information, and discount stock prices accordingly. A number of subsequent models identify factors that may induce cross-sectional variations in voluntary disclosure policies. Verrecchia (1990) argues that managers' threshold for disclosing is lower when the information is of higher quality. Higher quality information is defined as information with lower variance, i.e., higher precision. The market knows the quality of the information, but not its type (good or bad). As the quality of the information increases, the market exerts more pressure on the manager to disclose the information by discounting stock prices more sharply in the event more precise information is withheld.

Based on the model of Verrecchia (1990), we predict bidder managers' likelihood of disclosing synergy forecasts to increase in the quality of the information available to calculate synergy values. We expect bidder management to use both publicly available information and inside, "soft" information as inputs for synergy forecasts. The set of variables used to measure the precision of relevant publicly available information largely overlaps with that used for measuring the uncertainty about synergies faced by bidder shareholders. More particularly,

[2]The business press provides ample illustrations of synergy forecasts being used as cheap talk to motivate controversial deals. As argued by Warren Buffett (Berkshire Hathaway Annual Report, 1997): "*If a CEO is enthused about a particularly foolish acquisition, both his internal staff and his outside advisers will come up with whatever projections are needed to justify his stance. Only in fairy tales are emperors told that they are naked.*"

[3]The relevant theoretical models for our research purpose focus on the decision whether or not to disclose information. A range of other models deal with the question on when to disclose information. This timing question is less relevant for our analysis, as all synergy disclosures are included together with, or shortly after, the deal announcement. Dye (2001) and Verrecchia (2001) provide an overview of studies on disclosure timing.

we expect it to be easier for managers to obtain an accurate synergy value estimate if the deal is targeted at a company in the same industry (Same Industry dummy variable equal to one), if there have been many previous deals in that same industry (higher Industry Liquidity Index), and if there is more precise information on the stand-alone value of the target (lower Target Volatility, and larger Target Total Assets). Since the signaling hypothesis and the information quality hypothesis of Verrecchia (1990) yield opposite predictions regarding the influence of these variables on the disclosure decision, their impact on bidder management's likelihood to disclose synergy estimates is an empirical issue. To proxy for management's inside information on synergy values, we include a dummy variable equal to one for Hostile deals. In hostile deals, it may be harder for bidder management to receive inside, "soft" information relevant for determining synergy values from target management. The Hostile dummy may thus act as an inverse proxy for the quality of the non-public information available to the bidder management, leading us to expect a negative impact of this dummy variable on the likelihood of synergy disclosures.

2.2.3 Synergy Disclosure and Proprietary Costs

The disclosure decision may also be influenced by product-market competition concerns. As argued by Verrecchia (1983) and Dye (1986), the release of private information can damage a firm's competitive position in product markets. Synergy forecasts may provide competitors with information on the sources of value creation resulting from the merger, and as such result in a substantial loss of proprietary information for the bidding firm. In line with the literature, we label the costs associated with the adverse impact of voluntary disclosures on the firm's competitive position "proprietary costs".

Following Bamber and Cheon (1998), we include growth opportunities as a proxy for proprietary information. Growth opportunities indicate availability of profitable investments such as new product introductions and capacity expansion projects. The more valuable the growth options, the more managers put at stake by releasing any information that could dissipate the value of these opportunities. We use the bidder's market to book ratio (Bidder Market to Book) as a measure for its growth opportunities. Also according to Bamber and Cheon, firms' actions (among which information disclosures) are more likely to affect competitors' actions in highly concentrated product markets. We therefore also include the Bidder Industry Concentration Ratio as a proprietary costs measure. We expect a negative impact of Bidder Market to Book and of Bidder Industry Concentration Ratio on bidders' propensity to disclose

synergies.

2.2.4 Synergy Disclosure and Shareholder Litigation

Litigation by shareholders can also reduce incentives to provide disclosure of forward-looking information if managers believe that the legal system penalizes forecasts made in good faith because it cannot distinguish between unexpected forecasts errors and those due to deliberate management bias (Skinner (1997); Healy and Palepu (2001)). According to Rule 10b-5 of the U.S. Security Exchange Act of 1934, a deliberately misleading synergy disclosure is unlawful, even if it happens under the safe harbor provision of the Private Securities Litigation Reform Act of 1995. Over the past years, a number of firms have been sued for making supposedly unrealistic synergy estimates (e.g., SunTrust has been sued by First Union Corp. and Wachovia). Other companies (among which Hewlett-Packard in its merger with Compaq) had to demonstrate in-court how they obtained their synergy estimate. The mere possibility of incurring legal costs resulting from the release of a synergy estimate might work as a deterrent of voluntary disclosures.

Based on Johnson et al. (2000) and Johnson et al. (2001), we use a dummy variable equal to one for firms in the computer hardware, software, or pharmaceuticals industry and equal to zero otherwise as a proxy for litigation risk. Firms in these high-technology industries have been reported to be at much higher risk of shareholder litigation than other firms (e.g., Field et al. (2005)). We expect a negative impact of this Litigation Risk dummy variable on firms' likelihood to disclose synergies.

2.2.5 Other Determinants of Synergy Disclosure

We include a number of control variables in our analysis. Bidder management needs to obtain the approval of their shareholders through voting when the firm expects to issue shares corresponding to more than 20% of the pre-bid outstanding shares to finance the acquisition (Bethel et al. (2009)). Bidder managers may be more likely to resort to voluntary synergy disclosures to convince shareholders in such cases. We therefore include a Shareholder Approval variable equal to one for deal types in which bidder shareholders need to express their approval by voting, and equal to zero otherwise.

We also control for the Takeover Premium (calculated as outlined in Appendix A). A

higher takeover premium may be perceived by the market as a signal of overpayment, and thus result in a stronger managerial need to convince shareholders of the synergies associated with the deal. However, shareholders may also perceive the takeover premium as an indicator of the magnitude of estimated deal synergies rather than of overpayment. Thus, the predicted impact of Takeover Premium on the likelihood of synergy disclosures is unclear.

We also include an Equity Payment dummy variable equal to one for deals that include a portion of equity financing. Equity-financed mergers are widely documented to induce more negative bidder announcement returns than cash-financed bids (Travlos (1987); Moeller et al. (2007)). A common explanation for this observation is that equity financing signals bidder overvaluation (Travlos (1987)). Despite this negative signal, bidders may have no other option than to resort to equity payments, for example due to limited cash availability (Martin (1996)). While synergy disclosures may not mitigate shareholder concerns regarding bidding-firm overvaluation (i.e., they pertain to synergy value rather than to bidding-firm value), bidding firms may still be more likely to resort to synergy disclosures for equity-financed deals, in order to alleviate the expected negativity of the announcement returns associated with these deals. We thus expect a positive impact of the Equity Payment dummy on the likelihood of synergy disclosures. Firms are more likely to disclose information on events that are material to them. To capture the importance of the deal for the bidding firm, we include the ratio of the deal value to the bidding firm's market capitalization (Relative Size).

In addition, we control for changes in shareholders' information environment resulting from the adoption of Regulation Fair Disclosure (FD) in October 2000.[4] Under Regulation FD, managers can no longer make selective disclosures of material information to analysts and other investment professionals. As such, this rule may induce firms to disclose more information through public channels, resulting in a positive impact on voluntary synergy disclosures.

Finally, we control for corporate governance quality of the bidder firm by including the Gompers et al. (2003) governance quality index (Bidder GIM Index). In firms with a poor governance structure in place, as reflected by a higher GIM Index value, shareholders may be more skeptical about the value-creating potential of M&A deals, thereby increasing the need to signal synergy value through synergy disclosures. Alternatively, self-serving managers in firms with poor governance may use inflated synergy value estimates to motivate a potentially

[4] An extensive literature examines the impact of Regulation Fair Disclosure on the level of information asymmetry between managers and shareholders (e.g., Heflin et al. (2003); De Jong and Apilado (2009)).

value-destructive deal. Thus, irrespective of whether bidder management aims to maximize shareholder value, we expect voluntary synergy disclosures to be more likely for firms with poor corporate governance in place.

2.3 Sample

We obtain a sample of mergers and acquisitions between U.S. public firms announced between January 1^{st} 1995 and December 31^{st} 2008 from the Securities Data Company's Mergers and Acquisitions Database (henceforth SDC). We exclude minority stake repurchases, acquisitions of remaining interest by majority owners, privatizations, leveraged buyouts, spinoffs, recapitalizations, self tenders, exchange offers, and repurchases. We also exclude utilities (SIC codes starting with 49) because these firms may have to pass on part of the synergies to their consumers and as such have different incentives for synergy disclosures (Seshadri et al. (2007)). In line with Betton et al. (2008), we eliminate deals involving target firms with a share price below one dollar 22 trading days before the offer is publicly announced. We require that all necessary accounting data for both bidder and target are available in the Compustat Fundamentals Annuals database, and that stock price information for bidder and target is available in the Center of Research in Security Prices (CRSP) database.

Our final sample consists of 1,990 M&A transactions, of which 1,719 are completed deals. We obtain deal-related data from SDC, institutional ownership information from the Thomson Reuters CDA/Spectrum s34 database, and GIM indices from the Investor Responsibility Research Center (IRRC). Following Ali et al. (2009), we obtain industry concentration ratios from the U.S. Census. All explanatory variables are winsorized at the 1% and the 99% level to reduce the influence of outliers.

To identify bidding firms releasing synergy forecasts, we search the Factiva database for all newspaper articles and press releases related to the acquiring firm on the deal's announcement date (retrieved from SDC), as well as on the preceding and following five trading days. We verify that the synergy forecast is provided by a chief executive of the acquiring firm, and not by other parties such as analysts or journalists. We identify 345 disclosing deals. In all disclosing deals, the synergy forecast is released on the same date as the announcement of the deal (i.e., either together with the announcement, or a few hours later). In the vast majority of cases (88%), the disclosure of synergies is included in a news article or press release issued by the acquiring firm. In the remaining 12% of the observations it is announced in a conference

call, and then reproduced by the media. Table 2.1 shows that the use of voluntary synergy disclosures has increased over time. While in 1995 only 8% of the deals are accompanied by a synergy forecast, in 2008 this percentage amounts to 37%. Deals with disclosed synergy values account for 42% of the total deal value between 1995 and 2008.

Table 2.1
Yearly Distribution of Disclosing and Non-Disclosing Deals
This table presents the number and relative value of disclosing and non-disclosing deals per year. Disclosing deals are deals in which bidding-firm managers publicly disclose a forecast of the value of the synergies they expect to achieve. The sample consists of M&As between public firms over the period 1995 to 2008 obtained from SDC. Synergy forecasts are hand-collected from Factiva. Deal values are obtained from SDC.

Year	Disclosure	Non-Disclosure	Disclosing Deals as Fraction of All Deals	Value of Disclosing Deals as Fraction of Total Deal Value
1995	13	156	8.33%	45.49%
1996	13	148	8.78%	21.70%
1997	25	215	11.63%	17.09%
1998	38	202	18.81%	44.47%
1999	25	191	13.09%	37.25%
2000	35	143	24.48%	48.56%
2001	20	127	15.75%	58.04%
2002	14	58	24.14%	17.95%
2003	24	80	30.00%	30.06%
2004	34	72	47.22%	27.20%
2005	21	75	28.00%	54.51%
2006	30	65	46.15%	58.10%
2007	36	67	53.73%	51.68%
2008	17	46	36.96%	76.83%
Total	345	1645	20.97%	42.28%

2.4 Determinants of Synergy Disclosures

2.4.1 Univariate Results

Table 2.2 provides the results of a univariate comparison of potential synergy disclosure determinants between disclosing and non-disclosing deals. We find that the Same Industry dummy variable, Target Volatility, and Target Total Assets are significantly different between disclosing and non-disclosing deals. The signs of the differences indicate that managers are more

likely to disclose synergies when they are able to calculate synergy values with more precision. This finding is consistent with the information quality hypothesis of Verrecchia (1990), and inconsistent with our signaling hypothesis. We also find that bidders are significantly more likely to make synergy disclosures when they have lower Bidder Volatility and larger Bidder Total Assets. These results are also inconsistent with our signaling hypothesis, to the extent that shareholders find it easier to assess deal synergies when there is less information asymmetry about the stand-alone value of the bidding firm.

As predicted, disclosing deals have significantly smaller Market to Book ratios, which we interpret as reflecting lower proprietary costs. But the Bidder Industry Concentration ratio, another proxy for proprietary costs, is not significantly different between both deal types. Also in line with our predictions, Litigation Risk is significantly smaller for disclosing deals, while Shareholder Approval and Equity Payment are significantly higher for the disclosing subsample. The findings regarding the impact of payment type hold regardless of whether we measure equity payment as a dummy variable equal to one whenever the payment includes a portion of shares (Equity Payment) or as a continuous variable capturing the actual percentage of shares involved in the payment (Equity Payment %). In the remainder of the analyses, we only report results with the Equity Payment dummy explanatory variable, but findings are robust to using the Equity Payment % variable.

Takeover Premium is significantly smaller for disclosing deals. We do not have a clear prediction on this variable. As predicted, disclosing deals have a significantly larger Relative Size. Finally, there are significantly more synergy disclosures in deals completed on or after the adoption of Regulation FD in October 2000. We do not find significant differences in the Hostile Deal frequency or in bidder corporate governance quality, as captured by the Bidder GIM Index, across the two subsamples.

2.4.2 Probit Results

We subsequently analyze whether these univariate results hold in a multivariate setting by conducting a probit analysis with a Synergy Disclosure dummy variable equal to one for disclosing deals as dependent variable. Table 2.3 presents the results. All regressions reported throughout this chapter include industry and year fixed effects. z-statistics are based on standard errors robust to industry clustering. Industry fixed effects and clustering are based on two-digit SIC codes.

Table 2.2
Univariate Comparison of Disclosing and Non-Disclosing Deals

This table compares potential determinants of the decision to disclose synergies for disclosing and non-disclosing deals. Disclosing deals are deals in which bidding-firm managers publicly disclose a forecast of the value of the synergies they expect to achieve. The sample consists of M&As between public firms over the period 1995 to 2008 obtained from SDC. Synergy forecasts are hand-collected from Factiva. We use a t-(χ^2-statistic) test to assess the significance of the differences among disclosing and non-disclosing deals for continuous (dummy) variables. N denotes the number of observations. Appendix A includes a detailed description of all explanatory variables. ***, **, and * denote statistical significance at the 1%, 5%, and 10% level, respectively.

Variable	Disclosing Deals		Non-Disclosing Deals		T-/χ^2-statistic Statistic for Difference in Means
	Mean	Median	Mean	Median	
Same Industry	0.699	1	0.64	1	4.28***
Industry Liquidity Index	0.077	0.026	0.084	0.038	-0.98
Target Volatility	0.437	0.373	0.58	0.517	-8.40***
Target Total Assets	5,558	1,204	1,277	227	10.69***
Bidder Volatility	0.339	0.307	0.397	0.333	-4.54***
Bidder Total Assets	20,450	3,306	12,508	1,992	4.22***
Hostile Deal	0.072	0	0.077	0	0.09
Bidder Market to Book	1.844	1.418	2.336	1.548	-4.31***
Bidder Ind. Concentration Ratio	18.347	18	17.508	14.4	1.1
Litigation Risk	0.107	0	0.222	0	-23.25***
Shareholder Approval	0.6	1	0.334	0	85.83***
Takeover Premium	0.462	0.364	0.522	0.418	-2.68***
Equity Payment	0.861	1	0.719	1	30.05***
Equity Payment %	0.715	1	0.636	1	3.09***
Relative Size	0.53	0.278	0.296	0.088	7.48***
Fair Disclosure	0.594	1	0.373	0	57.83***
Bidder GIM Index (N=1,188)	9.593	9	9.312	9	1.49

Table 2.3
Probit Analysis of the Determinants of Synergy Disclosure Decisions

This table presents a probit analysis of the determinants of the synergy disclosure decision. The dependent variable is equal to one for disclosing deals, and equal to zero for non-disclosing deals. Disclosing deals are deals in which bidding-firm managers publicly disclose a forecast of the value of the synergies they expect to achieve. The sample consists of M&As between public firms over the period 1995 to 2008 obtained from SDC. Synergy forecasts are hand-collected from Factiva. All explanatory variables are described in Appendix A. All models include year and industry dummy variables, the latter based on the bidder's two-digit SIC code obtained from SDC. z-statistics (reported in brackets) are computed using robust standard errors clustered per industry. N denotes the number of observations for which the analysis can be executed. ***, **, and * denote statistical significance at the 1%, 5%, and 10% level, respectively.

	(1)	(2)	(3)
	Synergy Disclosure	Synergy Disclosure	Synergy Disclosure
Same Industry	0.183*	0.360***	0.179*
	(1.76)	(2.96)	(1.74)
Industry Liquidity Index	0.683**	0.657	
	(2.14)	(1.47)	
Target Volatility	-0.117	-0.343	
	(-0.44)	(-0.90)	
LN(Target Total Assets)	0.436***	0.365***	0.459***
	(7.96)	(5.65)	(8.57)
Bidder Volatility	-0.451	0.026	
	(-1.23)	(0.04)	
LN(Bidder Total Assets)	-0.093*	-0.070	-0.083**
	(-1.73)	(-0.89)	(-2.06)
Hostile Deal	-0.324**	-0.415**	-0.302*
	(-2.08)	(-2.25)	(-1.73)
Bidder Market to Book	-0.059	-0.033	-0.062*
	(-1.43)	(-0.74)	(-1.66)
Bidder Ind. Concentration Ratio	0.009**	0.012*	0.008*
	(2.09)	(1.93)	(1.86)
Litigation Risk	-0.456*	-0.540*	-0.480**
	(-1.90)	(-1.71)	(-2.22)
Bidder GIM Index		0.022	
		(0.86)	
Shareholder Approval	0.271***	0.450***	0.246***
	(4.43)	(4.98)	(3.93)
Takeover Premium	-0.188**	-0.046	
	(-2.00)	(-0.34)	
Equity Payment	0.325***	0.231*	0.284***
	(3.60)	(1.94)	(3.73)
Relative Size	0.097	0.249*	0.113

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Table 2.3 – Continued from the previous page

	(1.28)	(1.93)	(1.44)
Fair Disclosure	0.252	0.07	0.116
	(1.14)	(0.30)	(0.44)
Cross-Border			-0.387***
			(-3.53)
Intercept	-3.407***	-3.544***	-4.391***
	(-9.54)	(-5.34)	(-15.36)
Mc Fadden R-Squared	30.02%	32.49%	29.59%
N	1,990	1,188	2,171

Model (1) includes all variables from Table 2.2 except for the Bidder GIM Index, which is only available for a subset of observations (1,188 out of 1,990). A pairwise analysis of correlations reveals that multicollinearity is not likely to be an issue in our data. The highest Pearson's correlation, 0.63, is between Bidder and Target Volatility. All other correlations are well below 0.60. Overall, while some of the results on individual parameters differ from the univariate findings, the probit results yield largely the same conclusions. We obtain strong evidence for Verrecchia (1990) information quality argument for voluntary disclosure. More particularly, consistent with this rationale, we find a significant positive impact of Same Industry, Industry Liquidity Index, and Target Total Assets, and a significant negative impact of the Hostile dummy variable on the likelihood of synergy disclosures.

In contrast with the univariate results, and consistent with the signaling hypothesis, Bidder Total Assets has a significant negative impact on the disclosure decision. We furthermore find a significant positive impact of the Bidder Industry Concentration ratio, which goes against the prediction that bidders with higher proprietary costs are more likely to engage in synergy disclosures. Market to Book, our alternative proprietary costs proxy, does not have a significant impact. Consistent with the univariate results, we find a significant negative impact of Litigation Risk and Takeover Premium, and a significant positive impact of Shareholder Approval and Equity Payment. Relative Size and Fair Disclosure are no longer significant.

In Model (2), we add the Bidder GIM Index. We find that this variable has an insignificant regression coefficient, suggesting that bidder corporate governance does not play an important role in the synergy disclosure decision. The results for the other explanatory variables are largely similar to those in Model (1). Model (3) extends our analysis to disclosures made by U.S. bidders involved in cross-border deals (271 transactions). Cross-border deals tend to be

surrounded by more uncertainty than domestic deals, due to geographical distance and differences in accounting standards and regulations, language, and culture (Eckbo and Thorburn (2000); Moeller and Schlingemann (2005)). These deals may therefore be characterized by higher uncertainty about synergy values, both for bidding-firm shareholders and managers. Whether synergy disclosures are more likely for cross-border deals thus depends on the relative importance of bidding-firm managers' need to reduce the information gap by signaling deal quality to their shareholders, versus bidding-firm managers' reluctance to release imprecise information. We collect accounting data for the cross-border targets from WorldScope. Due to restrictions in data availability, we only include a subset of the explanatory variables in Model (3).[5] We find that the dummy variable capturing cross-border deals is negative and statistically significant at the 1% level, which again supports the information quality rationale for synergy disclosures. Further corroborating this rationale, unreported analyses indicate that disclosure is significantly more likely when the target is domiciled in a country that is more similar to the U.S (i.e., Canada, Common Law countries, or countries with English as official language).

Together, the univariate and probit results in Tables 2.2 and 2.3 provide evidence that bidding-firm managers are more likely to disclose synergies when they possess more precise information for synergy value calculations. Litigation costs play an important role as well. We find only unsystematic evidence on the impact of proprietary costs on the synergy disclosure decision. Furthermore, the significant positive impact of the Equity Payment dummy variable, which is consistent throughout our univariate and probit regression tests, suggests that managers may be more likely to disclose synergies when they expect a more negative market reception of the deal due to adverse selection problems. In Section 2.5, we explore this intuition more formally by analyzing the impact of synergy disclosures on bidder announcement returns.

2.5 Impact of Synergy Disclosures on Bidder Stock Returns

We examine the impact of synergy disclosures on bidder stock returns to provide further insights into the motivations for firms to make these disclosures. We measure bidding-firm cumulative abnormal stock returns (CARs) using the market model based on the CRSP value-

[5] More particularly, we leave out the Industry Liquidity Index, Target and Bidder Volatility, Bidder GIM Index, and Takeover Premium.

weighted index over the period [-3, +3] relative to the deal's announcement date (obtained from SDC). The estimation period ranges from trading days -243 to -43. To mitigate the effect of different probabilities of deal completion on abnormal returns, we only include completed deals in the event-study analysis.

The average (median) CAR over the window [-3, +3] equals -2.65% (-2.59%) for disclosing deals, while the average (median) CAR is -1.99% (-1.45%) for non-disclosing deals. Differences in CARs between both subsamples are not statistically significant (t-statistic for differences in means equals -1.21). This result does not necessarily imply that voluntary synergy disclosures have no impact on bidder stock returns. As documented earlier, characteristics of disclosing deals are substantially different from those of non-disclosing deals. If we want to obtain a clean estimate of the impact of synergy disclosure on stock returns, we need to control for these differences. We therefore perform a regression of bidding-firm CARs measured over the window [-3, +3] on the Synergy Disclosure dummy defined earlier, and on a variable labeled "Synergy Ratio". The Synergy Disclosure dummy captures the discrete decision of releasing a synergy forecast, while the Synergy Ratio captures the magnitude of the forecasted synergies accruing to bidding-firm shareholders. Appendix B provides a detailed description of how we calculate Synergy Ratio. As control variables, we include the same explanatory variables as those included in the probit analysis of the synergy disclosure decision. In line with Martynova and Renneboog (2008), we also control for Bidder Leverage (defined as outlined in the Appendix A).

Model (1) of Table 2.4 shows the OLS regression results. The coefficient on the Synergy Disclosure dummy variable is not statistically significant. However, one concern with the current model specification is that unobserved deal or firm characteristics may have an impact both on the decision to disclose and on bidder CARs. Such endogeneity problem would cause the error term of the CAR analysis to be correlated with the disclosure dummy, leading to biased inferences on the impact of synergy disclosures on stock returns. To correct for this potential bias, we use a two-step Heckman (1979) estimation procedure, as in Campa and Kedia (2002) and Kisgen et al. (2009). In the first step, we run the probit regression on the decision to disclose using the explanatory variables specified in Model (1) of Table 2.3. From the probit results we derive an Inverse Mills ratio, and include this ratio in the second-stage regression on the bidder CAR. The inclusion of the Inverse Mills ratio controls for the correlation between the error term in the probit regression and the CAR regression, thus allowing us to estimate the CAR regression as a simple OLS model. We adjust standard errors following the lines of

Greene (2003).[6]

Table 2.4
Regression Analysis of the Impact of Synergy Disclosures on Bidder Stock Returns around M&A Announcements

This table presents the a regression analysis of cumulative abnormal stock returns over the window [-3,+3] surrounding the M&A announcement date, estimated using the market model based on the CRSP value-weighted market index. Models (1) and (2) use bidder abnormal stock returns as dependent variable, while Model (3) uses the weighted abnormal stock returns of the bidder and target firm as dependent variable. As weighting variables we use the bidder's and target's market capitalizations measured four days before the deal announcement date. Disclosing deals are deals in which bidding-firm managers publicly disclose a forecast of the value of the synergies they expect to achieve. The sample consists of M&As between public firms over the period 1995 to 2008 obtained from SDC. We set Synergy Ratio equal to zero if the acquirer's management does not publicly disclose a forecasted synergy value. The Inverse Mills ratio is obtained from the probit regression specified in Model (1) of 2.3. All other explanatory variables are defined in Appendix A. All models include year and industry dummy variables, the latter based on the bidder's two-digit SIC code obtained from SDC. t-statistics are computed using robust standard errors clustered per industry. z-statistics are computed using standard errors calculated as suggested in Greene (2003). ***, **, and * denote statistical significance at the 1%, 5%, and 10% level, respectively.

	(1)	(2)	(3)
	Bidder CAR	Bidder CAR	Combined CAR
	[-3; +3]	[-3; +3]	[-3; +3]
Synergy Disclosure	-0.001	0.049**	0.059***
	(-0.24)	(2.31)	(3.06)
Synergy Ratio	0.052**	0.051***	0.045***
	(2.22)	(3.25)	(3.18)
Same Industry	0.001	-0.001	-0.000
	(0.11)	(-0.25)	(-0.04)
Industry Liquidity Index	-0.005	-0.011	-0.008
	(-0.28)	(-0.60)	(-0.44)
Target Volatility	-0.003	-0.005	-0.025**
	(-0.18)	(-0.48)	(-2.50)
LN(Target Total Assets)	-0.002	-0.006**	-0.001
	(-0.87)	(-2.24)	(-0.60)
Bidder Volatility	-0.041**	-0.033*	-0.006
	(-2.12)	(-1.89)	(-0.41)
LN(Bidder Total Assets)	-0.003*	-0.002	-0.009***

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[6]We rely on the non-linearity of the inverse Mills ratio to achieve identification in the two-step Heckman (1979) procedure (see Li and Prabhala (2007) for a detailed discussion of this approach).

Table 2.4 – Continued from the previous page

	(-1.86)	(-1.27)	(-4.96)
Hostile Deal	0.008	0.016	0.022*
	(0.70)	(1.24)	(1.87)
Bidder Market to Book	-0.003**	-0.003**	-0.004***
	(-2.84)	(-2.12)	(-3.62)
Bidder Ind. Concentration Ratio	0	-0.000	-0.000
	(0.18)	(-0.24)	(-0.28)
Litigation Risk	-0.022**	-0.018*	-0.015*
	(-2.15)	(-1.76)	(-1.65)
Shareholder Approval	-0.021***	-0.025***	-0.011**
	(-3.79)	(-4.27)	(-2.10)
Takeover Premium	-0.005	-0.002	0.024***
	(-0.75)	(-0.41)	-4.63
Equity Payment	-0.014**	-0.017***	-0.021***
	(-2.65)	(-3.01)	(-4.10)
Relative Size	-0.030***	-0.032***	-0.015***
	(-4.38)	(-5.61)	(-2.93)
Fair Disclosure	0.01	0.004	0.004
	(0.55)	(0.20)	(0.26)
Bidder Leverage	0.007***	0.007**	0.007***
	(2.88)	(2.30)	(2.56)
Inverse Mills		-0.030**	-0.032***
		(-2.49)	(-2.90)
Intercept	0.102***	0.114***	0.131***
	(6.62)	(4.09)	(5.22)
Adjusted R2	11.30%		
Wald Chi-Squared		624.66***	581.59***
N	1,719	1,719	1,719

Model (2) of Table 2.4 reports the results of the second-stage OLS regression. The Synergy Disclosure dummy now has a significantly positive regression coefficient. Thus, once controlled for the endogeneity of the disclosure decision, the market does react more positively to disclosing deals. This finding is consistent with synergy disclosures being able to alleviate shareholder concerns about deal overpayment. The coefficient size of Synergy Disclosure suggests that, everything else equal, deals accompanied with synergy disclosures result in approximately 5% higher bidder announcement returns.

The coefficient on the Inverse Mills ratio is significant, implying that it is important to control for endogeneity in this context. Its sign is negative, suggesting that unobservable char-

acteristics inducing bidders to disclose synergies (positive error term in the probit analysis) have a negative impact on bidder stock returns (negative error term in the CAR analysis). This result is consistent with our signaling hypothesis, which predicts that it is more important for managers to signal deal quality when shareholders are more likely to react negatively to the deal announcement.

As predicted, we find that bidder stock returns are increasing in the value of the projected synergies, as reflected by Synergy Ratio. This finding suggests that shareholders consider the disclosed synergy amount to be value relevant and at least partly credible. With respect to the control variables, our results largely confirm those of existing studies. In line with Officer (2003), we find more negative announcement returns for bidders with higher Stock Volatility. Consistent with most other studies, we also find a significant negative impact of the Equity Payment dummy variable and of Relative Size (e.g., Morck et al. (1990)), and a significant positive impact of Bidder Leverage. Remarkably, we also find a significant negative impact of Litigation Risk and Shareholder Approval.

In Model (3), we regress the combined abnormal stock returns of bidder and target firm over the window [-3, +3], weighted by their market capitalizations four days before the announcement, on the same set of explanatory variables. Our findings on the impact of synergy disclosures on stock price reactions to deal announcements remain largely similar to those in the previous two models.

Overall, the analysis of announcement returns suggests that bidding firms can obtain a significantly better stock market reception of the deal when including a synergy forecast estimate. Our announcement returns analysis also confirms that bidder announcement returns are significantly more negative for equity-financed deals. The latter result corroborates our earlier interpretation of the positive impact of the Equity Payment dummy variable on the likelihood of synergy disclosures: managers are more likely to provide synergy forecasts for equity-financed deals, since these deals are expected to provoke significantly more negative bidder announcement returns. It is important to point out that the signal provided by the synergy forecasts refers to the deal value, while the adverse signal provided by the equity financing of the deal refers to the bidding-firm value. We do not claim that synergy forecasts undo the negative signal derived from the payment form. Shareholders interpret equity financing as a bad signal about bidding-firm value, and synergy disclosures are not able to alleviate that concern. We instead argue that the positive signal derived from the synergy disclosures results in significantly less negative announcement returns for deals that would otherwise be received

very negatively by the market. To formally test whether the synergy disclosure signal interferes with the payment form signal, we include an interaction term of the Synergy Disclosure dummy variable with the Equity Payment dummy variable in the regression analysis of bidder announcement returns. The results of this untabulated test indicate no significant impact of the interaction term on bidder announcement returns, corroborating our interpretation that the signal provided by synergy disclosures pertains to the deal while the signal provided by equity payment pertains to the value of the bidding firm.

As discussed earlier, we find that bidder announcement stock returns are significantly positively affected by both the synergy disclosure decision and the magnitude of the forecasts. However, similar to Houston et al. (2001) and Bernile and Bauguess (2011), we obtain a rather small coefficient size of Synergy Ratio (approximately 5%), indicating that shareholders only capitalize part of the forecasted synergy gains. Given the uncertainty associated with forecasted synergies, shareholders may be slow to realize the implications of a given synergy announcement for future expected cash flows. If this explanation holds, then we should observe a stronger impact of the Synergy Ratio on CARs measured over an extended window after the deal announcement. We test this prediction by examining one-year buy-and-hold stock returns following the M&A deal announcements. Using a calendar-time portfolio approach (Fama (1998)), we build equally- and value-weighted monthly-rebalanced portfolios long in stocks of disclosing firms, and regress one-year returns over these portfolios on the three Fama and French (1993) factors and a Carhart (1997) momentum factor. We retrieve the returns on the Fama and French (1993) and momentum factors from Kenneth French's website.[7] We also construct portfolios long in disclosing deals and short in non-disclosing deals. Table 2.5 reports the findings.

We find no evidence that disclosing deals significantly outperform non-disclosing deals (alphas of the constructed portfolios are always insignificant). Thus, bidding-firm announcement-period stock returns seem to capture the full impact of the synergy disclosure. Similar to Houston et al. (2001), we conclude that the small capitalization percentage of the Synergy Ratio may be attributable to errors or uncertainties associated with the translation of projected synergy values into firm value gains.[8]

[7] http://mba.tuck.dartmouth.edu/pages/faculty/ken.french/data_library.html

[8] Houston et al. (2001) find that costs savings projections are more credible than revenue enhancement projections. However, in unreported analyses, we do not find a larger coefficient size of the Synergy Ratio when leaving out synergy projections that include revenue enhancement forecasts (which constitute a mere 8% of the disclosure deals).

Table 2.5

One-Year Stock Returns Following Disclosing and Non-Disclosing Deals

This table presents regressions of one-year buy-and-hold returns on four different portfolios. Disclosing deals are deals in which bidding-firm managers publicly disclose a forecast of the value of the synergies they expect to achieve. The sample consists of M&As between public firms obtained from SDC. Synergy forecasts are hand-collected from Factiva. Portfolios (1) and (2) consist of disclosing bidders only. Portfolio (1) is an equally-weighted (EW) portfolio, while Portfolio (2) is a value-weighted (VW) portfolio. Portfolios (3) and (4) are constructed by going long in disclosing and going short in non-disclosing bidders. Portfolio (3) is an equally-weighted (EW) portfolio, while Portfolio (4) is a value-weighted (VW) portfolio. Value-weighted portfolios are constructed using the bidder market capitalization measured four trading days before the deal announcement as weighting variable. Portfolios are rebalanced monthly. A bidding firm can only enter a portfolio in the month after the completion date of the deal. We measure monthly returns over 12 years (from 1997 to 2008). The monthly returns are regressed on the Fama and French (1993) factors and on a momentum factor obtained from Kenneth French's website, following Fama (1998). t-statistics are computed using robust standard errors robust to heteroskedasticity and autocorrelation and are reported in brackets. N denotes the number of observations for which the analysis can be executed. ***, **, and * denote statistical significance at the 1%, 5%, and 10% level, respectively.

Portfolio	Alpha	Rm-Rf	SMB	HML	Momentum	Adj. R2	N
(1) Long disclosing deals, EW	-0.002	1.038***	0.324**	0.625***	-0.277***	69.06%	144
	(-0.69)	-9.86	-2.11	-5.01	(-3.14)		
(2) Long disclosing deals, VW	-0.000	1.014***	-0.034	0.288**	-0.320***	64.86%	144
	(-0.01)	-9.16	(-0.20)	-2.42	(-3.69)		
(3) Long disclosing deals	-0.003	-0.008	0.018	0.432***	-0.074	14.30%	144
short non-disclosing deals, EW	(-0.85)	(-0.07)	-0.11	-3.15	(-0.75)		
(4) Long disclosing deals	-0.004	0.091	0.093	0.638***	-0.131	16.92%	144
short non-disclosing deals, VW	(-1.01)	-0.7	-0.51	-4.2	(-1.24)		

2.6 Conclusion

We examine why a substantial percentage of bidding-firm managers include a synergy forecast estimate in their M&A deal announcement. We draw from the M&A and the voluntary disclosure literature to derive a set of predictions on the determinants of the synergy disclosure decision.

In the first step of our analysis, we conduct a probit regression of the determinants of the synergy disclosure decision. Consistent with the information quality framework of Verrecchia (1990), we find that managers' willingness to disclose synergies is strongly affected by the quality of the available information for calculating synergy values. If the available information is more precise, as is likely to be the case, for example, in same-industry deals and in deals where there is low asymmetry of information about the target value, managers are significantly more likely to provide synergy estimates. Conversely, if the information related to synergies is uncertain, as is likely to be the case, for example, in cross-border deals, managers are more likely to refrain from disclosing synergies. We also find that managers are significantly less likely to disclose synergies when there is higher risk of shareholder litigation.

In the second step of our empirical analysis, we examine the impact of synergy disclosures on bidding-firm stock returns, while controlling for the endogeneity of the synergy disclosure decision. Our analysis suggests that managers are more likely to make synergy disclosures when the deal is likely to cause highly negative bidding-firm stock price reactions. Importantly, we obtain only little evidence that these negative stock price reactions are caused by perceived overpayment for the deal, as was predicted by our signaling hypothesis. The main observable reason for disclosing deals to cause a negative stock price reaction seems to be the fact that these deals are significantly more likely to be financed with equity. We also obtain evidence that disclosing deals have unobservable characteristics that would result in a more negative market reception of the deal without offsetting synergy disclosure. Without accompanying synergy disclosures, the expected market reaction associated with disclosing deals would be approximately 5% more negative. Overall, our results suggest that the synergy disclosure decision mainly results from a trade-off between the favorable stock price impact of disclosures, and managers' reluctance to disclose imprecise information.

Appendix A	# indicates a Compustat data item. All continuous variables are winsorized at the 1% and the 99% level.
Bidder GIM Index	Gompers et al. (2003) governance index for the bidding firm. Obtained from the Investor Responsibility Research Center (IRRC), and measured at year-end before the deal announcement. If the GIM index value is missing for a given year, we take the value of the most recent previous year that is covered.
Bidder Industry Concentration Ratio	Bidder industry concentration ratio obtained from U.S. Census data based on the 4-digit NAICS code of the firm (obtained from SDC). We use the census of 2002 for the period 2000-2008 and the census of 1997 for the period 1995-1999. We take the changes in NAICS codes between the 1997 and the 2002 Census into account, as SDC reports the most recent NAICS code.
Bidder Leverage	Ratio of total debt to the market value of equity measured at the fiscal year-end prior to the announcement of the deal. Debt is computed by adding long term debt (#LTD) and current liabilities (#DLC). Market value of equity is calculated by multiplying the total number of shares outstanding (#CSHO) by the stock price (#PRCC_F).
Bidder Market to Book	Ratio of the market to book value of assets measured at the fiscal year-end prior to the acquisition announcement date. The market value of assets is calculated as the book value of total assets (#AT) minus the book value of equity (#CEQ) plus the market value of equity, which equals the total number of shares outstanding (#CSHO) multiplied by the stock price (#PRCC_F).
Bidder Total Assets	Book value of the bidder's total assets (#AT) measured at fiscal year-end prior to the deal announcement. In regression analyses we take the natural logarithm (LN) of total assets.
Bidder Volatility	Standard deviation of the market-adjusted residuals of bidder daily stock returns measured over the window [-305, -43] relative to the announcement date (Moeller et al. (2007)).
Cross-Border	Dummy variable equal to one if the target firm is domiciled outside the United States (obtained from SDC).
Equity Payment	Dummy variable equal to one if the deal is (partly) financed with equity (obtained from SDC).
Equity Payment (%)	Percentage equity financing of the deal (obtained from SDC).

(Continued on the next page)

Fair Disclosure	Dummy variable equal to one if the deal was announced on or after the adoption of Regulation Fair Disclosure on October 23, 2000.
Hostile Deal	Dummy variable equal to one if the bid is coded as hostile or unsolicited by SDC.
Industry Liquidity Index	Following Schlingemann et al. (2005), we collect all corporate transactions at the three-digit SIC code level for each sample year from SDC. The industry's liquidity index is the ratio of the value of those corporate control transactions to the total book value of assets of all the firms in the same three-digit SIC code in that year. We compute this measure using the target firm's main SIC code (obtained from SDC).
Litigation Risk	Dummy variable equal to one if the bidder belongs to the computer hardware (SIC codes 3570-3577), computer software (SIC codes 7371-7379), or pharmaceuticals (SIC codes 2833-2836) industries (Johnson et al. (2001)).
Relative size	Ratio of the deal value reported by SDC to the market value of the bidder. The market value of the bidder is calculated as bidder total assets (#AT) minus the book value of equity (#CEQ) plus market value of equity (#CSHO times #PRCC_F).
Same Industry	Dummy variable equal to one if the bidder's three-digit NAICS code (obtained from SDC) is the same as the target's.
Shareholder Approval	Dummy variable equal to one if bidder shareholders have to approve the deal. This is the case if shares corresponding to more than 20% of the pre-bid outstanding shares are expected to be issued to finance the acquisition (Bethel et al. (2009)).
Synergy Disclosure	Dummy variable equal to one if bidder has issued a synergy forecast.
Synergy Ratio	Ratio of the present value of the forecasted synergy-related cash flows minus the takeover premium in dollars, scaled by the market value of the bidding firm's equity measured four trading days before the announcement date (obtained from CRSP) as defined as in Appendix B.

(Continued on the next page)

Takeover Premium	Takeover premium in U.S. dollars, calculated by multiplying the percentage takeover premium with the target market capitalization measured four days prior to the takeover announcement. Following Officer (2003), we first compute the percentage premium using the pay components reported by SDC. If this value is lower than zero or higher than two, we instead use the premium using the initial price of the offer as reported in SDC. In line with Officer (2004), we measure the equity market value four trading days prior to the announcement. Results are robust if we measure the market value 22 trading days prior to the announcement instead.
Target Total Assets	Book value of target total assets (#AT) measured at fiscal year-end prior to the deal announcement. In regression analyses we take the natural logarithm (LN) of total assets.
Target Volatility	Standard deviation of the market-adjusted residuals of target daily stock returns measured over the window [-305, -43] relative to the announcement date (Moeller et al. (2007)).

Appendix B

To calculate the present value of the forecasted synergies, we manually collect detailed synergy information (source of the synergy, value, and timing) for each of the 345 disclosing deals.[9] In line with other studies (Houston et al. (2001); Bernile and Bauguess (2011)), we find that the reported synergies mainly result from costs savings. In only 8% of the observations the estimates of the synergy include forecasts of revenue enhancements as a result of the merger. In these few observations, revenue enhancements amount to 39% of the total disclosed synergy value. We adjust all disclosed values to after-tax figures by applying a 35% statutory federal tax rate over corporate income. A small fraction (15%) of the synergy forecast announcements include a range of synergy values. In such cases, we use the range's midpoint in subsequent analyses.

We account for the forecasted timing of synergy-related cash flows by following the procedure outlined in Houston et al. (2001). In 60% of the observations, managers use a specified projection horizon for the yearly synergy estimates. If managers do not mention what happens in intermediate years, we assume a linear increase in yearly synergy forecasts between the disclosure date and the year in which the manager's projection ends. For example, in the acquisition of Merrill Lynch by Bank of America announced in 2008, the latter firm mentions that it expects to achieve "$7 billion in yearly pre-tax expense savings, fully realized by 2012". In this case, we project (pre-tax) cash flows of $1.75 billion in 2009, $3.5 billion in 2010, $5.25 billion in 2011, and $7 billion in 2012. We assume that all cash flows occur at year-end. In cases in which managers do not specify in which year they expect the full synergies to be attained (40% of the observations), we assume that the synergies are fully achieved at the end of the following calendar year. An example is the merger between SCI Systems and Sanmina announced in 2001, in which the management discloses that "the two companies expect $100 to $150 million in cost savings" without providing a more detailed projection horizon. In our calculations, we project a cash flow of $125 million at the end of 2002. We assume that, after the projection horizon, the value of the synergies grows at the expected long-term inflation rate prevailing at the time of the announcement of the deal. We obtain this rate from the Federal Reserve Bank of Philadelphia.

Following Kaplan and Ruback (1995) and Houston et al. (2001), we use the cost of equity of the acquiring firm as the discount factor for calculating the present value of the forecasted

[9] Our sample contains only two cases in which management directly reports the present value of the synergies. In these cases, we use the managerial estimate as such, without further adjustments.

cash flows.[10] We calculate this cost of equity by multiplying the firm's adjusted market beta (computed using daily stock returns over a period of one year prior to the announcement of the deal, with the estimation period ending six months prior to the deal) by a 7% risk premium, and adding the yield on a ten-year U.S. Treasury Bond at the time of the announcement (obtained from Datastream).[11]

To measure the fraction of synergies accruing to acquirer shareholders, we subtract the Takeover Premium (measured as outlined in Appendix A) from the present value of the forecasted synergies, and scale the result by the bidding-firm's equity market value. By subtracting the Takeover Premium from the estimated synergies, we remove the portion of the synergies accruing to target shareholders. We label the resulting ratio "Synergy Ratio". The average (median) Synergy Ratio value for disclosing deals is 9.86% (1.92%).

[10]To obtain a more precise estimate of the total synergies, we should subtract the integration costs forecasted by managers. However, 77% of the synergy disclosures do not mention these costs. We do not expect the non-inclusion of these costs to materially affect the results, given the small values usually forecasted for restructuring charges. For example, Houston et al. (2001) find that average integration costs amount to only 1% of the combined bidder and target equity values in their sample of bank mergers.

[11]The adjusted market beta corrects for the mean-reversion tendency observed in market betas (Blume (1975)). It is calculated as 0.333 plus the historical market beta multiplied by 0.666.

Chapter 3

Does Stock Liquidity Affect the Incentives to Monitor: Evidence from Corporate Takeovers*

3.1 Introduction

Despite a considerable literature on the intersection between ownership structure, corporate decision making, and firm value, the question whether and how stock liquidity affects incentives for shareholder monitoring remains largely unanswered. In this chapter we aim at filling this gap by analyzing whether stock liquidity provides an incentive or works as an impediment for institutional monitoring.[1] This research question is motivated by two opposing theoretical views expressed in the existing literature.

Starting with Coffee (1991) and Bhide (1993), several researchers have expressed their concern that stock liquidity may not be unambiguously beneficial for the firm. Higher stock liquidity implies that a large shareholder in the firm may exit its position more easily, as its trading actions have a lower impact on the price of the stock. As such, when confronted with bad news, the large shareholder may become less likely to exert effort and intervene in the firm, opting instead to exit its investment. Kahn and Winton (1998) develop a model of the institutions' choice between intervening in firms they invest in and trading on the basis of their private information. In this model, the incentive for an institution to trade based on its

*This chapter is based on Roosenboom et al. (2012). We thank Leonce Bargeron, Dave Denis, Alex Edmans, and Buhui Qiu for helpful suggestions.

[1]We define institutional monitoring as the direct or indirect actions of an institution that lead managers to take actions more closely aligned with shareholders' interest.

superior knowledge of the firm is increasing in the liquidity of the stock if other speculators have non-uniform costs of gathering information. As a result, the incentive for institutions to intervene in the firm's management and to increase firm value is reduced when stock liquidity is higher.

However, other theoretical articles derive the opposite view on the effect of stock liquidity on the incentives for institutional owners to monitor firms. Maug (1998) develops a model in which the creation of concentrated shareholdings is endogenous and shows that higher stock liquidity helps investors overcome free-riding problems. Stocks with higher liquidity can more easily be traded without affecting their price, which in turn increases the investors' incentive to increase firm value through monitoring, as they can benefit more from the impact of their actions on prices. Faure-Grimaud and Gromb (2004) show that a more liquid stock reflects better the value impact of the institutions' intervention, thereby increasing their incentive to monitor the firm.

In addition, recent theoretical research has uncovered another channel through which stock liquidity may positively impact institutional monitoring. Edmans (2009) and Admati and Pfleiderer (2009) argue that by making the threat of exit by large shareholders more credible, stock liquidity increases the ex-ante incentives for managers to maximize shareholders' wealth. In these models, the large shareholders collect private information on managers' actions to trade upon. If they get a negative signal, they sell their stake. Assuming that managers care about the stock price and want to reduce the probability of exit by large shareholders, they exert more effort to reduce the likelihood that shareholders receive a negative signal. The impact of the threat of exit on managers' actions is increasing in liquidity because higher stock liquidity allows easier accumulation of shares and reduces the severity of the negative signal under which the large shareholder sells its position and thereby making selling less costly.

We test these contrasting theoretical predictions on the role of stock liquidity as an incentive for monitoring by analyzing corporate takeovers (Chen et al. (2007); Gaspar et al. (2005); Qiu (2006)).[2] There are several reasons why we choose to focus on takeovers. First, their announcement date is easily identified, allowing for "cleaner" empirical tests. Second, corporate takeovers are typically large events that impact the valuation of the companies involved. Third, it is a setting in which agency problems (and consequently institutional monitoring) are of large importance as managers' self-interested actions may have severe consequences for the firm (Morck et al. (1990)). Finally, besides providing an opportunity to analyze whether

[2]We use the terms takeovers and acquisitions interchangeably throughout the chapter.

and how ex-ante monitoring affect takeover valuations, corporate takeovers provide an ideal setting to complement our analysis with an investigation of how stock liquidity affects ex-post monitoring efforts with respect to deal completion, CEO turnover, and operational performance. When subject to stricter monitoring managers should make better takeover decisions, resulting in higher announcement returns on average. If stock liquidity impedes institutional monitoring by facilitating trading over intervention, we should observe a negative relation between bidder stock liquidity and announcement returns (*tradeoff hypothesis*). If, on the other hand, stock liquidity enhances firm value by encouraging monitoring, either directly or indirectly via the threat of exit by institutions, we should find a positive relation between bidder stock liquidity and announcement returns (*complementarity hypothesis*).

We use a sample of completed acquisitions announced between January 1998 and December 2008 involving U.S. based firms and a publicly-listed bidder. We exclude equity-financed acquisitions for public targets because of the potential bias they could introduce in our results. Mitchell et al. (2004) show that a considerable fraction of the bidder returns in equity-financed public acquisitions is due to the short-selling pressure of arbitrageurs. The price pressure of short sales is decreasing on the liquidity of the stock, and thus could induce a positive relation between announcement returns and stock liquidity that has no connection to institutional monitoring. Furthermore, announcement returns of equity-financed acquisitions for public targets are heavily influenced by the market's perception regarding the stand-alone value of the bidder, reducing their usefulness as a measure of deal quality (Savor and Lu (2009)). We show that a selection bias is unlikely to arise from excluding equity-financed acquisitions, as bidders' ex-ante stock liquidity is not a significant predictor of the method of payment used.[3]

Using the Amihud (2002) measure of stock liquidity, we find strong support for the tradeoff hypothesis. More specifically, we find that the relation between stock liquidity and announcement returns is significantly negative, even after controlling for the main factors impacting bidder announcement returns previously reported in the literature. The impact is also economically significant. A one standard deviation increase in stock liquidity is associated with a 0.38% decrease in bidder returns over a window of five trading days around the announcement date of the acquisition, which average 1.21% for the whole sample. We also find that more liquid bidders are more likely to announce takeovers that trigger negative announce-

[3]We acknowledge the important effect that takeover sample selection criteria have on conclusions with respect to average takeover gains (e.g., Netter et al. (2011)). However, we specifically construct the takeover sample in ways that provide an ideal background against which we test how stock liquidity plays a key role in institutional monitoring instead of making inferences with respect to average bidder gains.

ment returns.

Our main results are consistent with the view of Bhide (1993) that stock liquidity reduces the incentives for institutions to monitor management, thereby allowing managers to make less value-creative acquisitions. We conduct further tests on this interpretation by studying the cross-sectional variation of the impact of liquidity on announcement returns. We hypothesize that, if liquidity impacts returns through monitoring, its effect should be stronger when institutions are more likely to collect private information on the firm. In order to test whether this effect is present in the data, we create a new variable, Bidder Portfolio Share, that captures the relative importance of a firm in each institution's portfolio. If a firm has a larger weight in the portfolios of institutions, these institutions are more likely to engage in costly information collection about its actions. We partition our sample sorted on the maximum of the Bidder Portfolio Share at the firm level and find that the effect of stock liquidity on announcement returns is only present when institutions have a stronger incentive to collect information on the firm. In the subsample of firms with the lowest importance on institutions' portfolios we do not find any significant effect of stock liquidity on announcement returns or on the likelihood of having a negative CAR. We find similar results when using the ownership concentration by dedicated institutions as the partitioning variable (Bushee (2001); Chen et al. (2007)).

Given the evidence that stock liquidity affects the ex-ante monitoring by institutional owners, as reflected in the higher announcement returns of deals made by illiquid firms which institutions are more prone to monitor, it is likely that liquidity also affects their ex-post monitoring efforts. We test whether this effect is present in the data by analyzing the probability of completion of announced takeovers (Kau et al. (2008); Luo (2005)) and the probability of CEO turnover (Lehn and Zhao (2006)). We find that the likelihood that managers withdraw a previously announced deal is decreasing on announcement returns and is higher when there is a negative announcement return, but only in the subsample with lower stock liquidity. This result is consistent with institutional owners pressuring managers to drop deals that are value-destroying in firms for which the illiquidity of the stock gives them a stronger incentive to monitor. Further, we find that the negative relation between announcement returns and CEO turnover reported by Lehn and Zhao (2006) is also only present in the subsample with lower stock liquidity, again providing evidence of how ex-post monitoring by institutions is dependent on the firm's stock liquidity. In both cases, within the observations with low stock liquidity the effects are only present when institutions are more likely to monitor those firms (i.e. firms with a greater weight in institutions' portfolios). These results are consistent with an increased role for institutional monitoring in less liquid firms, which forces managers to

"listen to the market" and drop acquisitions that were not seen as beneficial for the firm or else face a higher probability of getting fired. We also report that stock liquidity is negatively associated with the operating performance of the firm after the takeover, especially for the group of firms which have a higher weight in institutions' portfolios.

Further, we analyze how the relation between stock liquidity and announcement returns varies depending on the need for institutional monitoring. Consistent with the view that stock illiquidity gives an incentive for institutions to engage in monitoring, we find that the relation between stock liquidity and announcement returns is significantly more negative in the subsamples with potentially higher agency costs, as proxied by lower managerial stock ownership (Jensen and Meckling (1976)) or higher product uniqueness (Titman and Wessels (1988)). Institutional monitoring is of less importance for firms with fewer agency problems, and we see for those firms a smaller or no effect of stock liquidity on the quality of the takeovers they make. Finally, consistent with the effect of stock liquidity on both ex-ante and ex-post monitoring, we find that the operational performance following a takeover is negatively related to the bidder's stock liquidity, and that such effect is stronger for bidders that are more likely to be monitored by institutions.

We conduct several robustness checks. Our results remain similar when instrumenting for stock liquidity using the bidder's level of institutional ownership one year before the takeover (while controlling for the ownership by dedicated institutions, as defined by Bushee (2001)). Further, we show that our results are not due to the market pricing the future increase in liquidity after the merger. In addition, an analysis of the long-term returns following the completion of the takeovers shows that the market does not systematically misprice the announcements made by less liquid firms. Finally, we show that the negative relation between stock liquidity and announcement returns is also present when using the bid-ask spread as an alternative measure of stock liquidity.

There are a number of articles closely-related to ours. Fang et al. (2011) find, consistent with our study, that higher stock liquidity leads to a decrease in firm innovation through an increase in ownership in the firm by non-active institutions, which have a short-term focus. Contrasting results are obtained by Bharath et al. (2010), who, using a different setting, show that there is a positive relation between stock liquidity and firm value in the presence of blockholders. Based on the exit models of Admati and Pfleiderer (2009) and Edmans (2009), they argue that the reduction in the cost of exit by blockholders caused by an increase in stock liquidity puts more pressure on managers to exert more effort ex-ante and avoid such exit.

This study is different from theirs in that we focus on a specific managerial action (takeovers), where we believe that monitoring is of greater importance. Furthermore, we show that the importance of monitoring also depends on the context of the firm and on its governance. Edmans et al. (2011) study the effect of stock liquidity on hedge fund activism and also find support for the theoretical models of governance through the threat of exit. They find that an increase in stock liquidity is associated with an increase in the probability that hedge funds acquire a stake in the firm and that such purchase triggers positive abnormal stock returns. However, conditional on having purchased a stake in the firm, they find that higher stock liquidity is associated with a lower likelihood of direct intervention by the hedge fund, which is consistent with our finding of a negative relation between stock liquidity and institutional monitoring. Finally, we add to previous work by several authors that examine the role of institutional monitoring in acquisition decisions of firms. Duggal and Millar (1999) find that higher levels of institutional ownership are not significantly associated with higher takeover announcement returns for the acquirer. Chen et al. (2007) report that ownership of the bidder by independent long-term institutions has a positive impact on the short- and long-term performance of acquisitions. Qiu (2006) contends that it is ownership by large public pension funds that improves the acquisition decisions of firms. We contribute to this literature by showing that it is necessary to consider the incentives for institutions to engage in monitoring in order to fully understand their impact on firms' actions and value.

The chapter proceeds as follows. Section 3.2 introduces our hypotheses and section 3.3 the data. In Section 3.4 we present the main results, and in Section 3.5 the robustness tests. Section 3.6 concludes.

3.2 Institutional Ownership, Stock Liquidity, and Acquirer Returns

Early work on agency conflicts in corporations focuses on the relations between managers and a dispersed group of shareholders, who were implicitly assumed to be too small to directly interfere in the firm's management (Jensen and Meckling (1976)). However, soon researchers started to realize that highly dispersed ownership of firms is not as common as initially thought and that ownership concentration by institutions could be a solution to the standard agency problems (Shleifer and Vishny (1986)). The impact of concentrated ownership on corpora-

tions' actions and value has since been a productive topic of research.[4]

Institutions are often active investors (Brickley et al. (1988); Gordon and Pound (1993); Smith (1996)), whose intervention in the firm's decisions is considered credible (Agrawal and Mandelker (1990); Gillan and Starks (2000)). As such, institutional monitoring has been associated with an increase in firm value by improving the quality of the firm's actions and by reducing agency costs. Smith (1996) analyzes the intervention of CalPERS on a sample of firms and shows that shareholder wealth increases when its proposals are accepted by the firm targeted. Opler and Sokobin (1995) show a significant value improvement in firms targeted by institutional investors, which may arise from the private relationship that is built between them and the managers of the firm. Aggarwal et al. (2010) find that higher institutional ownership triggers governance improvements in the firms. Demiralp et al. (2011) find that institutional ownership mitigates adverse stock reactions to seasoned equity offerings announcements and is associated with better post-issue operational and stock price performance. The authors' findings are consistent with the view that institutions reduce agency costs through monitoring and that, as a result, their ownership has a positive influence on firm value.

However, institutional investors are a heterogeneous group. Empirical research has shown that some institutions are more likely to be long-term investors and are thus more active in monitoring their investments. Bushee (2001) reports that managers are less short-term oriented when the stock of the firm is held by non-transient institutions, i.e., institutions that hold on to their shares for longer periods of time. Burns et al. (2010) show a similar pattern with regards to financial misreporting. Qiu (2006) reports that public pension funds ownership is associated with a reduction in the probability of the firm making value-destroying acquisitions. Gaspar et al. (2005) show that firms with short-term focused institutions receive lower takeover premiums. Gaspar and Massa (2007) find evidence supportive of the view that better informed institutions improve firm governance and allow for an increase in value-enhancing decisions. Chen et al. (2007) argue that to understand the impact of institutional monitoring researchers should focus on measures of ownership concentration by long-term independent institutions. They find that a higher presence of such institutions in the ownership structure of the bidding firm is associated with better short-term and long-term performance of mergers.

Despite the large body of evidence on the relation between institutional ownership and corporate decisions and governance, the role of monitoring incentives on such relation is still little understood (Becht et al. (2003)). Simply put: What are the factors that influence the

[4]See Holderness (2003) or Becht et al. (2003) for a survey of this literature.

institutions' propensity to engage in monitoring and the effort they put on it? The main focus of the theoretical literature on the subject has been the relation between monitoring effort and stock liquidity. Bhide (1993), Coffee (1991), and Kahn and Winton (1998) argue that there is a tradeoff between stock market liquidity and active monitoring. These authors contend that stock liquidity reduces the cost of an exit by a large shareholder. Reducing the costs of exit for a large shareholder reduces its incentive to intervene and improve firm value when confronted with negative news, as it will sell its position more easily before the market learns of the negative news. As a result, holding all else equal, higher liquidity may reduce firm value through its negative impact on monitoring incentives.[5]

On the other hand, Maug (1998) argues that higher stock liquidity increases monitoring efforts because it mitigates free-riding problems and thus facilitates the creation of concentrated shareholdings, as blocks of shares can be accumulated more cheaply. Faure-Grimaud and Gromb (2004) claim that an increase in the price informativeness of the stock increases the incentive for an institutional owner to monitor. A more liquid stock has a price that is more informative of the institution's actions, thereby increasing its incentive to monitor the firm in the first place. As a result, higher liquidity should result in more value-creative monitoring.

Recent theoretical models of governance through exit also derive a positive impact of stock liquidity on the value created by managerial actions, although the underlying mechanism is slightly different from direct institutional intervention. Edmans (2009) studies the behavior of a large shareholder that receives a private signal on the value of the firm and trades on its basis. He shows that, when the block size held by a shareholder is endogenous, higher stock liquidity increases firm value by making the trading actions of the large shareholder more informative of the signal it received in the first place. Since the sale of the stock by a large shareholder is damaging to managers, ex-ante they will adopt value-increasing actions that increase the probability of the large shareholder receiving a positive private signal. Admati and Pfleiderer (2009) develop a similar model with a focus on agency costs and also conclude that liquidity enhances governance through its role on the exit incentives of large shareholders. A more liquid stock is associated with lower transactions costs in case of an exit by a large shareholder, thereby decreasing the threshold at which the large shareholder sells its position. Managers want to avoid such sale and are thus disciplined by the threat of exit of the large shareholder. Admati and Pfleiderer (2009) posit that the governance effect of the threat of exit

[5] In the model of Kahn and Winton (1998) that is only the case if other speculators on the firm's stock have differential costs of gathering information. Such assumption seems reasonable as it can be interpreted as other speculators having different levels of ability.

is more important in reducing agency problems when these relate to a value-reducing action, such as a misguided merger. [6]

Ultimately, it is an empirical question how the relation between stock liquidity and institutional monitoring works, a question which, to the best of our knowledge, has not been studied before.[7] We conduct our analysis on the basis of two competing hypotheses. Based on the view that there is a tradeoff between liquidity and monitoring, we expect that there is less monitoring by institutional owners the more liquid the firm's stock is. We refer to this as the *tradeoff hypothesis*. Specifically, the tradeoff hypothesis predicts a negative relation between takeover announcement returns and the liquidity of the stock of the bidder, as firms less subject to institutional monitoring are likely to make worse acquisitions. Alternatively, based on the strands of the literature that highlight the positive role of liquidity in the creation of monitoring incentives for large shareholders, the *complementarity hypothesis* predicts a positive relation between takeover announcement returns and the liquidity of the stock of the acquirer. Under this hypothesis, firms with more liquid stock will make better acquisitions, in terms of value creation, as a result of the monitoring incentives created by stock liquidity.

Takeovers also provide a unique opportunity to analyze whether and how stock liquidity affects ex-post monitoring. Therefore, in addition to the tests above, we further investigate these two competing hypotheses by examining the probability that a deal is withdrawn after being announced (e.g., Kau et al. (2008); Luo (2005)) and by looking at CEO turnover as a function of announcement returns (Lehn and Zhao (2006)). Conditional on a more negative market reaction to the announcement, stock liquidity can have two effects on the likelihood of completion of a deal and on CEO turnover. According to the tradeoff hypothesis, a higher stock liquidity reduces the incentives for institutions to monitor management, and should therefore result in less pressure for managers to withdraw a bad deal (a deal with more negative announcement returns) or to be replaced following a bad acquisition. In contrast, the complementarity hypothesis predicts that in firms with higher stock liquidity institutions are more active monitors and, as result, are more likely to pressure managers into withdrawing a

[6] A theoretical study that does not directly study the impact of stock liquidity on monitoring but that examines the choice between direct intervention and the threat of exit is Edmans and Manso (2011). The authors show how the number of blockholders in a firm is associated with whether monitoring is conducted through direct intervention or through the threat of exit. The existence of few blockholders reduces free-riding problems and thus increases incentives to intervene in the management of the firm. However, multiple blockholders also exert governance because of their more credible threat to punish managers for negative outcomes by selling their positions.

[7] Recent work by Edmans et al. (2011) also studies the relation between monitoring and stock liquidity, but focuses on hedge fund activism, which is only a subsample of all the instances of institutional monitoring.

deal that was not viewed favorably by the market or to be fired after its completion.

3.3 Data and Descriptive Statistics

3.3.1 Data Sources

We retrieve from Securities Data Company (SDC) data on all the completed takeovers between U.S. based firms that involve a public acquirer. Our sample period is from January 1998 to December 2008. We exclude acquisitions for less than 50% of the equity, with a deal value lower than 50 million dollars, or equivalent to less than 1% of the bidder's assets. Furthermore, to avoid contamination, we exclude clustered acquisitions, defined as deals announced within five trading days by the same bidder. We also exclude leveraged buyouts, privatizations, spinoffs, recapitalizations, self-tenders, exchange offers, and repurchases. We require data on the bidder to exist on CRSP and Compustat. Finally, we exclude offers that involve securities as a method of payment (either fully equity-financed or mixed offers) if they also involve a publicly-traded target.[8] Particularly, when using takeovers in the context of analyzing whether stock liquidity affects the incentives for institutional monitoring, there are several reasons for this exclusion. Equity offers for public targets are often associated with negative abnormal returns due to the signaling of overvaluation of the bidder (Myers and Majluf (1984)). Because the more overvalued a firm is, the higher the incentive it has to use stock as a method of payment, the abnormal return at the time of the announcement is a poor proxy for how the market perceives the quality of the acquisition (Savor and Lu (2009)). More importantly, in these offers a significant component of the market reaction is caused by merger arbitrageurs shorting the stock of the acquirer (Mitchell et al. (2004)).[9] Not only does the effect of short-selling pressure on prices further weakens the interpretation of announcement returns as a sign of deal quality, but it is also an effect that affects bidder returns in an inverse relation to stock liquidity (the stock price of illiquid bidders suffers more from the selling pressure of arbitrageurs),

[8] In Section 3.5 we show that this selection criteria is unlikely to bias our sample given that stock liquidity does not affect the choice of method of payment and that our results are robust to restricting the whole sample to all-cash offers.

[9] The arbitrageurs' strategy is to capture the difference between the value offered by the acquirer and the target's stock price. In order to protect themselves from changes in the relative market value of the acquirer and the target, they short the stock from the acquirer at a ratio that depends on the conversion rate offered by the acquirer for the target shares. Given that this shorting is not driven by the fundamental value of the acquirer or by the market assessment of the deal, its impact on prices is solely due to demand curves not being perfectly elastic (Mitchell et al. (2004)).

thereby biasing the coefficient of this measure, which is our variable of interest. We thus opt to leave out deals involving both equity as a method of payment and public targets. Our main sample comprises 2,601 completed acquisitions for which we can analyze announcement returns. We focus on completed acquisitions to mitigate concerns that different expectations regarding the probability of completion of a deal affect the announcement returns.

We get the institutional ownership data from Thomson 13-F filings. 13-F filings include all the long common stock positions of institutional investment managers with assets under management above USD$100 million. All the positions of 10,000 shares or more, or worth $200,000 or more, have to be disclosed. Institutional investment managers include all the institutions that invest on their own account or that exercise discretion over the account of other person or entity. This definition thus includes, among other institutions, banks, insurance companies, pension funds, mutual funds, and hedge funds. The remaining data is obtained from SDC (deal-related data), CRSP (stock prices and trading volume), Compustat (accounting data), and ExecuComp (insider stock ownership and CEO information). All accounting variables refer to the financial year before the announcement date. All variables are winsorized at the 1% and 99% percentile and are defined in the Appendix.

3.3.2 Descriptive Statistics

In Table 3.1 we present the summary statistics for our sample of acquisitions. We measure announcement returns by calculating the abnormal return on the stock in the 5 days surrounding the acquisition announcement date (obtained from SDC). We use a market model based on the CRSP value-weighted index.[10] The estimation windows for the factor's exposure comprise at least 100 trading days (maximum 200) and end in day -46 relative to the announcement date. Our measure of liquidity is the Amihud (2002) measure. We compute it by taking the average of the daily Amihud measure over a period of 100 trading days finishing 46 days before the announcement date of the deal. Days with no trading are excluded from this calculation. We multiply its value by 10^{12} and take its square root to account for the skewness in its distribution. Since a higher value of this measure corresponds to a lower level of liquidity (higher price impact of trades), we also multiply it by minus one to facilitate its interpretation as a measure of liquidity.

Following the literature on corporate acquisitions (Masulis et al. (2007), Moeller et al.

[10] All our results are robust to using the Fama and French (1992) three-factor model to calculate expected returns.

Table 3.1
Descriptive Statistics

This Table presents descriptive statistics for the whole sample. The sample includes all the completed takeovers between U.S. based firms that involve a public acquirer occurring between 1998 and 2008. We exclude acquisitions for less than 50% of the equity, and with a deal value lower than 50 million dollars or equivalent to less than 1% of the bidder's assets. We exclude offers involving securities as method of payment if the target is publicly listed. We also exclude acquisitions that are announced within five trading days by the same bidder. All variables are described in the Appendix.

Variable	Mean	Standard Deviation	Minimum	Maximum	N
Bidder CAR [-2; +2]	1.211%	7.243%	-24.230%	27.390%	2601
Bidder Stock Liquidity	-0.079	0.140	-1.221	-0.004	2601
Percentage of Cash	51.754%	46.400%	0%	100%	2601
Percentage of Cash (Non-Public Target)	46.510%	45.896%	0%	100%	2346
Target = Public	0.098	0.297	0.000	1.000	2601
Target = Subsidiary	0.444	0.497	0.000	1.000	2601
Relative Size	0.326	0.640	0.011	6.257	2601
Bidder Total Assets	4154.935	8800.635	30.610	84785.600	2601
Bidder Leverage	0.215	0.196	0.000	0.779	2601
Bidder Market to Book	2.247	2.864	0.235	20.524	2601
Bidder Cash Flow	0.091	0.087	-0.388	0.319	2601
Bidder Insider Ownership	3.101%	6.000%	0.000%	33.446%	1704
Bidder Dedicated Institutional HHI	0.007	0.010	0.000	0.056	2601
Bidder Dedicated Institutional Ownership	8.941%	7.538%	0%	35.674%	2601
Bidder Institutional Ownership	68.547%	25.338%	0.987%	118.094%	2601

(2004), Moeller et al. (2005)) we include a large set of variables to control for other effects that may impact announcement returns. These include the percentage of cash included in the acquisition offer, a dummy for whether the target is publicly listed, a dummy for whether the target is a subsidiary, the relative size of the target relative to the bidder, and a range of variables related to the bidding firm. The latter include size, leverage, market to book ratio, cash flow scaled by total assets, and insider ownership. Finally, we control for institutional monitoring by including the Herfindahl-Hirschman index of ownership concentration of the bidder's stock by dedicated institutions (Bushee (1998); Bushee (2001)). We calculate it by summing at the firm level the square of the holdings (expressed as a percentage of total shares outstanding) of every institution classified as dedicated.[11] This measure is expected to better

[11] We follow the definition of Bushee (2001), who uses principal component analysis based on a large number of variables for this classification. An institution is labeled dedicated if it belongs to the group with lower share turnover and more concentrated holdings. This data is kindly made available by Brian Bushee on his website

capture institutional monitoring than a measure based on the level of institutional ownership. Previous literature shows that ownership concentration is a better predictor of monitoring than ownership levels (Burns et al. (2010); Chen et al. (2007)), and that dedicated institutions are the ones that monitor firms more intensely (Bushee (2001); Demiralp et al. (2011)). The descriptive statistics for all the variables are in Table 3.1.

The average announcement return in our sample is 1.21%, close to the average announcement return of non-listed targets of 1.45% in Chang (1998) (public targets constitute only 10% of our sample). Bidder characteristics are also in line with previous studies. For example, in our sample the averages for the bidder's leverage and market to book ratio are 0.22 and 2.25. In comparison, the equivalent averages reported by Masulis et al. (2007) are 0.15 and 1.98. The higher leverage and market to book in our sample may be due to our exclusion of acquisitions of publicly-listed targets paid for with equity, which typically are made by larger firms with lower leverage and fewer growth opportunities. This exclusion also results in a lower average for the bidder's total assets in our sample, at slightly more than 4 billion dollars, compared to Masulis et al. (2007) average of 9 billion dollars. Our median of 1,438 million (untabulated) is much closer to the one in their sample (1,880). Also, in our sample, institutions own on average 68.55% of the outstanding shares (8.94% is owned by dedicated institutions), which is slightly above the 60% level reported by Gaspar and Massa (2007) for all Compustat firms.[12] Overall, despite its unique selection criteria, our sample seems comparable to the samples used in previous studies.

3.4 Results

3.4.1 Bivariate Analysis of Announcement Returns

We start by examining, in a bivariate setting, how bidder announcement returns vary depending on the liquidity of the bidder. For this purpose, we split the observations based on the bidders' pre-announcement stock liquidity. Since liquidity is highly correlated with firm size, and firm size is a known determinant of bidder announcement returns (Moeller et al. (2004)), we first construct three size portfolios and then sort on the basis of stock liquidity within each

(http://acct3.wharton.upenn.edu/faculty/bushee/).

[12]The maximum institutional ownership in our sample is above 100% both because of inaccuracies in the database and because of the double counting arising from institutions lending out shares to parties that short-sell them in the market and that end up being owned by other institutions.

size portfolio. We then compare the announcement returns (CAR) and the likelihood of observing a negative CAR between the top and bottom liquidity terciles within each size tercile.[13] Results are in Table 3.2. We find preliminary support for the tradeoff hypothesis. In Panel A

Table 3.2
Bivariate Analysis

This Table presents a bivariate comparison of abnormal returns and of the likelihood of experiencing negative abnormal returns at the time of the announcement of an acquisition. The sample includes all the completed takeovers between U.S. based firms that involve a public acquirer occurring between 1998 and 2008. We exclude acquisitions for less than 50% of the equity, and with a deal value lower than 50 million dollars or equivalent to less than 1% of the bidder's assets. We exclude offers including securities as method of payment if the target is publicly listed. We also exclude acquisitions that are announced within five trading days by the same bidder. The sample is double sorted on the basis of the size and stock liquidity of the bidding firm. High Liquidity (Size) is the top tercile of the observations sorted on the basis of the variable Bidder Stock Liquidity (Bidder Total Assets). Medium Liquidity (Size) is the middle tercile of the observations sorted on the basis of the variable Bidder Stock Liquidity (Bidder Total Assets). Low Liquidity (Size) is the bottom tercile of the observations sorted on the basis of the variable Bidder Stock Liquidity (Bidder Total Assets). Panel A presents the average Bidder CAR [-2, +2] for each cell and the t-statistics and associated p-values of a t-test that the average of the CAR in the low liquidity subsamples is equal to the average of the CAR in the high liquidity subsamples. Panel B presents the Bidder Negative CAR average for each cell and the χ^2-statistics and associated p-values of a χ^2 test that the fraction of negative CARs in the low liquidity subsamples is equal to the fraction of negative CARs in the high liquidity subsamples. All variables are described in the Appendix. Each cell has between 285 and 293 observations. *, **, and *** denote statistical significance at the 10%, 5%, and 1% level, respectively.

Panel A - Bidder CAR [-2; +2]						
	Low Liquidity	Medium Liquidity	High Liquidity	Low Minus High	T-statistic	P-value
Small Size	4.638%	2.162%	1.076%	3.562%	4.357***	0.000
Medium Size	1.336%	0.669%	0.213%	1.123%	2.052**	0.041
Large Size	0.594%	0.569%	-0.368%	0.962%	2.285**	0.023
Panel B - Fraction of Bidders with Negative CAR						
	Low Liquidity	Medium Liquidity	High Liquidity	Low Minus High	χ^2-statistic	P-value
Small Size	31.488%	41.724%	46.875%	-15.387%	14.334***	0.000
Medium Size	39.100%	42.321%	48.421%	-9.321%	5.066**	0.024
Large Size	50.519%	44.138%	51.042%	-0.523%	0.016	0.900

of Table 3.2 we show that announcement returns are declining on the bidder's stock liquidity in the three size terciles. The difference between the two extreme terciles is statistically

[13] We use total assets as a measure of size, but using the market capitalization of the bidder does not change any of our conclusions throughout the chapter.

significant within each of the three size groupings. In Panel B we examine the likelihood of observing a negative CAR at announcement depending on the bidder's stock liquidity. Consistent with a tradeoff between liquidity and institutional monitoring, we find that bidders with higher stock liquidity are more likely to experience a negative CAR at deal announcement within each of the size terciles. The difference between the two extreme terciles is statistically significant in both the small and medium size groups, but not in the large size group. It must be noted though that there may be more differences in the characteristics of the acquirer and of the deal between the two different groups that drive our bivariate results. We thus run a multivariate analysis in the next section to control for these differences and understand the role of stock liquidity as an incentive for monitoring.

3.4.2 Multivariate Analysis of Announcement Returns

We first run an Ordinary Least Squares regression using the cumulative abnormal returns of the bidder at the time of the takeover announcement, CAR, as the dependent variable. We are interested in the coefficient of the variable Bidder Stock Liquidity, which captures the liquidity of the stock of the bidder before the takeover announcement. We use the set of control variables commonly employed in the literature that we introduced in Section 3.3. In all the models throughout the chapter we use year and industry fixed effects, the latter based on the acquirer's Fama and French (1997) industry, but we do not report them. Standard errors are robust to heteroskedasticity and clustered at the acquirer level.

In Models (1) to (4) of Table 3.3 we progressively introduce all the control variables. We consistently find that the higher the liquidity of the bidder's stock, the lower the announcement returns. With a t-statistic of 2.67 or above in all the models, this relation is consistent with our bivariate results and in line with the predictions of the tradeoff hypothesis. This hypothesis states that liquidity reduces the incentive for institutional holders to monitor the firm's actions, resulting in corporate takeover decisions with a less positive impact on shareholder wealth. Results are not consistent with the predictions of the complementarity hypothesis, under which a higher degree of liquidity would encourage institutional shareholders to increase their monitoring efforts. In terms of economic significance, and using Model (3) as reference, a one standard deviation change in the level of the Bidder Stock Liquidity is associated with a 0.38% change in Bidder CAR. Given that the average Bidder CAR is 1.21% (with a standard deviation of 7.24%), it is clear that the level of stock liquidity of the bidding firm has a significant economic impact on acquisition announcement returns.

Table 3.3
Multivariate CAR Analysis

This Table presents a multivariate analysis of abnormal returns at the time of the announcement of an acquisition. The sample includes all the completed takeovers between U.S. based firms that involve a public acquirer occurring between 1998 and 2008. We exclude acquisitions for less than 50% of the equity, and with a deal value lower than 50 million dollars or equivalent to less than 1% of the bidder's assets. We exclude offers including securities as method of payment if the target is publicly listed. We also exclude acquisitions that are announced within five trading days by the same bidder. All variables are described in the Appendix. Models (1) to (4) are estimated using an Ordinary Least Squares regression. Models (5) to (8) are estimated using a Probit regression. All models include year and industry fixed-effects, the latter based on the bidder's Fama and French (1997) industry. T-statistics are reported in parenthesis and are based on standard errors robust to heteroskedasticity and clustered at the firm level. *, **, and *** denote statistical significance at the 10%, 5%, and 1% level, respectively.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Bidder CAR [-2; +2]	Bidder CAR [-2; +2]	Bidder CAR [-2; +2]	Bidder CAR [-2; +2]	Bidder Negative CAR	Bidder Negative CAR	Bidder Negative CAR	Bidder Negative CAR
Bidder Stock Liquidity	-0.090***	-0.064***	-0.052***	-0.133***	1.028***	0.825***	0.707**	2.802***
	(-5.353)	(-3.637)	(-2.673)	(-2.916)	(4.102)	(3.239)	(2.487)	(2.691)
Percentage of Cash		0.008**	0.006*	0.004		-0.100*	-0.082	-0.064
		(2.226)	(1.785)	(0.864)		(-1.659)	(-1.333)	(-0.824)
Target = Public		-0.005	-0.003	0.001		0.134	0.110	0.055
		(-0.986)	(-0.704)	(0.150)		(1.422)	(1.080)	(0.471)
Target = Subsidiary		0.012***	0.011***	0.013***		-0.147***	-0.154***	-0.180***
		(3.700)	(3.555)	(3.527)		(-2.672)	(-2.750)	(-2.578)
Relative Size		0.036***	0.038***	0.007		-0.268***	-0.207	0.018
		(3.979)	(3.611)	(0.433)		(-2.596)	(-1.615)	(0.096)
Bidder Total Assets			-0.002	-0.001			0.034	0.009
			(-1.017)	(-0.590)			(1.260)	(0.249)
Bidder Leverage			-0.001	-0.006			0.292	0.655**
			(-0.067)	(-0.376)			(1.563)	(2.367)

Continued on the next page

Table 3.3 – Continued from the previous page

Bidder Market to Book			-0.002*	-0.001			0.020	0.017
			(-1.693)	(-0.716)			(1.511)	(0.967)
Bidder Cash Flow			-0.002	-0.011			0.125	0.404
			(-0.074)	(-0.290)			(0.379)	(0.812)
Bidder Dedicated			-0.031	-0.062			-1.400	-4.024
Institutional HHI			(-0.197)	(-0.362)			(-0.507)	(-1.136)
Bidder Insider				0.036				-0.368
Ownership				(1.136)				(-0.694)
Constant	-0.015	-0.027	-0.009	-0.017	0.473***	0.585***	0.207	0.491
	(-0.703)	(-1.478)	(-0.395)	(-0.716)	(4.783)	(4.899)	(0.823)	(1.387)
Observations	2,601	2,601	2,601	1,704	2,597	2,597	2,597	1,701
Adjusted R-squared	0.034	0.058	0.060	0.021				
Pseudo R-squared					0.030	0.036	0.038	0.042

Next, we run a similar analysis to the one described above, but using as dependent variable a dummy variable for whether the market reaction to the takeover announcement is negative (Bidder Negative CAR). It is important to check whether our results hold in this specification because of the potential nonlinearities in the relation between stock liquidity and announcement returns and because of the skewness present in both variables. In Models (5) to (8) of Table 3.3 we report that firms with higher stock liquidity are more likely to experience negative announcement returns. This relation is statistically very robust, with the t-statistics of the coefficients always above 2.48.

Although the negative relation between stock liquidity and announcement returns is consistent with our tradeoff hypothesis, there may be alternative mechanisms through which liquidity impacts the quality of the acquisitions made. A unique prediction of the tradeoff hypothesis is that, if stock illiquidity impacts announcement returns through its role as a monitoring incentive, it should affect announcement returns only when there is a large enough fraction of shares held by institutions as to encourage them to collect private information on the firm's activity. It is however challenging to define what would be a "large enough" stake in the firm. We assume that the likelihood that an institution incurs in costly information collection about the firm is increasing on the relative importance that the firm has on that institution's portfolio. If an institution has a very small share of its total portfolio invested in a single firm, it is less likely that it will ever monitor managers, regardless of the liquidity of its participation. Based on this idea, we create a measure capturing how important a firm is in an institutions' portfolio, which we call Portfolio Share. The Portfolio Share of institution *i* in firm *n* in quarter *t* is defined as following:

$$Portfolio\ Share_{i,n,t} = \frac{Shares\ Owned_{i,n,t} * Price\ per\ Share_{n,t}}{[\sum_{n=1}^{N}(Shares\ Owned_{i,n,t} * Price\ per\ Share_{n,t})]_{i,t}} \tag{3.1}$$

We obtain the information needed to calculate the Portfolio Share from the Thomson 13-F filings. A higher value for this variable means that a larger fraction of the institution's holdings is committed to firm *n* at time *t*. We aggregate this information at the bidding firm level by calculating the highest portfolio share per firm (main results are unchanged if we instead aggregate it as an Herfindahl-Hirschman index at the firm level). We call this new variable Bidder Top Portfolio Share. This variable reflects the weight that the firm *n* has on the institution *i*, which at time *t* is the institution with the largest fraction of its portfolio invested in the firm. The larger the variable Bidder Top Portfolio Share is, the more likely

it is that an institution will be engaged in collecting information on the firm's actions.[14] Its average in our sample is 7.949%, with a median of 4.525%. It must be noted that this variable captures an institution's own interest in monitoring a portfolio firm irrespective of free-rider concerns; assuming a fixed cost component of monitoring (Chen et al. (2007)), the net benefit of monitoring for the institution is proportional to the importance of the firm in its portfolio, regardless of who else owns the stock.

We partition our sample in two halves based on the variable Bidder Top Portfolio Share in the quarter before the acquisition was announced. We expect to find little or no effect of the bidder's stock liquidity in the subsample of firms in which institutional shareholdings are less significant in the context of the institutions' total portfolios. Once an institution has a large enough stake to potentially engage in monitoring, the incentive effect of stock liquidity should matter and be reflected in a significant relation between stock liquidity and announcement returns. In addition, we partition our sample based on the ownership concentration of dedicated institutions (Bushee (1998); Bushee (2001)). Although we consider this partition conceptually inferior to the partition based on Bidder Top Portfolio Share, it gives us two subsamples for which the monitoring role of institutions ought to be different based on the higher importance of active institutions in the subsample with higher concentration relative to the subsample with lower concentration. We thus expect the effect of stock liquidity to be concentrated on the former.

In Table 3.4 we repeat the main specification of Model 4 from Table 3.3 for the splits based on Bidder Top Portfolio Share and on Bidder Dedicated Institutional HHI.[15] In line with our expectation, the effect of stock liquidity on bidder CAR is not significant when institutions are less likely to collect information on the managers' actions (Model (1) and (3)). Once the likelihood of having institutions actively following the managers' actions increases (Models (2) and (4)), the effect of stock illiquidity on bidder CAR increases in importance and becomes statistically significant. The difference in the coefficients of the variable Bidder Stock Liquidity between Models (1) and (2) is statistically significant, and between Models (3) and (4) almost so. More specifically, the p-value of a t-test that the coefficient is significantly lower in the

[14] This variable is, of course, correlated with the size of the bidding firm, as larger firms are more likely to be a more significant portion of institutions' portfolio. However, this correlation is not very high (0.33), and simply reflects the stronger incentive that institutions have to monitor larger firms.

[15] Throughout the chapter we split the sample based on different measures rather than using interaction terms because, given the differences in the characteristics of firms with different levels of institutional ownership or of liquidity, we do not want to impose a linear structure on the relation between the explanatory variables and the different dependent variables equal for all the firms.

subsamples with Lower Bidder Top Portfolio Share and Lower Bidder Dedicated Institutional HHI is 0.037 and 0.141 respectively. Partitioning on the basis of an Herfindahl-Hirschman concentration index of the institutions' Portfolio Share in each bidder leads to similar results, also if we restrict it to be calculated using only dedicated institutions (unreported). Overall the results are consistent with the view that stock liquidity is an important monitoring incentive only when there are active institutions with a large enough level of ownership in the firm to put resources into monitoring (Bushee (1998)).[16]

Table 3.4
Multivariate CAR Analysis sorted on Maximum Portfolio Share

This Table presents a multivariate analysis of abnormal returns at the time of the announcement of an acquisition. The sample includes all the completed takeovers between U.S. based firms that involve a public acquirer occurring between 1998 and 2008. We exclude acquisitions for less than 50% of the equity, and with a deal value lower than 50 million dollars or equivalent to less than 1% of the bidder's assets. We exclude offers including securities as method of payment if the target is publicly listed. We also exclude acquisitions that are announced within five trading days by the same bidder. Models (1) includes only the bottom half of the sample sorted on the largest relative ownership by institutions as given by the maximum of the variable Portfolio Share (defined in Equation (1)) at each observation's level. Model (2) includes the corresponding top half. Model (3) includes only the bottom half of the sample sorted on the variable Bidder Dedicated Institutional HHI. Model (4) includes the corresponding top half. All variables are described in the Appendix. All models are estimated using an Ordinary Least Squares regression and include year and industry fixed-effects, the latter based on the bidder's Fama and French (1997) industry. T-statistics are reported in parenthesis and are based on standard errors robust to heteroskedasticity and clustered at the firm level. *, **, and *** denote statistical significance at the 10%, 5%, and 1% level, respectively.

	(1)	(2)	(3)	(4)
	Bidder CAR [-2; +2]	Bidder CAR [-2; +2]	Bidder Negative CAR	Bidder Negative CAR
	Low Bidder Top Portfolio Share	High Bidder Top Portfolio Share	Low Bidder Top Portfolio Share	High Bidder Top Portfolio Share
Bidder Stock Liquidity	-0.036	-0.158**	-0.035	-0.076**
	(-1.587)	(-2.460)	(-1.505)	(-2.541)

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[16]Because of concerns with reduced statistical power, for the tests in this and in the following sections (except the sections on deal completion and on CEO turnover) we use only Bidder CAR [-2; +2] as a measure of deal quality rather than the dummy variable for whether the CAR at announcement is negative (Bidder Negative CAR). The latter generally yields results of the same sign but with weaker statistical significance, as expected when not using all the information contained in the data.

Table 3.4 – Continued from the previous page

Percentage of Cash	0.012**	0.000	0.011**	-0.000
	(2.221)	(0.031)	(2.171)	(-0.010)
Target = Public	-0.015*	0.006	-0.003	-0.004
	(-1.752)	(1.052)	(-0.382)	(-0.631)
Target = Subsidiary	0.009**	0.013***	0.014***	0.008*
	(1.984)	(3.196)	(2.997)	(1.834)
Relative Size	0.051***	0.022	0.038***	0.038**
	(3.512)	(1.413)	(2.712)	(2.321)
Bidder Total Assets	-0.001	-0.002	-0.002	-0.001
	(-0.460)	(-0.944)	(-0.867)	(-0.240)
Bidder Leverage	0.006	-0.009	0.028*	-0.031*
	(0.397)	(-0.555)	(1.854)	(-1.944)
Bidder Market to Book	-0.005**	-0.001	-0.000	-0.004**
	(-2.256)	(-0.419)	(-0.364)	(-2.467)
Bidder Cash Flow	0.004	-0.022	-0.011	0.034
	(0.121)	(-0.664)	(-0.347)	(0.877)
Bidder Dedicated	0.211	-0.197	1.183	0.173
Institutional HHI	(0.773)	(-1.014)	(0.499)	(0.803)
Constant	0.036	-0.032	0.024	-0.029
	(1.395)	(-1.448)	(1.301)	(-1.311)
Observations	1,301	1,300	1,284	1,286
Adjusted R-squared	0.069	0.042	0.055	0.074

3.4.3 Analysis of Probability of Completion

The previous analyses give strong support to our first hypothesis that stock liquidity acts as a deterrent for institutional monitoring. So far we show this effect by presenting a negative relation between the quality of takeovers completed by the firm and its stock liquidity and by demonstrating that this effect is concentrated in the firms that institutions are more likely to collect private information on. We now focus on testing further predictions associated with our tradeoff hypothesis leaving aside the complementarity hypothesis, for which we find no empirical support whatsoever in this setting.

An additional way to test whether the tradeoff hypothesis describes managerial behavior is to examine how managers react to market information (Chen et al. (2007); Kau et al. (2008); Luo (2005)). If there is an increased monitoring of managerial actions by institutions, managers are more likely to be pressured into withdrawing a deal that has been considered a bad

deal by the market, i.e., a deal with more negative announcement returns. According to the tradeoff hypothesis, more negative market reactions should be associated with a higher likelihood of withdrawing a deal for the firms with lower stock liquidity, in which institutions are more active monitors, but less so for the firms with higher stock liquidity, in which institutions are more likely to exit rather than intervene.

We test this conjecture by running a Probit analysis on the likelihood of completing an announced deal using the market reaction at announcement as the key independent variable. We use the same sample as before, but we also include 202 deals that meet the selection criteria outlined in Section 3.3 but that were withdrawn. Note that because of the perfect colinearity between some of the industry fixed effects and the dependent variable the total sample size is reduced (these observations are dropped out of the estimation). We sort the sample into two halves based on the bidder's stock liquidity and use the same explanatory variables as before. In Models (1) and (2) of Table 3.5 we use the Bidder CAR [-2; +2] as an independent variable to measure the market reaction to deal announcement. However, we expect that there is a non-linear relation between Bidder CAR and likelihood of withdrawal, with institutions becoming significantly more dissatisfied with a deal that triggers negative announcement returns. As such, in Models (3) and (4) we use a dummy for whether the Bidder CAR is negative at announcement (Bidder Negative CAR), and in Models (5) and (6) a dummy for whether the Bidder CAR is below -5% at announcement (Bidder Extreme Negative CAR). We find that, in line with the prediction of the tradeoff hypothesis, a more negative market reaction to deal announcement is positively associated with the likelihood of withdrawing the deal, but only for firms in the subsample with lower stock liquidity. This relation holds independently of whether we measure the market reaction with a continuous variable or using a dummy for negative or extremely negative market reactions. The coefficients in the subsamples with lower stock liquidity are statistically different from the coefficients in the corresponding subsample with higher stock liquidity. The p-values of a test that the coefficient of Bidder CAR [-2; +2] in the low stock market liquidity subsample is higher than in the high stock market liquidity subsample is 0.017. An equivalent test on the coefficients of the Bidder Negative CAR dummy and of the Bidder Extreme Negative CAR dummy yields similar results, with p-values of 0.008 and 0.013 respectively. In an unreported analysis we find that the relation between stock market reaction and deal completion is concentrated in the subsample with higher Bidder Top Portfolio Share within the subsample of firms with lower stock liquidity, consistent with our hypothesis of illiquidity working as an incentive for institutions to monitor managers.

Table 3.5
Deal Completion Analysis

This Table presents a multivariate analysis of the probability of completing a publicly announced takeover. The sample includes all the announced takeovers between U.S. based firms that involve a public acquirer occurring between 1998 and 2008. We exclude acquisitions for less than 50% of the equity, and with a deal value lower than 50 million dollars or equivalent to less than 1% of the bidder's assets. We exclude offers including securities as method of payment if the target is publicly listed. We also exclude acquisitions that are announced within five trading days by the same bidder. All variables are described in the Appendix. Models (1), (3), and (5) include only the observations on the bottom half of the sample sorted on the basis of Bidder Stock Liquidity. Models (2), (4), and (6) include only the observations on the top half of the sample sorted on the basis of Bidder Stock Liquidity. All models are estimated using a Probit regression. All models include year and industry fixed-effects, the latter based on the bidder's Fama and French (1997) industry. T-statistics are reported in parenthesis and are based on standard errors robust to heteroskedasticity and clustered at the firm level. *, **, and *** denote statistical significance at the 10%, 5%, and 1% level, respectively.

	(1) Deal Completion	(2) Deal Completion	(3) Deal Completion	(4) Deal Completion	(5) Deal Completion	(6) Deal Completion
	Low Stock Liquidity	High Stock Liquidity	Low Stock Liquidity	High Stock Liquidity	Low Stock Liquidity	High Stock Liquidity
Bidder CAR [-2; +2]	1.521*	-1.095				
	(1.875)	(-1.177)				
Bidder Negative CAR			-0.228**	0.155		
			(-2.079)	(1.330)		
Bidder Extreme Negative CAR					-0.421***	0.066
					(-2.892)	(0.404)
Percentage of Cash	0.307*	-0.042	0.303*	-0.045	0.310*	-0.037
	(1.923)	(-0.301)	(1.904)	(-0.328)	(1.950)	(-0.269)
Target = Public	-1.440***	-0.497**	-1.427***	-0.509***	-1.445***	-0.497**
	(-6.919)	(-2.566)	(-6.798)	(-2.622)	(-6.935)	(-2.561)
Target = Subsidiary	-0.247*	0.064	-0.235*	0.058	-0.240*	0.058

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Table 3.5 – Continued from the previous page

	(-1.903)	(0.522)	(-1.802)	(0.469)	(-1.865)	(0.475)
Relative Size	-0.723***	0.492	-0.722***	0.486	-0.672***	0.464
	(-3.636)	(1.388)	(-3.626)	(1.376)	(-3.423)	(1.312)
Bidder Total Assets	0.040	0.107*	0.030	0.109*	0.037	0.109*
	(0.581)	(1.895)	(0.434)	(1.937)	(0.534)	(1.946)
Bidder Leverage	-0.165	-0.596	-0.140	-0.591	-0.152	-0.553
	(-0.580)	(-1.354)	(-0.492)	(-1.319)	(-0.530)	(-1.237)
Bidder Market to Book	0.092***	-0.003	0.090***	-0.003	0.092***	-0.003
	(2.721)	(-0.114)	(2.612)	(-0.112)	(2.688)	(-0.107)
Bidder Cash Flow	-0.130	1.165	-0.199	1.194	-0.201	1.230
	(-0.203)	(1.426)	(-0.312)	(1.450)	(-0.316)	(1.483)
Bidder Dedicated	5.604	2.398	5.254	2.347	5.585	1.989
Institutional HHI	(0.967)	(0.357)	(0.909)	(0.350)	(0.948)	(0.296)
Constant	4.187***	5.042***	4.332***	4.995***	4.297***	5.000***
	(7.066)	(7.350)	(7.310)	(7.112)	(7.316)	(7.310)
Observations	1,267	1,255	1,267	1,255	1,267	1,255
Pseudo R-squared	0.176	0.135	0.175	0.136	0.179	0.134

3.4.4 Analysis of CEO Turnover

So far we show that monitoring by institutions is associated with higher announcement returns (ex-ante monitoring) and with a higher likelihood of withdrawing value-destroying deals (ex-post monitoring). Another way of examining whether institutions are engaged in ex-post monitoring is to examine CEO turnover subsequent to the completion of an acquisition. Lehn and Zhao (2006) report that there is a significant negative relation between acquisition announcement returns and subsequent CEO turnover, consistent with corporate governance mechanisms punishing CEOs for value-destroying acquisitions. Following our tradeoff hypothesis that stock liquidity serves as an impediment for institutional monitoring, we expect that the negative relation between announcement returns and CEO turnover is stronger for firms with lower stock liquidity (in which institutions have stronger incentives to monitor) than for firms with higher stock liquidity (in which institutions have fewer incentives to monitor).

We split our sample based on pre-acquisition stock liquidity (variable Bidder Stock Liquidity) and we run a Probit analysis with CEO Turnover as dependent variable for each subsample. We define CEO Turnover as a dummy variable taking one if the executive with the CEO title changes in any of the five years following the acquisition announcement, zero otherwise. We obtain this data from ExecuComp, and we exclude observations which disappear from ExecuComp in any of the subsequent five years or whose CEOs were 58 years old or above. We apply these criteria to ensure that we restrict our turnover variable to situations in which the CEO is replaced involuntarily, and not because the firm got delisted or acquired or the CEO retired. As independent variables we include the same set of variables used in previous analyses, plus the returns on the acquirer's stock the three years following the announcement and the CEO's age and tenure, following Lehn and Zhao (2006). We have 770 observations of completed deals for which the analysis can be run.

In Table 3.6 we report the results on the likelihood of CEO turnover following an acquisition. As in Lehn and Zhao (2006), we find a negative relation between announcement returns and CEO turnover, regardless of whether announcement returns are measured using the Bidder CAR or dummy variables capturing a negative CAR or an extremely negative CAR ($<$-5%). However, in support of the view that liquidity reduces the incentives for institutional monitoring, this negative relation is only significant in the subsample of firms with lower stock liquidity (Models (1), (3), and (5)). Due to the small sample size, the p-value of a test that the coefficient on Bidder CAR [-2; +2] is lower in the low stock market liquidity subsample than in the high stock market liquidity subsample is above standard levels of statistical significance

Table 3.6
CEO Turnover Analysis

This Table presents a multivariate analysis of the probability of CEO turnover after an acquisition announcement. The sample includes all the completed takeovers between U.S. based firms that involve a public acquirer occurring between 1998 and 2008. We exclude acquisitions for less than 50% of the equity, and with a deal value lower than 50 million dollars or equivalent to less than 1% of the bidder's assets. We exclude offers including securities as method of payment if the target is publicly listed. We also exclude acquisitions that are announced within five trading days by the same bidder. CEO Turnover is a dummy variable taking one if there is a change in the CEO in the five years following the announcement of an acquisition, zero otherwise. We exclude observations for which we do not have the complete information on ExecuComp for those five years and observations for which the CEO is aged 58 or above. CAR +3 is the market-adjusted cumulative abnormal returns on the stock of the acquirer from 20 days after the announcement of the acquisition until three years after. The market betas used are calculated over a period of 255 trading days (minimum 100) ending 20 days before the announcement. CEO Age is defined as the CEO's age at the observation's date (in years). CEO Tenure is defined as the difference between the observation's date and the date the executive became CEO (in years). All other variables are described in the Appendix. Models (1), (3), and (5) include only the observations on the bottom half of the sample sorted on the basis of Bidder Stock Liquidity. Models (2), (4), and (6) include only the observations on the top half of the sample sorted on the basis of Bidder Stock Liquidity. All models are estimated using a Probit regression and include year and industry fixed-effects, the latter based on the bidder's Fama and French (1997) industry. T-statistics are reported in parenthesis and are based on standard errors robust to heteroskedasticity and clustered at the firm level. *, **, and *** denote statistical significance at the 10%, 5%, and 1% level, respectively.

	(1) CEO Turnover	(2) CEO Turnover	(3) CEO Turnover	(4) CEO Turnover	(5) CEO Turnover	(6) CEO Turnover
	Low Stock Liquidity	High Stock Liquidity	Low Stock Liquidity	High Stock Liquidity	Low Stock Liquidity	High Stock Liquidity
Bidder	-2.084*	-0.718				
CAR [-2; +2]	(-1.947)	(-0.550)				
Bidder			0.255*	-0.049		
Negative CAR			(1.799)	(-0.351)		

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Table 3.6 – Continued from the previous page

Bidder Extreme					0.505**	0.182
Negative CAR					(2.465)	(0.836)
CAR +3	0.003	-0.012	0.004	-0.015	0.003	-0.015
	(0.054)	(-0.179)	(0.061)	(-0.223)	(0.052)	(-0.224)
CEO Age	0.051***	0.041*	0.050***	0.042*	0.051***	0.042*
	(3.164)	(1.877)	(3.152)	(1.897)	(3.258)	(1.908)
CEO Tenure	-0.019	0.016	-0.019	0.015	-0.019	0.016
	(-1.237)	(0.850)	(-1.205)	(0.794)	(-1.177)	(0.825)
Percentage of Cash	-0.225	0.027	-0.238	0.032	-0.219	0.025
	(-1.203)	(0.134)	(-1.264)	(0.156)	(-1.172)	(0.124)
Target = Public	0.247	-0.348	0.268	-0.344	0.288	-0.354*
	(0.851)	(-1.631)	(0.901)	(-1.614)	(1.000)	(-1.663)
Target = Subsidiary	0.299*	-0.063	0.302*	-0.081	0.286*	-0.069
	(1.844)	(-0.356)	(1.859)	(-0.455)	(1.756)	(-0.392)
Relative Size	-0.680	0.847	-0.733*	0.842	-0.799*	0.850
	(-1.629)	(1.464)	(-1.787)	(1.467)	(-1.953)	(1.464)
Bidder Total Assets	0.014	0.007	0.012	0.007	0.012	0.011
	(0.124)	(0.068)	(0.103)	(0.063)	(0.104)	(0.097)
Bidder Leverage	-0.489	-1.998**	-0.443	-1.919*	-0.374	-1.997**
	(-0.686)	(-2.006)	(-0.614)	(-1.905)	(-0.526)	(-1.996)
Bidder Market to Book	0.039	-0.010	0.046	-0.009	0.041	-0.009
	(0.875)	(-0.235)	(1.031)	(-0.219)	(0.892)	(-0.224)
Bidder Cash Flow	-0.011	-2.984*	-0.023	-2.916*	0.112	-2.963*
	(-0.008)	(-1.934)	(-0.016)	(-1.901)	(0.079)	(-1.941)
Bidder Dedicated	-7.619	-8.431	-7.690	-8.842	-7.679	-8.239
Institutional HHI	(-0.889)	(-0.667)	(-0.893)	(-0.702)	(-0.900)	(-0.651)
Constant	-6.980***	-6.615***	-7.128***	-6.554***	-7.105***	-6.748***
	(-5.726)	(-5.283)	(-5.814)	(-5.241)	(-5.842)	(-5.188)
Observations	390	378	390	378	390	378
Pseudo R-squared	0.148	0.154	0.146	0.153	0.151	0.154

Table 3.7
Cross-Sectional CAR Analysis

This Table presents a multivariate analysis of cumulative abnormal returns at the time of the announcement of an acquisition. The sample includes all the completed takeovers between U.S. based firms that involve a public acquirer occurring between 1998 and 2008. We exclude acquisitions for less than 50% of the equity, and with a deal value lower than 50 million dollars or equivalent to less than 1% of the bidder's assets. We exclude offers involving securities as method of payment if the target is publicly listed. We also exclude acquisitions that are announced within five trading days by the same bidder. Model (1) ((2)) includes only the observations in the bottom (top) half of the sample sorted on the basis of insider stock ownership as a percentage of total shares outstanding. Model (3) ((4)) includes only the observations on the bottom (top) half of the sample sorted on the basis of the GIM index of Gompers et al. (2003). Model (5) ((6)) includes only the observations on the bottom (top) half of the sample sorted on the basis of the median selling expenses to sales ratio of the Fama and French (1997) industry of the bidding firm. All variables are described in the Appendix. All the models are estimated using an Ordinary Least Squares regression with year and industry fixed-effects, the latter based on the bidder's Fama and French (1997) industry. T-statistics are reported in parenthesis and are based on standard errors robust to heteroskedasticity and clustered at the firm level. *, **, and *** denote statistical significance at the 10%, 5%, and 1% level, respectively.

	(1)	(2)	(3)	(4)	(5)	(6)
	Bidder CAR [-2; +2]	Bidder CAR [-2; +2]	Bidder CAR [-2; +2]	Bidder CAR [-2; +2]	Bidder CAR [-2; +2]	Bidder CAR [-2; +2]
	Low Insider Ownership	High Insider Ownership	Low GIM	High GIM	Not Unique	Unique
Bidder Stock Liquidity	-0.294***	-0.131**	0.061	0.010	-0.022	-0.081***
	(-3.119)	(-2.454)	(0.787)	(0.292)	(-0.716)	(-3.535)

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Table 3.7 – Continued from the previous page

Percentage of Cash	-0.001	0.007	-0.005	-0.003	0.005	0.008
	(-0.283)	(1.017)	(-0.790)	(-0.461)	(1.027)	(1.350)
Target = Public	0.007	-0.009	-0.002	0.001	0.002	-0.005
	(0.986)	(-1.049)	(-0.250)	(0.062)	(0.254)	(-0.775)
Target = Subsidiary	0.014***	0.016***	0.014***	0.012**	0.006	0.017***
	(2.918)	(2.676)	(2.643)	(2.399)	(1.511)	(3.286)
Relative Size	-0.013	0.021	0.074***	-0.009	0.038***	0.041**
	(-0.616)	(0.924)	(4.015)	(-0.330)	(3.136)	(2.514)
Bidder Total Assets	-0.002	0.002	0.001	-0.006**	-0.005**	0.001
	(-0.704)	(0.612)	(0.346)	(-2.230)	(-2.158)	(0.384)
Bidder Leverage	0.018	-0.022	-0.016	0.024	-0.021	0.001
	(0.876)	(-0.896)	(-0.840)	(1.086)	(-1.488)	(0.055)
Bidder Market to Book	-0.002	0.000	-0.001	0.005**	-0.007***	-0.001
	(-1.150)	(0.136)	(-1.080)	(2.112)	(-3.166)	(-0.712)
Bidder Cash Flow	-0.002	0.011	-0.081	-0.105	-0.049	0.010
	(-0.060)	(0.177)	(-1.637)	(-1.516)	(-1.112)	(0.330)
Bidder Dedicated	-0.161	0.123	0.106	-0.298	-0.122	0.131
Institutional HHI	(-0.664)	(0.449)	(0.380)	(-1.276)	(-0.657)	(0.482)
Constant	-0.030	-0.025	-0.022	0.012	0.067***	-0.060*
	(-0.994)	(-1.029)	(-0.856)	(0.419)	(3.066)	(-1.879)
Observations	852	852	807	646	1,302	1,299
Adjusted R-squared	0.035	0.004	0.039	0.010	0.073	0.047

(0.201). However, the p-values of a test that the coefficient on Bidder Negative CAR and Bidder Extreme Negative CAR is higher in the low stock market liquidity subsample than in the high stock market liquidity subsample is 0.064 and 0.140, respectively, corroborating our interpretation that liquidity works as an incentive for institutions to monitor and results in the negative effect of announcement returns on CEO turnover being stronger when stock liquidity is lower. As with the analysis on the probability of completion, we find that the effect of announcement returns on CEO turnover is concentrated in the subsample with higher Bidder Top Portfolio Share within the subsample of firms with lower stock liquidity, again supporting our hypothesis that illiquidity works as an incentive for institutions to monitor management.

3.4.5 Cross-Sectional Variation in the Effect of Liquidity

In the previous sections we show that liquidity is negatively associated with takeover announcement returns, and that such effect is concentrated in the firms in which institutions may potentially engage in costly information acquisition. We also show that managers in less liquid firms are more responsive to market signals about the quality of an announced deal, presumably because of closer institutional monitoring, and are more likely to be fired in the event of a bad acquisition. However, it is still possible that there are omitted factors that impact our results and that are not related to stock liquidity reducing the incentives for institutional owners to monitor firms' management. Although it is impossible to completely dispel all alternative explanations, in this section we run further tests that provide additional evidence consistent with our interpretation of the results. We use one-sided tests, which are based on the idea that, if liquidity is related to the institutions' incentives to monitor, its effect on announcement returns should be concentrated on firms that have potentially more severe agency problems. In other words, if a firm has a strong system of governance or external monitoring, the monitoring incentive given to institutions by the stock's illiquidity should unambiguously be of relatively lower importance.

We start by testing whether the effect of liquidity is more pronounced for firms with a weaker corporate governance system. We do so by partitioning the sample on the basis of two different measures. First, we split the sample into two halves based on the share of common equity held by firm managers. A higher level of insider ownership implies that managers' interests are more closely aligned with shareholders' interests (Jensen and Meckling (1976)). As such, the importance of monitoring incentives should be lower in the subsample with higher insider ownership. Second, we split the sample based on the governance index (GIM index)

developed by Gompers et al. (2003). This measure is the number of the anti-takeover defenses present in the firm ranging from 1 to 24, with a higher value being equivalent to a worse governance system. Gompers et al. (2003) show that a higher GIM index reduces the value of a firm, while Masulis et al. (2007) link it to a higher propensity for the managers to engage in empire-building. We run our analysis separately on the half with better governance (low GIM index) and on the half with worse governance (high GIM index) to understand how corporate governance is linked to the role of stock liquidity on monitoring incentives.

Next, we analyze the role of product market pressure in the relation between stock liquidity and announcement returns. Recent literature shows that corporate governance is more important for firms that operate in less competitive product markets (Giroud and Mueller (2011)). Managers in firms that operate in competitive industries already have less slack due to demands put by vibrant competition; if a firm has high agency costs in such environment, it is put out of business. In the literature, industry competition is often measured using the Herfindahl-Hirschman concentration index based on all the Compustat firms. However, Ali et al. (2009) highlight that using Compustat data for calculating industry concentration may lead to incorrect inferences due to the exclusion of almost all private firms, and suggest using the U.S. Census database instead. Nevertheless, there are also some problems with relying on Census data, as it only includes manufacturing companies and is only released every 5 years (Giroud and Mueller (2011)). Given these problems with calculating the Herfindahl-Hirschman index, we use instead the ratio of selling expenses to sales as a proxy for the degree of product market pressure in a firm's industry (Titman and Wessels (1988)). This ratio captures product uniqueness - a firm in an industry with higher selling expenses as a fraction of sales has more unique products, and is therefore less subject to product market pressure and more subject to agency problems (Masulis et al. (2007)). The advantage of this variable is that it captures the market conditions in the industry also taking into account the competition by foreign and non-listed firms. Arguably such competition impacts the decisions regarding selling expenses for *all* the firms in the industry. We compute the degree of product uniquess of each observation by taking the median of the ratio of selling expenses to sales in the bidding firm's industry (defined following Fama and French (1997)) each year. We then sort our sample into two halves based on this measure, and run our main regression separately for the bottom half (low product uniqueness) and for the top half (high product uniqueness).

In Models (1) and (2) of Table 3.7 we sort the sample based on the level of insider ownership, and we find that the negative relation between stock liquidity and announcement returns is significantly more negative in the regression including the subsample with low insider own-

ership than in the regression including the subsample with higher insider ownership (p-value for a one-sided t-test of difference in means is 0.066). In Models (3) and (4) we find that the negative impact of stock liquidity on announcement returns is not statistically different from zero in either governance subsample, potentially due to the lower power arising from the smaller sample size. Finally, we analyze the effect of product market pressure on the importance of monitoring in Models (5) and (6) of Table 3.7. Stock liquidity as a monitoring incentive is only important for firms that operate in industries with more unique products, in which product market competition per se is not enough to minimize agency costs. The coefficient on Bidder Stock Liquidity is significantly lower for the top half of the sample sorted on (industry) product uniqueness than for the bottom tercile (p-value for a one-sided t-test of difference in means is 0.062). It must be noted that insider ownership, corporate governance (GIM index), and product market pressure (product uniqueness) are capturing different aspects of the firm's environment, as the correlations between these variables are low (the maximum correlation is -0.137 between the GIM Index and Insider Ownership). Overall the evidence presented in Table 3.7 is consistent with our intuition that monitoring incentives, such as stock illiquidity, are of greater importance when the firm's agency problems are likely to be greater.

3.4.6 Operational Performance Analysis

If increased incentives for institutional monitoring result in better acquisitions, this effect should be present in the operational performance of the bidding firm in addition to being reflected in announcement returns. We test whether stock liquidity is associated with changes in the industry-adjusted return on assets (ROA) of the acquiring firms using the same method as Chen et al. (2007). More specifically, we estimate a cross-sectional AR(1) model in which the average ROA in the three years following the completion of the merger is regressed on the average ROA in the three years prior to the completion of the merger. We take out the industry medians from each of these measures by subtracting the industry-year median. Industries are defined at two digit SIC level. We use the residual of the regression (adjusted R-squared of 0.57) as the measure of change in return on assets (Change in ROA). We then regress this variable on the set of variables of Model (2) of Table 3.3. Results are in Table 3.8.

Consistent with the liquidity tradeoff hypothesis, in Model (1) of Table 3.8 we find that the bidder's stock liquidity is negatively associated with the change in operating performance of the acquirer following the takeover. In Models (2) and (3) we split our sample based on the median of the Bidder Top Portfolio Share to understand if the negative impact of stock liquidity

Table 3.8
Operational Performance Analysis

This Table presents a multivariate analysis of change in operational performance following an acquisition. The sample includes all the completed takeovers between U.S. based firms that involve a public acquirer occurring between 1998 and 2008. We exclude acquisitions for less than 50% of the equity, and with a deal value lower than 50 million dollars or equivalent to less than 1% of the bidder's assets. We exclude offers including securities as method of payment if the target is publicly listed. We also exclude acquisitions that are announced within five trading days by the same bidder. Bidder Change in ROA is the residual of a cross-sectional regression of the average industry-adjusted return on assets in the three years following the completion of the merger on the average industry-adjusted return on assets in the three years prior to the completion of the merger. Return on assets is equal to Earnings Before Interest and Taxes (EBIT) scaled by Total Assets. It is industry-adjusted by subtracting the median ROA of the two-digit SIC code industry of the bidder in the same year. Bidder Top Portfolio Share Group is equal to one if the observation is in the bottom half of the sample sorted by Bidder Top Portfolio Share and to two if it is in the top half, as defined in Table 3.4. All other variables are described in the Appendix. Models (2) includes only the bottom half of the sample sorted on the largest relative ownership by institutions as given by the maximum of the variable Portfolio Share (defined in Equation (1)) at each observation's level. Model (3) includes the corresponding top half. Model (3) includes only the bottom half of the sample sorted on the variable Bidder Dedicated Institutional HHI. All models are estimated using an Ordinary Least Squares regression and include year and industry fixed-effects, the latter based on the bidder's Fama and French (1997) industry. T-statistics are reported in parenthesis and are based on standard errors robust to heteroskedasticity and clustered at the firm level. *, **, and *** denote statistical significance at the 10%, 5%, and 1% level, respectively.

	(1)	(2)	(3)	(4)
	Bidder Change in ROA	Bidder Change in ROA	Bidder Change in ROA	Bidder Change in ROA
	Complete Sample	Low Bidder Top Portfolio Share	High Bidder Top Portfolio Share	Complete Sample
Bidder Stock Liquidity	-0.057***	-0.058***	-0.203***	0.088
	(-4.050)	(-3.628)	(-2.777)	(1.354)
Bidder Top Portfolio Share Group				-0.002
				(-0.415)
Bidder Stock Liquidity * Top Portfolio Share Group				-0.146**
				(-2.231)
Percentage of Cash	0.005*	0.004	0.006	0.006*
	(1.725)	(0.851)	(1.224)	(1.835)
Target = Public	-0.001	-0.006	-0.003	-0.001
	(-0.153)	(-0.684)	(-0.393)	(-0.133)
Target = Subsidiary	-0.000	-0.002	0.001	0.000

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Table 3.8 – Continued from the previous page

	(-0.011)	(-0.549)	(0.226)	(0.047)
Relative Size	-0.032***	-0.028**	-0.043**	-0.033***
	(-2.977)	(-2.105)	(-2.563)	(-3.121)
Bidder Total Assets	0.001	0.003	0.001	0.002
	(0.831)	(1.167)	(0.264)	(1.056)
Bidder Leverage	-0.020	0.000	-0.052**	-0.022*
	(-1.587)	(0.013)	(-2.581)	(-1.725)
Bidder Market to Book	-0.003*	0.002	-0.005**	-0.003*
	(-1.847)	(0.450)	(-2.497)	(-1.734)
Bidder Cash Flow	-0.074	-0.024	-0.114**	-0.071
	(-1.370)	(-0.371)	(-2.075)	(-1.324)
Bidder Dedicated	-0.089	-0.231	0.055	-0.152
Institutional HHI	(-0.642)	(-1.103)	(0.288)	(-1.071)
Constant	0.050***	0.011	0.067**	0.047***
	(2.928)	(0.414)	(2.560)	(2.747)
Observations	2,067	1,034	1,033	2,067
Adjusted R-squared	0.151	0.073	0.245	0.157

on the operational performance can be related to institutional monitoring intensity. Consistent with our predictions, we find that the effect is significantly stronger in the subsample with higher likelihood of having institutions engaged in monitoring. The p-value of a one-sided t-test that the coefficient of Bidder Stock Liquidity is more negative in the subsample with High Bidder Top Portfolio Share than in the subsample with Low Bidder Top Portfolio Share is 0.026. However, in constrast to the results of the analyses in previous sections, the coefficient on Bidder Stock Liquidity is also statistically significant in the model with Low Bidder Top Portfolio Share, and the R-squared of the regression is much lower for this subsample. It is thus possible that the difference between the two samples is being driven by the different distribution of the Bidder Stock Liquidity variable in each of them or by the noise that exists in the estimation. To ensure that these effects are not driving our conclusions, in Model (4) we interact the Bidder Top Portfolio Share group variable (taking value one if low, value two if high) with Bidder Stock Liquidity. As discussed before, this approach has the disadvantage of forcing a similar relation between the control variables and the dependent variable across the two groups. Nevertheless, we find that the interaction term is negative and statistically significant, confirming our previous finding that higher stock liquidity is associated with less positive changes in operating performance following the takeover, especially for the firms for which institutions have a stronger interest in monitoring.

Table 3.9
Instrumental Variable Analysis

This Table presents an instrumental variable analysis of cumulative abnormal returns at the time of the announcement of an acquisition. The sample includes all the completed takeovers between U.S. based firms that involve a public acquirer occurring between 1998 and 2008. We exclude acquisitions for less than 50% of the equity, and with a deal value lower than 50 million dollars or equivalent to less than 1% of the bidder's assets. We exclude offers including securities as method of payment if the target is publicly listed. We also exclude acquisitions that are announced within five trading days by the same bidder. Bidder Stock Liquidity* is the predicted value given by Model (1), using as instrument the variable Bidder Institutional Ownership 1 Year. All the other variables are described in the Appendix. Model (1) is estimated using an Ordinary Least Squares regression. Model (2) is estimated using a Two-Stage Least Squares regression. All models include year and industry fixed-effects, the latter based on the bidder's Fama and French (1997) industry. T-statistics are reported in parenthesis and are based on standard errors robust to heteroskedasticity and clustered at the firm level. *, **, and *** denote statistical significance at the 10%, 5%, and 1% level, respectively.

	(1)	(2)
	Bidder Stock Liquidity	Bidder CAR [-2; +2]
Bidder Stock Liquidity*		-0.115*
		(-1.817)
Percentage of Cash	-0.000	0.006*
	(-0.034)	(1.768)
Target = Public	-0.010*	-0.004
	(-1.676)	(-0.725)
Target = Subsidiary	0.002	0.011***
	(0.346)	(3.456)
Relative Size	-0.068***	0.026**
	(-4.144)	(2.081)
Bidder Total Assets	0.036***	0.001
	(13.520)	(0.300)
Bidder Leverage	-0.205***	-0.021
	(-6.787)	(-1.476)
Bidder Market to Book	0.011***	-0.001
	(8.317)	(-1.056)
Bidder Cash Flow	-0.047	-0.007
	(-1.286)	(-0.279)
Bidder Dedicated	-0.100	0.123

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Table 3.9 – Continued from the previous page

Institutional HHI	(-0.197)	(0.328)
Bidder Dedicated	-0.101*	-0.019
Institutional Ownership	(-1.682)	(-0.425)
Bidder Institutional	0.179***	
Ownership 1 Year	(10.728)	
Constant	-0.452***	-0.034
	(-12.822)	(-1.129)
Observations	2,601	2,409
Adjusted R-squared	0.427	0.032

3.4.7 Instrumental Variable Analysis

The evidence provided in the previous sections mitigates concerns with having omitted variables driving the results we report. For that to be the case, it is necessary that the omitted variable is correlated with liquidity and correlated in an inverse way with announcement returns, but only in firms with sufficiently large importance in institutions' portfolios, with lower management ownership, and in industries with more unique products. Furthermore, it must be correlated with managerial's choice to withdraw takeover bids that trigger more negative announcement returns, with CEO turnover after a value-destroying acquisition, and with improvements in operating performance following a merger. We cannot think of any plausible explanation for these results other than the monitoring incentives created by stock (il)liquidity. Nevertheless, in this subsection we try to address any remaining concern with omitted variables by instrumenting the stock liquidity of the bidder.

It is always challenging to find valid instruments for stock liquidity that are not correlated with any omitted factor influencing announcement returns. The one we use is institutional ownership as a percentage of shares outstanding. Institutions are likely to prefer more liquid stocks, all else equal, due to the lower costs associated with trading. On the other hand, institutional ownership has been reported in the literature as having no direct impact on announcement returns (Duggal and Millar (1999); Masulis et al. (2007)). We think that such a measure will be a valid exogenous instrument provided we control for any monitoring effects of specific institutions that may be correlated with the error term in the CAR regression. We do so by controlling for the concentration of dedicated institutions' ownership in the firm, which we already have in our model. Dedicated institutions, defined as in Bushee (2001), have been shown to be the ones that monitor managers' actions (e.g. Burns et al. (2010)). Although own-

ership concentration is usually seen as the best proxy for monitoring efforts, to ensure that our instrument is exogenous we also include the percentage ownership by dedicated institutions in the firm as a control variable (Dedicated Institutional Ownership). In addition, to mitigate concerns that an unobservable effect drives both the ownership decisions of institutions and the acquisition decisions of companies contemporaneously, we use the level of institutional ownership in the firm one year prior to the acquisition announcement (Bidder Institutional Ownership 1 Year). It is unlikely that institutions positions in a firm are due to the same information that one year later drives the company to make a takeover, especially given that we control for the level of dedicated ownership, which represents ownership by longer-term informed institutions.

In Model (1) of Table 3.9 we regress Bidder Stock Liquidity on the set of control variables used before and on the instrumental variable Bidder Institutional Ownership 1 Year. The instrument is highly significant, with a F-statistic of 113.087 (p-value of 0.000) and a partial R-squared of 0.046, ensuring good identification of the system. We then use the fitted values from this first regression (Bidder Stock Liquidity*) as a regressor in Model (2). The coefficient on the instrumented Bidder Stock Liquidity remains significantly negative, lending further support to the hypothesis that higher stock liquidity reduces monitoring incentives.

3.5 Robustness Checks

In this section we present several robustness checks to dismiss alternative explanations for our results and to show their robustness to different specifications. A primary concern in the literature on institutional ownership and firm value is whether such relation is driven by monitoring or by the stock-picking abilities of the institutions (Chen et al. (2007)). For example, Nain and Yao (2012) find that acquirers whose stock is held by skilled mutual funds make better acquisitions. However, stock-picking is unlikely to be the effect driving our results. For that to be the case, stock liquidity would have to be inversely related to acquirer returns due to factors other than institutional monitoring incentives, and institutions would have to consistently choose to invest in the lower liquidity stocks. The latter is not consistent with existing evidence on institutional ownership preferences (e.g. Gompers and Metrick (2001)). Nevertheless, we test whether our results change while controlling for changes in institutional ownership in the bidding firm, as a proxy for stock-picking by institutions (unreported). Our results are unchanged, and this variable is almost never statistically significant.

Table 3.10
Robustness Checks

This Table presents robustness checks on the multivariate analysis of cumulative abnormal returns at the time of the announcement of an acquisition. The sample includes all the completed takeovers between U.S. based firms that involve a public acquirer occurring between 1998 and 2008. We exclude acquisitions for less than 50% of the equity, and with a deal value lower than 50 million dollars or equivalent to less than 1% of the bidder's assets. We exclude offers including securities as method of payment if the target is publicly listed. We also exclude acquisitions that are announced within five trading days by the same bidder. All variables are described in the Appendix. All models are estimated using an Ordinary Least Squares regression with year and industry fixed-effects, the latter based on the bidder's Fama and French (1997) industry. T-statistics are reported in parenthesis and are based on standard errors robust to heteroskedasticity and clustered at the firm level. *, **, and *** denote statistical significance at the 10%, 5%, and 1% level, respectively.

	(1)	(2)	(3)
	Bidder CAR [-2; +2]	Bidder CAR [-2; +2]	Bidder CAR [-2; +2]
Bidder Stock Liquidity	-0.038*	-0.046**	
	(-1.959)	(-2.536)	
Bidder Change in Stock Liquidity	0.023***	0.032***	
	(4.758)	(5.575)	
Bidder Change in Stock Liquidity*		0.078**	
Bidder Stock Liquidity		(2.253)	
Bidder Bid-Ask Spread			0.175***
			(2.855)
Percentage of Cash	0.008**	0.008**	0.006*
	(2.302)	(2.340)	(1.666)
Target = Public	-0.005	-0.005	-0.003
	(-0.984)	(-1.026)	(-0.673)
Target = Subsidiary	0.011***	0.011***	0.010***
	(3.582)	(3.535)	(3.360)
Relative Size	0.035***	0.035***	0.040***
	(3.353)	(3.340)	(3.881)
Bidder Total Assets	-0.002	-0.002	-0.002
	(-1.433)	(-1.199)	(-1.600)
Bidder Leverage	-0.004	-0.002	0.004
	(-0.383)	(-0.216)	(0.379)
Bidder Market	-0.002**	-0.002**	-0.001
to Book	(-2.135)	(-1.989)	(-1.369)
Bidder Cash Flow	-0.008	-0.006	-0.002
	(-0.297)	(-0.226)	(-0.095)
Bidder Dedicated	-0.104	-0.115	-0.064
Institutional HHI	(-0.715)	(-0.780)	(-0.407)
Constant	-0.001	-0.005	-0.018
	(-0.037)	(-0.227)	(-0.801)
Observations	2,461	2,461	2,601
Adjusted R-squared	0.075	0.079	0.057

Table 3.11
Analysis of Long-Term Returns

This Table presents a long-term analysis of the stock returns following the completion of a takeover. The sample includes all the completed takeovers between U.S. based firms that involve a public acquirer occurring between 1998 and 2008. We exclude acquisitions for less than 50% of the equity, and with a deal value lower than 50 million dollars or equivalent to less than 1% of the bidder's assets. We exclude offers including securities as method of payment if the target is publicly listed. We also exclude acquisitions that are announced within five trading days by the same bidder. Long Illiquid 1(3) Year(s) is a portfolio that buys and holds for one (three) year(s) the stocks of bidders included in the bottom half of the sample sorted on the basis of stock liquidity. A stock is bought in the month following the completion of the takeover. Long Illiquid Short Liquid 1(3) Year(s) is a portfolio that goes long on the Long Illiquid 1(3) Year(s) portfolio and short on an equivalent portfolio comprising only the top half of the sample sorted on the basis of stock liquidity. Market, Small Minus Big, High Minus Low, and Momentum are asset pricing factors obtained from Kenneth French's website, and are based on Fama and French (1992) and Carhart (1997). Liquidity Innovations is based on Pastor and Stambaugh (2003) and is obtained from Robert Stambaugh's website. All models are estimated using an Ordinary Least Squares regression. T-statistics are reported in parenthesis and are based on standard errors robust to heteroskedasticity. *, **, and *** denote statistical significance at the 10%, 5%, and 1% level, respectively.

	(1)	(2)	(3)	(4)
	Long Illiquid 1 Year	Long Illiquid 3 Years	Long Illiquid Short Liquid 1 Year	Long Illiquid Short Liquid 3 Years
Market	0.974***	0.997***	-0.130*	-0.112*
	(16.756)	(19.151)	(-1.707)	(-1.967)
Small Minus Big	0.572***	0.578***	0.419***	0.396***
	(8.418)	(10.118)	(5.271)	(6.635)
High Minus Low	0.487***	0.525***	0.707***	0.575***
	(6.913)	(9.689)	(6.805)	(9.566)
Liquidity Innovations	-1.723	-4.483	1.663	0.280
	(-0.552)	(-1.529)	(0.450)	(0.093)
Momentum	-0.205***	-0.200***	-0.022	0.061
	(-5.354)	(-4.958)	(-0.375)	(1.181)
Constant	0.127	0.275	-0.168	-0.103
	(0.610)	(1.555)	(-0.608)	(-0.467)
Observations	143	155	143	155
Adjusted R-squared	0.863	0.895	0.405	0.405

Another possible alternative explanation for our results is related to the change in stock liquidity after a merger. If there is an improvement in the stock liquidity of the bidder after a takeover (maybe due to the increase in firm size), and such improvement is larger and/or more valuable for illiquid bidders, there would be a spurious negative relation between the bidder's pre-acquisition liquidity and announcement returns, as the market prices in the future improvement in the liquidity of the stock. We thus study the changes in liquidity occurring as a result of the takeover and its possible impact on announcement returns.

We create a new variable, Bidder Change in Stock Liquidity, that captures the difference in the Amihud measure of stock liquidity of the bidder, measured over the 100 trading days starting 46 days after the *completion* of the takeover, to the Amihud measure before the acquisition announcement used in the previous analyses, scaled by the latter. Again, to facilitate interpretation we multiply this measure by minus one: a positive value for the variable thus means that the liquidity of the stock increased after the takeover.

We re-estimate Model (3) of Table 3.3 including as a regressor the variable Bidder Change in Stock Liquidity. If the market has unbiased expectations on the improvement of liquidity as a result of the takeover, the coefficient on that regressor should capture the value effects arising from the change in liquidity. The results in Model (1) of Table 3.10 are consistent with the market reacting positively to an anticipated increase in the stock's liquidity; a positive coefficient on the Bidder Change in Stock Liquidity means that the more the Bidder Stock Liquidity is increased after the takeover, the higher the abnormal returns at the time of the announcement. More importantly, the coefficient on the Bidder Stock Liquidity variable remains negative and statistically significant, dispelling concerns that it was simply capturing the value effects of expected changes in liquidity. However, it is still possible that illiquid bidders benefit disproportionably more from a change in liquidity than liquid bidders. Such relation could drive the results we report on the negative impact of stock liquidity on announcement returns. Nevertheless, when we introduce an interaction term between the Bidder Stock Liquidity and the Bidder Change in Stock Liquidity variables, the coefficient on Bidder Stock Liquidity remains negative and even becomes more statistically significant (Model (2) of Table 3.10).

We also re-run our main analysis using the bid-ask spread as a measure of stock liquidity. We calculate it as in the Bidder Stock Liquidity variable, i.e., over a window of 100 trading days ending 46 days before the announcement of a takeover. We take the square root to mitigate its skewness. We use closing bid and ask prices obtained from CRSP and exclude days with no trading. Results are in Model (3) of Table 3.10 and are similar to the ones

obtained using the Bidder Stock Liquidity variable based on the Amihud (2002) measure. We also check for the robustness of our findings to a change in the event-window from 5 to 3 days and to using Fama and French (1992) three-factor model as the asset pricing model for computing abnormal returns. All our results are qualitatively similar (unreported).

Next, we run a long-term analysis of the abnormal returns following the completion of an acquisition. We do so to alleviate any concerns that the market may systematically misvalue deals made by less liquid firms in the short-run. We construct an equally-weighted portfolio including all the takeovers completed by bidders in the less liquid half of the sample. We rebalance the portfolio monthly, introducing illiquid bidders in the month following the completion of a takeover included in our sample and dropping them out of the portfolio one (or three) year(s) later. Following Fama (1998), we then regress the monthly returns of the portfolio (above the risk-free rate) on the Fama and French (1992) factors and on a momentum factor following Carhart (1997).[17] In addition, given that the portfolio is built on the basis of stock liquidity, which is a priced factor, we include the liquidity factor of Pastor and Stambaugh (2003) to ensure that any abnormal returns we may capture are not simply driven by the illiquidity of the stock.[18]. Results are in Columns (1) and (2) of Table 3.11. The intercept of the regression model is not significantly different from zero in either of the models, implying that there are no long-run abnormal returns systematically arising from takeovers made by less liquid bidders.

In Models (3) and (4) of Table 3.11 we create a portfolio that has a long position on the half of our sample that completes a deal and has the lowest stock liquidity and has a short position on the half that completes a deal and has the highest stock liquidity. This zero-cost portfolio allows us to capture any long-term returns differential between the two types of bidders. However, again we find that there are no statistically significant abnormal returns as the intercept is never statistically different from zero. Overall the findings in Table 3.11 suggest that the market does not systematically misprice the acquisitions made by less liquid firms.

Finally, we check whether our sample selection procedure, based on the method of payment used for acquisitions of public targets, may be introducing a selection bias in our study. We do so by testing whether stock liquidity, which is our main variable of interest, has any power in explaining the choice of method of payment. We run both an OLS and a Tobit analy-

[17] We obtain this data from Kenneth French's website at http://mba.tuck.dartmouth.edu/pages/faculty/ken.french/data_library.html

[18] We obtain this data from Robert Stambaugh's website at http://finance.wharton.upenn.edu/~stambaug/

Table 3.12
Analysis of Percentage of Cash Used

This Table presents a multivariate analysis of the percentage of cash used in a takeover offer. The sample includes all the completed takeovers between U.S. based firms that involve a public acquirer occurring between 1998 and 2008. We exclude acquisitions for less than 50% of the equity, and with a deal value lower than 50 million dollars or equivalent to less than 1% of the bidder's assets. We exclude offers including securities as method of payment if the target is publicly listed. We also exclude acquisitions that are announced within five trading days by the same bidder. All variables are described in the Appendix. Model (1) is estimated using an Ordinary Least Squares regression. Model (2) is estimated using a Tobit regression. All models include year and industry fixed-effects, the latter based on the bidder's Fama and French (1997) industry. T-statistics are reported in parenthesis and are based on standard errors robust to heteroskedasticity and clustered at the firm level. *, **, and *** denote statistical significance at the 10%, 5%, and 1% level, respectively.

	(1)	(2)
	Percentage of Cash	Percentage of Cash
	OLS	Tobit
Bidder Stock Liquidity	0.032	0.100
	(0.513)	(0.437)
Target = Public	0.044**	0.250***
	(1.990)	(2.998)
Target = Subsidiary	0.076***	0.287***
	(3.969)	(3.892)
Relative Size	-0.120***	-0.528***
	(-4.391)	(-4.477)
Bidder Total Assets	-0.008	-0.024
	(-1.048)	(-0.814)
Bidder Leverage	-0.116*	-0.427*
	(-1.839)	(-1.777)
Bidder Market to Book	-0.021***	-0.105***
	(-5.922)	(-4.688)
Bidder Cash Flow	0.551***	2.269***
	(6.472)	(5.987)
Bidder Dedicated	1.162	5.608*
Institutional HHI	(1.403)	(1.753)
Constant	0.668***	0.988
	(4.473)	(1.139)
Observations	3,226	3,226
Adjusted R-squared	0.158	
Pseudo R-squared		0.0891

sis using the percentage of cash used in the takeover offer as dependent variable and the same

set of controls as before. For this analysis we also include acquisitions for public targets that include securities as method of payment. We exclude withdrawn deals to be consistent with most of our analyses, but results are unchanged if they are included. Results are in Table 3.12 and mitigate concerns with sample selection bias, as stock liquidity does not seem to be taken into account by firms when choosing the method of payment used in takeovers. In addition, in unreported analyses we confirm that our results continue to hold even when we restrict the whole sample to cash-only acquisitions.

3.6 Conclusion

In this chapter we analyze the role of liquidity as a monitoring incentive and its effect on firm value by analyzing the market reaction to the takeover decisions of firms. There are two main views in the theoretical literature that analyzes the relation between stock liquidity and the monitoring efforts of large shareholders. On the one hand, by making exit easier, liquidity may reduce the incentives for institutional owners to monitor and intervene in the firm's management (tradeoff hypothesis). On the other hand, since more liquid stocks reflect better the value-improvement activities of institutions and make their exit threat more credible, higher liquidity may result in an increase in monitoring efforts (complementarity hypothesis).

The empirical evidence we present in this chapter is consistent with the view that there is a tradeoff between monitoring and liquidity. In all our specifications, in which we include a large set of control variables and industry and year fixed effects, we find that less liquid bidders make acquisitions that trigger higher announcement returns and that are less likely to have negative announcement returns. In addition, firms with lower stock liquidity are more likely to withdraw takeover bids that trigger more negative announcement returns, experience higher CEO turnover following value-destroying acquisitions, and have better operating performance following the acquisition. These results, which are mostly concentrated in the group of firms in which institutions are more likely to collect private information, are consistent with an active role of institutions in monitoring management when stock illiquidity impedes their easy exit from the firm. We present several additional tests that reduce concerns with biases arising from omitted variables. More specifically, the effect of liquidity on announcement returns is significantly stronger when the firm is more prone to suffer from agency problems, as measured by the level of insider ownership or by product market pressure, when monitoring is more valuable. Further, we show that results are robust to instrumental variables estimation,

cannot be explained by the market anticipation of the change in liquidity after the takeover, and are unchanged by using the bid-ask spread as an alternative measure of stock liquidity.

Appendix	# indicates a Compustat data item. All continuous variables are winsorized at the 1% and the 99% level.
Bidder Bid-Ask Spread	Square root of the average of the bidder's closing bid-ask spread over 100 trading days, finishing 46 days before the announcement date, scaled by the share price. Days with negative spread are excluded.
Bidder CAR [-2; +2]	Bidder cumulative abnormal return in the window [-2; +2] relative to the announcement date of the deal, using the market model. The estimation period ends in day -46 and runs for a period of 100 to 200 trading days.
Bidder Cash Flow	Following Sufi (2009). Net income before extraordinary items (#IB) plus depreciation and amortization expenses (#DPC), over total assets (#AT).
Bidder Change in Stock Liquidity	Difference between the square root of the average illiquidity measure of Amihud (2002) over a period of 100 trading days ending 46 days after the takeover completion (multiplied by 10^{12}) and the variable Bidder Stock Liquidity, scaled by the latter and multiplied by minus one. Days with no trading are excluded from the calculation.
Bidder Dedicated Institutional HHI	Herfindahl Hirschman concentration ratio of the holdings of dedicated institutions in the bidding firm, measured in the quarter prior to the takeover announcement. Dedicated institutions are as classified by Bushee (2001).
Bidder Dedicated Institutional Ownership	Fraction of shares held by dedicated institutional owners in the bidding firm, measured in the quarter prior to the takeover announcement. Dedicated institutions are as classified by Bushee (2001).
Bidder Extreme Negative CAR	Dummy variable taking value 1 if Bidder CAR [-2; +2] is less than -5%, zero otherwise.
Bidder Institutional Ownership	Fraction of shares held by institutional owners in the bidder in the quarter prior to the acquisition announcement.
Bidder Institutional Ownership 1 Year	Fraction of shares held by institutional owners in the bidder in the quarter one year prior to the acquisition announcement.
Bidder Insider Ownership	Fraction of shares held by insiders in the bidding firm.

(Continued on the next page)

Bidder Leverage	Bidder book value of debt over market value of assets. Book value of debt equals long-term debt (#DLTT) plus debt in current liabilities (#DLC). Market value of assets is given by liabilities (#LT) minus balance sheet deferred taxes and investment tax credit (#TXDITC) plus preferred stock (#PSTKL if available, else #PSTKRV) plus market equity (#CSHO times #PRCC_F).
Bidder Market to Book	Bidder market value of assets divided by the book value of assets following Fama and French (2002). Market value of assets is given by liabilities (#LT) minus balance sheet deferred taxes and investment tax credit (#TXDITC) plus preferred stock (#PSTKL if available, else #PSTKRV) plus market equity (#CSHO times #PRCC_F). Book value of assets is given by total assets (#AT).
Bidder Negative CAR	Dummy variable taking value one if Bidder CAR [-2; +2] is negative, zero otherwise.
Bidder Stock Liquidity	Square root of the average illiquidity measure of Amihud (2002) over a period of 100 trading days ending 46 days before the takeover announcement multiplied by minus 10^{12}. Days with no trading are excluded from the calculation.
Bidder Total Assets	Total assets of the bidder (#AT). When used in multivariate regressions we take the natural logarithm of this variable.
Percentage of Cash	Fraction of cash used as method of payment in the takeover.
Relative Size	Ratio of deal value to bidder total assets (#AT).When used in multivariate regressions we take the natural logarithm of one plus this variable.
Target = Public	Dummy variable taking value one if the target firm is publicly-listed, zero otherwise.
Target = Subsidiary	Dummy variable taking value one if the target firm is a subsidiary, zero otherwise.

Chapter 4

Public Debt Market Access and Corporate Investment*

4.1 Introduction

In this chapter I study the impact of accessing the public debt market on the level of corporate investment.[1] Financial intermediation theories posit that firms with a low probability of default and with a favourable reputation in financial markets may replace bank debt with arm's-length debt (Bolton and Scharfstein (1996); Diamond (1991)). By obtaining financing from a well-diversified pool of investors, firms accessing the bond market reduce the hold-up problem associated with borrowing from financial intermediaries and obtain financing at a lower cost (Leland and Pyle (1977); Rajan (1992)). As a result, tapping the public debt market results in a reduction in financing constraints, thereby allowing for an increase in the level of firm investment (e.g., Whited (1992)).

However, there are also reasons to believe that accessing the bond market may be associated with a reduction in firms' investment level. Nini et al. (2009) show that creditors are averse to firms' capital investments, as these investments can be made to increase equityhold-

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[1] I use the expressions public debt market and bond market interchangeably throughout the chapter.

ers' expected payoff at the expense of debtholders (Jensen and Meckling (1976)). Given that equityholders ultimately bear the agency costs of debt, it is in their interest to commit ex-ante not to expropriate debtholders' wealth, thereby ensuring better access to financing in the future (Almeida et al. (2011)). Consequently, firms that tap the bond market may want to reduce their level of investment in order to encourage relatively uninformed investors to hold their debt on more favourable terms. This change in firm behaviour might be necessary because other mechanisms to reduce agency costs of debt, such as monitoring, become weaker when switching from borrowing from financial intermediaries to borrowing from financial markets (Chava and Roberts (2008); Diamond (1991)).

I test these two mutually exclusive hypotheses using a sample of all Compustat firms between 1986 and 2008. I examine both the level of investment in fixed assets (Capex) and corporate takeovers. Most of the literature classifies firms as accessing the bond market if they have a credit rating (Cantillo and Wright (2000); Faulkender and Petersen (2006)). However, as shown by Sufi (2009), it is possible that some rated firms may be accessing only the syndicated loan market and do not have outstanding bonds. I thus classify firms as accessing the bond market only if they have both a credit rating and a bond outstanding in a given year.[2] Endogeneity is a major concern in this setting. Obtaining financing from the bond market may simply be indicative of certain characteristics of the firm that are also linked to its investment decisions, such as size or growth opportunities. I therefore use a comprehensive set of control variables and a number of econometric tools to address concerns with omitted factors. These include controls for industry specific shocks through the interaction of year and industry dummies, firm fixed effects estimation, and identification via instrumental variables.

I find that firms accessing the public debt market significantly reduce their level of investment on Plant, Property, and Equipment (PPE) and on takeovers financed with cash. More specifically, when using a firm fixed effects specification, accessing the bond market is associated with a reduction in the level of capital expenditures (cash-financed takeovers) equal to 0.6% (1.3%) of lagged total assets per year. This difference is equivalent to a reduction of 8.2% (38.4%) in the level of capital expenditures (cash-financed takeovers) for the average firm. This negative impact of bond market access on the level of investment is robust to estimation using an instrumental variables procedure, and is consistent with the hypothesis that firms accessing the bond market choose to restrict the level of investment, thereby reducing agency costs of debt and encouraging uninformed investors to hold their bonds. It is not

[2] All the results in this chapter are robust to classifying firms as accessing the bond market only on the basis of having a credit rating.

consistent with the hypothesis that firms that access the bond market increase their level of investment as a result of a reduction in financing constraints.

Further evidence is given by an analysis of the cross-sectional variation of the impact of accessing the bond market on corporate investment. The reduction in the level of investment is significantly more pronounced for firms with higher credit risk, as measured by their modified Altman Z-score (MacKie-Mason (1990)) or predicted credit rating. This result is in line with the expectation that the need to internalize agency costs of debt is stronger for firms in a weaker financial condition (Nash et al. (2003)). Firms relatively closer to financial distress suffer more from the debtholder/equityholder conflict (Jensen and Meckling (1976)), and thus have greater need to adjust their actions to attract debt investors.[3]

I also analyze the impact of accessing the public debt market on other firm actions and find evidence consistent with the interpretation that managers adjust their decisions to take into account bondholders' preferences. More specifically, firms' likelihood of violating debt covenants is negatively associated with using the public debt market. In addition, firms significantly reduce payouts to shareholders (dividends and share buybacks) when accessing the bond market by 0.4% of lagged total assets. This effect is equivalent to a reduction of 14.0% in payouts for the average firm. This result is of great importance in dispelling explanations based on the life-cycle of firms accessing the bond market. If it would be the maturity of the firm driving both its decision to access the bond markets and the reduction in investment, and if my econometric specifications had somehow failed to control for this effect, I should observe a positive impact of bond market access on payouts to equityholders. It is challenging to explain the reduction in payouts that I report outside a framework in which the firm is adjusting its actions to reduce agency costs of debt and access debt markets more favourably.

I run several tests to rule out alternative explanations. I analyze the market reaction to the announcement of acquisitions to dismiss the possibility that the reduction in corporate investment is an effect of the discipline brought about by the use of debt (Jensen (1986)). Inconsistent with this interpretation, I find that the market reaction to the announcement of acquisitions made by firms with bond market access is not significantly different from the market reaction to the announcement of acquisitions made by firms that only use other sources of debt

[3]The fact that the effect I document is mostly present in firms in a weaker financial condition also reduces concerns that the instrument used is in any way correlated with omitted variables such as the firm's maturity or reputation. If that would be the case, the level of investment would be reduced the most the more mature/reputable a firm is, implying that the effect of accessing bond markets on investment would mostly be present in firms with a stronger financial profile.

financing. In addition, I run several analyses to show that the results I report cannot be explained by debt-overhang either (Myers (1977)). More specifically, I find that firms accessing the bond market have a lower credit risk than firms without such access, inconsistent with the explanation that, in firms tapping the public debt market, equityholders force a reduction in investment because a larger fraction of the payoffs go to debtholders. Also, I find that the results I report are not consistently depending on the macroeconomic conditions or on the maturity of the firm's debt as it would be expected if debt-overhang was the cause for the reduction in corporate investment.

I conduct several robustness checks to ensure that the effect I report holds under different specifications. Results remain qualitatively similar when including the lag of the dependent variable as an explanatory variable, when analyzing the change in total investment, or when controlling for previous acquisitions. In addition, I find that the results using fixed effects estimation are similar to the ones using first differences, suggesting that most of the change in the level of investment occurs immediately upon accessing the bond market for the first time. It is unlikely that any omitted effect, such as a change in the unobservable investment opportunities, could explain such pronounced change in the level of investment around accessing the public debt market. For that to be the case, the omitted effect would have to be relatively constant over time and suddenly change around the time the firm accesses the bond market, remaining stable afterwards (Faulkender and Petersen (2006)). Further, I find a negative impact of the effect of public debt market's access on the sensitivity of the level of investment to investment opportunities. This last result helps to dispel any concerns that the instrument I use is only capturing the maturity of the different industries over time. If that would be the case, it should have no impact on the relation between firm-level growth opportunities and firm-level investment. I also show that firms accessing the bond market significantly increase their cash holdings.

This chapter adds to the recent literature on the importance of debtholders in corporate governance, which has so far focused on bank debt as a result of its stricter covenants and easier renegotiation (Chava and Roberts (2008); Nini et al. (2009); Nini et al. (2010)). I provide evidence that, in a contracting framework with less monitoring and higher information asymmetry, the existence of debt claims held by dispersed investors leads the firm to change its investment decisions. This self-imposed change in behaviour is meant to reduce agency costs of debt, and is aimed at encouraging uninformed investors to hold the firm's debt on more favourable terms.

My findings are in line with the intuition in Almeida et al. (2011) that, in the absence of perfect markets for external financing, investment decisions may be significantly affected by concerns regarding future access to financing, and with the argument of Rauh and Sufi (2010) that debt heterogeneity should be taken into account when establishing the link between financing and investment. In a broader sense, this chapter extends to debt financing the analysis made by Asker et al. (2011) of the differences in investment behavior between private firms and stock market listed firms. Similarly to them, I find that firms with publicly-listed securities have lower levels of investment and have a weaker relation between investment and investment opportunities. While Asker et al. (2011) show that in equity markets it is managerial myopia the main driver of the change in investment behavior, I offer evidence that in debt markets it is the agency costs of debt that lead to the lower investment level of the firms with traded securities.

Given the evidence reported in this chapter, it may be asked *why* firms choose to access the public debt market if it does not allow them to increase their investment level. First, it must be noted that firms reduce their investment as a percentage of total assets, which does not necessarily mean that they reduce their absolute level of investment (i.e. they reduce investment as a percentage of the total resources they control, but the level of total resources they hold may be, and typically is, increased).[4] Furthermore, there are cost advantages of accessing bond markets (Diamond (1991)). In addition to benefiting from bondholders' lower cost of capital, firms directly accessing the public debt market can benefit from the lower monitoring expenses associated with their relatively higher reputation. This latter effect is in contrast to what is reported for bank financing, where hold-up problems prevent firms from benefiting in price from a lower need of monitoring of their operations by intermediaries (Petersen and Rajan (1994)). Also, there may be other important benefits of bond market financing in the form of an increase in bargaining power with banks or more financial flexibility (Datta et al. (2000); Hale and Santos (2009)).

The chapter proceeds as follows. In the next section I discuss the theoretical background of this study and develop testable hypotheses. In Section 4.3 I discuss the data used, and then in Section 4.4 I present the main analyses. Additional analyses are presented in Section 4.5, alternative explanations in Section 4.6, and robustness checks in Section 4.7. Section 4.8

[4]In unreported analyses I find that firms accessing the bond market significantly increase their assets and their investment as a percentage of capital stock, consistent with such access reducing their financing constraints. However, the focus of this chapter is on how agency considerations result in a decrease in investment as a fraction of the resources controlled by a firm, and not on financing constraints and overall firm investment.

concludes.

4.2 Theory and Hypotheses

In this section I develop two testable and mutually exclusive hypotheses on the link between access accessing the bond market and corporate investment.

4.2.1 Reduction in Financial Constraints

Firms that access the public debt market are typically large firms with stable operations that have built their reputation through successful interaction with bank lenders (Diamond (1991); Cantillo and Wright (2000)). A key advantage of this access is the possibility to obtain less costly financing, since diversified bondholders have lower cost of capital than financial intermediaries (Cantillo and Wright (2000)). In addition, the reduced importance of informational advantages in the bond market (Rajan (1992)) allows the firm to benefit in price from the reduction in the level of monitoring associated with its higher reputation.

As a result, firms that use the public debt market are usually deemed to be firms less subject to financial constraints, which are therefore better able to raise the necessary funding for new projects (e.g., Almeida and Campello (2007); Whited (1992)). Consistent with this view, Faulkender and Petersen (2006) show that firms significantly increase their leverage after starting to access the bond market. Sufi (2009) argues, based on the Holmstrom and Tirole (1997) model, that firms that are able to certify their debt at a lower cost are more likely to raise funds from uninformed investors, and are thus less affected by credit constraints when making investment decisions. He shows that firms that obtain a loan rating to access the syndicated loan market increase their level of cash acquisitions and investment in working capital. He therefore concludes that third-party debt certification has a positive impact on firms' investment level.[5]

Based on the abovementioned findings, I hypothesize that firms increase their level of investment when they access the public debt market, taking advantage of their reduced financing

[5]The key difference of this chapter in relation to Sufi (2009) is that Sufi focuses only on syndicated loans, in which monitoring is arguably more present than in public debt markets, and in the corresponding loan ratings, which are obtained also by firms that cannot access public debt markets. It is not clear whether his results can be extended to a setting including the public debt market, in which monitoring is reduced and in which there are more concerns with information asymmetry (Diamond (1991)).

constraints to not only increase investment at large, but also its intensity (investment level). Another potential driver of the increase in investment level may be the easing of the debt covenants, which in the public debt market are looser than in the private lending market (Nash et al. (2003); Nini et al. (2010)). By accessing non-private markets and gradually becoming free from tighter covenants, firms may more easily finance and pursue investment projects.

I further hypothesize that accessing uninformed capital is more important for firms with higher credit risk. These are firms that are more subject to financial constraints, which are prevented from obtaining as much capital as they need for investment (Almeida and Campello (2007)). Following Sufi (2009), I expect that they benefit the most from an increase in the availability (or a decrease in the cost) of capital.

4.2.2 Increase in Agency Costs

Another view on the interaction between public debt market access and corporate investment is given by the literature on agency costs and on financial intermediation. Although the conflict of interests between managers and shareholders has been the main focus of the literature since Jensen and Meckling (1976), it has long been recognized that there is also an important misalignment of interests between shareholders and debtholders that may carry costs for a levered firm. Given that shareholders hold an option on the firm's assets with exercise value equal to the face value of debt, they have an incentive to increase the variance of the value of firm's assets, especially when the firm is closer to the point of financial distress, as they benefit from the upside but have limited loss on the downside. Furthermore, they may not pursue investments that increase the value of the firm if such value mostly accrues to debtholders (Myers (1977)). Rational debtholders will anticipate this behaviour and demand a higher price to hold the debt of the firm, which implies that the agency costs of debt are ultimately borne by the equityholders. Any reduction in agency costs, through monitoring for example, is thus in the interest of the equityholders.

For firms accessing the public debt market, monitoring by bondholders is difficult given the well-known free-riding and incentive problems faced by large numbers of claim-holders. Furthermore, the incentives for banks to monitor these firms are reduced because of the dilution of the banks' claims and their seniority in relation to bondholders (Besanko and Kanatas (1993)).[6] As such, agency costs become higher when a firm introduces public debt (Datta

[6] An alternative view is derived by Park (2000), who argues that by having a smaller senior claim on a firm's

et al. (2000)). A potential concern for dispersed lenders is that firms may engage in deceptive behaviour once they borrow directly from financial markets and are less subject to the strict monitoring exerted by banks.[7] In contrast to direct bank lenders, dispersed debtholders have difficulty in enforcing covenants limiting firms' actions (Nini et al. (2009)). As such, they may avoid holding a firm's debt when they have little knowledge about projects that have substantial room for managerial misbehaviour or risk-shifting (Ortiz-Molina (2006)). Given that any such fears will be priced in the cost of debt, firms that access the bond market have an incentive to reduce the concerns of debtholders and build their reputation by adjusting their investment decisions taking into account lenders' preferences, thereby securing more favourable access to financing in the future (Almeida et al. (2011); Aivazian et al. (2006)).[8] Debt investors typically want the firm to reduce its investment level, as they fear that equityholders may engage in risk-shifting (Nini et al. (2009)). In the terminology of Jensen and Meckling (1976), firms can offset the reduction in external monitoring (banks' oversight) with internal bonding (reduction in investment level).

Following this reasoning, I hypothesize that firms accessing the bond market reduce their level of investment in order to attract investors' interest in their debt securities and secure financing on more favourable terms. Not all firms need to equally take into account the preferences of their debtholders. Firms farther from financial distress, for which there is little risk of missing the debt repayments, are less likely to be affected by debtholders' concerns, and therefore have less need to adjust their actions (Nash et al. (2003); Nini et al. (2010)). I thus hypothesize that the reduction in the level of investment triggered by accessing the bond market is stronger when the firm has a higher credit risk.

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assets, due to the introduction of junior public debt, banks actually exert more monitoring of the borrower. However, his model focuses on situations in which moral hazard is a very large concern and the bank has to decide on the liquidation of the firm. Furthermore, such relation only holds if the bank's claim is large enough to be impaired in case of default. As Park (2000) highlights, this model is more likely to be applicable to highly-leveraged transactions such as buyouts. If bank monitoring is more focused on maintaining the going-concern value of the firm rather than liquidating it, which is arguably the situation for the vast majority of the firms that access the bond market in my sample, then Park argues that "an investor's incentive to monitor is stronger when his stake is bigger" (p. 2159).

[7] The need of a credit rating to access debt markets (Sufi (2009)) cannot replace the monitoring by debtholders given the lack of direct financial incentives and the well-known agency problems of rating agencies (Leland and Pyle (1977)).

[8] Such adjustment was not as necessary before since stricter monitoring gave bank lenders more security that the firms' actions were not meant to expropriate them. In the absence of monitoring, the threshold at which firms' actions may start triggering debtholders' concerns is lowered (higher information asymmetry).

4.3 Data and Univariate Analysis

4.3.1 Data Sources

I retrieve all annual observations of publicly-traded firms incorporated in the United States that are available on Compustat between the beginning of 1986 and the end of 2008. I delete observations with total assets or sales below one million dollars and firms defined as utilities (SIC codes starting with 49) or financials (SIC codes between 6000 and 6800). I also obtain from Compustat data on the Standard and Poor's (S&P) long-term issuer credit rating. I retrieve from Mergent Fixed Income Securities Database (FISD) information on issuance and maturity dates for all bonds issued by firms in the sample. I collect from the Securities Data Company (SDC) the information on all the takeovers completed by each firm in each year, defined as acquisitions for more than 50% of the equity and with information available on the deal value. Finally, I collect from the Center for Research in Securities Prices (CRSP) data on stock prices. The final sample consists of 84,556 firm-year observations.

4.3.2 Univariate Analysis

I start by comparing the characteristics of firms that access the bond market with the ones that do not do it. Most of the literature identifies companies that use the bond market by checking whether they have a S&P credit rating on Compustat at the end of the financial year (Faulkender and Petersen (2006); Rauh and Sufi (2010)). Cantillo and Wright (2000) show that in less than 3% of their sample a firm has a credit rating and no publicly traded debt or vice-versa. However, as highlighted by Sufi (2009), some firms started obtaining credit ratings to access the syndicated loan market without issuing publicly-traded bonds after 1995. As such, I define firms as accessing the bond market if, in addition to appearing with a credit rating on Compustat, they also appear on Mergent FISD as having a bond outstanding for the same year in which they have the credit rating, and that thus I am certain that used public debt. Due to the limited coverage of Mergent FISD, I risk misclassifying issuers of public debt as firms that do not access the bond market. Nevertheless, all the results reported in this chapter are robust to the classification of firms as using the bond market based solely on whether they have a credit rating.

In Table 4.1 I separate the firm-year observations into two groups sorted on whether the firm accesses the public debt market. To be consistent with later analyses, I use the lag of all

Table 4.1
Descriptive Statistics

This table presents descriptive statistics for the overall sample, split into observations of firms accessing the bond market and not accessing to the bond market. The sample includes all Compustat firm-year observations of US-incorporated public firms between 1986 and 2008 with total assets and sales above 1 million dollars. Utilities (SIC codes between 4900 and 4999) and financials (SIC codes between 6000 and 6800) are excluded. Firms accessing the bond market are firms for which there is both a Standard and Poor's long-term issuer credit rating in Compustat and a bond outstanding in Mergent FISD for the last month of the fiscal year. All other variables are defined in the Appendix. The test for differences in means is executed using a t-test (for non-discrete variables) or a Chi-square test (for dummy variables). The p-value reported is the probability that the difference between the average of the firms accessing and the average of the firms not accessing the bond market equals zero.

	Firms Accessing to Bond Market$_{t\text{-}1}$	Firms not Accessing to Bond Market$_{t\text{-}1}$	P-value of test for difference	N
Total Assets$_{t\text{-}1}$	4299.590	439.043	0.000	84,556
Market to Book Ratio$_{t\text{-}1}$	1.635	2.154	0.000	84,556
Cash Flow$_{t\text{-}1}$	0.076	-0.001	0.000	84,556
Market Leverage$_{t\text{-}1}$	0.486	0.343	0.000	84,556
Firm Age$_{t\text{-}1}$	27.098	13.771	0.000	84,556
Modified Altman Z-score$_{t\text{-}1}$	1.746	0.908	0.000	84,556
S&P 500$_{t\text{-}1}$	0.392	0.037	0.000	84,556
NYSE listed$_{t\text{-}1}$	0.706	0.181	0.000	84,556
Percentage Access$_{t\text{-}1}$	0.184	0.116	0.000	84,556
Capex/TA$_t$	0.074	0.073	0.369	84,556
Acqs/TA$_t$	0.036	0.034	0.030	82,374
N (out of 84,556)	9,958	74,598		

variables except the ones related to firm investment. All variables are defined in the Appendix. In line with what is reported by Cantillo and Wright (2000) and Faulkender and Petersen (2006), firms accessing to the bond market are significantly larger and have a lower market to book ratio than the ones that do not use the bond market. As in Faulkender and Petersen (2006), they have higher leverage, are older, and are more likely to be part of the S&P 500 and to trade on the New York Stock Exchange (NYSE). In addition, firms tapping the public debt market generate a higher cash flow and, as expected, have a stronger credit profile, as measured by their modified Altman Z-score (MacKie-Mason (1990)). I use this measure of creditworthiness rather than the classic Altman Z-score model (Altman (1968)) to isolate the effect of leverage in my analyses. Finally, these firms are in an industry that has a higher proportion of firms taping the bond market (variable Percentage Access).

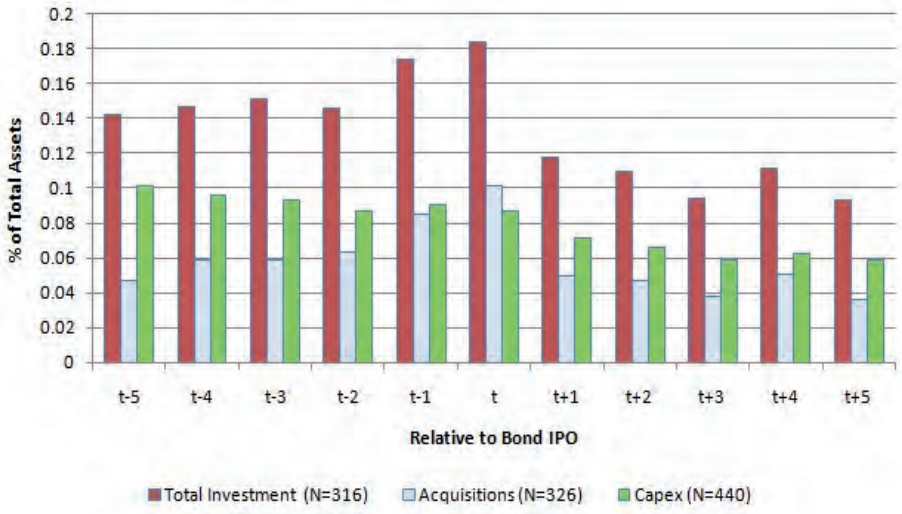
I examine firm investment by analyzing both the ratio of capital expenditures to lagged total assets (following Rauh (2006) and Sufi (2009)) and the ratio of acquisitions to lagged total assets (Sufi (2009)). For the latter I use the acquisitions reported on Compustat; note that this definition of acquisitions only includes the cash-financed component of takeovers. The univariate comparison of both samples gives some weak support to the hypothesis that firms accessing the bond market invest relatively more than firms that do not access it. Firms tapping the bond market spend an amount equivalent to 7.4% of their (lagged) total assets on capital expenditures, compared to the 7.3% spent by other firms. A similar situation is observed when examining the cash-financed component of the takeovers: firms with bond market financing spend 3.6% while firms without bond market financing spend 3.4% of lagged total assets. However, only the latter difference is statistically significant at the 95% confidence level.

Next, in Figure 4.1 I plot the average investment in capex, acquisitions, and their sum (total investment), scaled by lagged total assets, around the year in which firms start borrowing from the public debt market (t=0). In order to ensure that the averages can be compared across years, I only include firms for which there is data available for all the years. This criteria results in 319 firms being included in the total investment average, 326 firms being included in the acquisitions average, and 440 firms being included in the capex average. The relative spike in acquisitions just before and in $t=0$ suggests that many firms may be accessing the bond market to finance a specific takeover, or may inherit such access from the target firm they acquire.[9] To mitigate concerns with reverse causality, in my later analyses I lag all the independent variables by one year. There is a large drop in the level of firm investment from year t to $t+1$, which does not get reversed over the following years - if anything, the level of investment is reduced even further several years after the first time the firm accesses the bond market. This visual pattern is consistent with the hypothesis that firms reduce their level of investment once they access the public debt market due to the increase in agency costs of debt. However, despite the suggestive evidence in Figure 4.1, before inferring causality it is necessary to control for other factors that may impact both the investment policy and the likelihood of accessing the bond market and to address endogeneity concerns.

[9]Excluding firms that make significant acquisitions in any of the years (e.g., with acquisitions over lagged total assets above 10%) leads to a very similar plot to the one reported regarding the level of capital expenditures. This result reduces concerns that the change in investment I report is driven by firms that make large acquisitions and are spending their resources in integrating the firms. I return to this issue in Section 4.7.

Figure 4.1
Firm Investment and Public Debt Market Access

This plot presents corporate investment as a percentage of lagged total assets around the first year a firm accesses the bond market (*t*=0). A firm is defined as accessing the bond market if there is both a Standard and Poor's long-term issuer credit rating in Compustat and a bond outstanding in Mergent FISD in the last month of the fiscal year. Total Investment is the sum of the average of Acquisitions/TA and of Capex/TA for 319 firms with complete data for the 10 years surrounding the first year a firm accesses the bond market. Acquisitions is the average Acquisitions/TA for 326 firms with complete data for the 10 years surrounding the first year a firm accesses the bond market. Capex is the average Capex/TA for 440 firms with complete data for the 10 years surrounding the first year a firm accesses the bond market.



4.4 Multivariate Results

In this section I analyze the effect of accessing the bond market on corporate investment in a multivariate setting. The control variables I use are based on Sufi (2009) and on Gaspar et al. (2005). These variables are in Table 4.1 and include firm size, market to book ratio, cash flow, leverage, and firm age. In order to ensure that any effect reported does not arise from differences in the creditworthiness between the firms accessing the bond market and the other firms, I also control for the firms' modified Altman Z-score. Finally, I include variables to capture the firm's visibility, namely indicator variables to whether it belongs to the S&P 500 index or trades on the New York Stock Exchange (NYSE). As with obtaining credit ratings (Faulkender and Petersen (2006)), more visible firms may find it easier to raise financing for investments and/or may engage more often in acquisitions as they make a more attractive merging partner.

4.4.1 Capital Expenditures

I regress the yearly capital expenditures made by each firm, scaled by lagged total assets, on a dummy taking value one if a firm has both a credit rating and a bond outstanding at the end of the financial year (Access Dummy), and on the set of control variables described before. In most cases a firm chooses whether it wants to access the bond market or not. Given that this process is endogenous, appropriate techniques must be used to allow to infer causality. One concern is that firms do not alter their investment policy as a result of accessing the public debt market, but rather *because* they make (or will make) a large investment or acquisition they issue a bond. This possibility seems even more relevant following the evidence presented in Figure 4.1 of a spike in investment just before and around the first time a firm accesses the bond market. Another potential problem is that some omitted variable, such as good industry prospects, may drive both the decision of the firm to get bond financing and the change in investment.

I address both issues in several ways. Firstly, to partly mitigate the concern that a firm accesses the bond market when making a large investment, I use a one year lag on all the independent variables. Secondly, to reduce the probability that an unobservable industry effect or shock drives the reported relation, I estimate the models including one dummy variable per industry-year interaction (Kisgen (2009); Sufi (2009)). I use Fama and French (1997) 48 industries classification. Any effect on investment that arises from industry-wide shocks is

captured by these dummies, which amount to more than 900 in the main specifications.

In Model (1) of Table 4.2 the coefficient on the Access Dummy variable is not significantly different from zero. However, it is likely that there are still other firm-specific characteristics impacting investment that I am not taking into account. I thus re-estimate the model using firm fixed effects.[10] Note that as a result the estimate of the coefficient of the Access Dummy variable is based only on the firms that start/stop using the bond market during the sample period. Once firm time-invariant unobservable characteristics are accounted for in Model (2), the coefficient on the Access Dummy becomes significantly negative, and implies that firms accessing the bond market spend on average less 0.6% of total assets per year on capital investment. Given that on average firms spend almost 7.4% of total assets on capital expenditures, this coefficient means that the use of the public debt market is associated with a reduction of almost 8.2% on an average firm's capital investment level. This result supports the hypothesis that firms accessing the bond market reduce their level of investment to mitigate information asymmetry and moral hazard concerns from dispersed lenders. It is inconsistent with the hypothesis that these firms increase their investment level due to their better access to financing.

In addition to the use of an extensive set of control variables, industry-year fixed effects, and firm fixed effects, the fact that I find a negative relation between corporate investment level and bond market access further mitigates concerns with endogeneity. It is difficult to think of an alternative factor that leads firms to both choose to start accessing debt markets and reduce investment level other than their maturity and growth opportunities, which I control for. The hypothesized effect of a positive relation between corporate investment and bond market access would have been more prone to endogeneity concerns: a firm could choose to tap debt markets in anticipation of an increase in financing needs related to investment. Nevertheless, it is still possible that there are time-variant, non industry-specific factors impacting the relation between corporate investment and bond market access. To confirm that the relation I report is not driven by omitted variables, in Models (3) and (4) I estimate an instrumental variables model to ensure that the accessing the bond market can be treated as exogenous factor. Since the endogenous variable (Access Dummy) is binary, I follow the procedure described in Wooldridge (2002) (p. 623).

I first estimate the likelihood that a firm uses the public debt market, based on Faulkender and Petersen (2006). I follow these authors in including as an instrumental variable a measure

[10]The NYSE dummy drops out in all the panel regressions with firm fixed effects because no firm changes from being listed on the NYSE to another exchange during the sample period.

Table 4.2
Analysis of Capital Expenditures

This table presents the analysis of capital expenditures for the overall sample. The sample includes all Compustat firm-year observations of US-incorporated public firms between 1986 and 2008 with total assets and sales above 1 million dollars. Utilities (SIC codes between 4900 and 4999) and financials (SIC codes between 6000 and 6800) are excluded. Access Dummy takes value one for observations for which there is both a Standard and Poor's long-term issuer credit rating in Compustat and a bond outstanding in Mergent FISD in the last month of the fiscal year. All other variables are defined in the Appendix. All independent variables are lagged one year in relation to the dependent variable, except in Model (3). Model (1) is estimated using OLS. Model (2) is estimated using firm fixed effects. Model (3) is estimated using a Probit regression. Model (4) is the second stage of an instrumental variables estimation in which the first stage includes the same independent variables plus the fitted probability given by Model (3) as an instrument. All models except Models (3) and (4) include a dummy per interaction of Fama and French (1997) industry and year. Models (3) and (4) include Fama and French (1997) industry and year fixed effects separately. The constant term is included but not reported. T-stats are in parenthesis and are based on robust standard errors clustered at the firm level. *, **, and *** represent significance at the 90%, 95%, and 99% confidence level.

	(1)	(2)	(3)	(4)
	Capex/TA$_t$	Capex/TA$_t$	Access Dummy$_{t\text{-}1}$	Capex/TA$_t$
	OLS	Firm Fixed Effects	Probit	Instrumental Variables
Access Dummy$_{t\text{-}1}$	0.002	-0.006***		-0.026***
	(1.308)	(-3.071)		(-4.304)
Total Assets$_{t\text{-}1}$	0.001*	-0.017***	0.520***	0.002***
	(1.722)	(-20.011)	(26.938)	(3.978)
Market to Book	0.007***	0.007***	0.060***	0.008***
Ratio$_{t\text{-}1}$	(19.697)	(18.163)	(4.538)	(20.376)
Cash Flow$_{t\text{-}1}$	0.044***	0.012***	0.162	0.043***
	(16.679)	(5.798)	(1.557)	(16.418)
Market Leverage$_{t\text{-}1}$	-0.045***	-0.078***	1.424***	-0.042***
	(-18.198)	(-25.983)	(15.464)	(-16.008)
Firm Age$_{t\text{-}1}$	-0.012***	-0.009***	0.118***	-0.012***
	(-14.086)	(-4.468)	(3.811)	(-13.638)
Modified Altman	-0.001***	0.001***	-0.025**	-0.001***
Z- score$_{t\text{-}1}$	(-4.312)	(5.309)	(-2.528)	(-3.582)
S&P 500$_{t\text{-}1}$	-0.008***	-0.003	0.054	-0.001
	(-3.417)	(-1.352)	(0.769)	(-0.457)
NYSE listed$_{t\text{-}1}$	0.007***		0.293***	0.009***
	(3.746)		(5.639)	(4.950)
Percentage Access$_{t\text{-}1}$			4.298***	
			(8.972)	
Observations	84,556	84,556	84,556	84,556
Adjusted R-Squared	0.256	0.169		0.227
Pseudo R-Squared			0.460	

for the relative easiness with which a firm can start tapping the bond market. The variable I use is the (natural logarithm of one plus the) proportion of firms accessing the bond market in the firm's Fama and French (1997) industry in a given year. This variable is expected to be associated with the probability of using the public debt market as it is easier for firms to start issuing bonds if bond investors are already familiar with comparable companies. However, since I include industry fixed effects and an extensive set of control variables for firm maturity and growth opportunities in the second-stage regression, this variable is likely to be independent of the firm's investment decisions and of their interaction with industry membership.[11] As control variables I use all the variables used in the regression on the level of investment. The results of this Probit regression are shown in Table 4.2, Model (3), and are largely consistent with Faulkender and Petersen (2006). A test that the instrument used is significantly different from zero gives a t-statistic of 8.972 (p-value of 0.000), a necessary condition for good identification of the system. Given that the endogenous variable is binary, I cannot rely on the standard instrumental variables method. Instead, I obtain the probability of accessing the bond market given by this model and use it as an instrument for bond market access in a standard two stage least squares model, thereby accounting for the endogeneity arising from the firm's choice to issue a bond (Faulkender and Petersen (2006); Wooldridge (2002)).[12]

The inference that accessing the bond market causes a significant reduction in the level of capital expenditures is confirmed in the instrumental variables estimation. The impact is again statistically significant at the 99% confidence level. Economically, the coefficient on the Access Dummy is much larger in the instrumental variables estimation than in the fixed effects model, implying a reduction in the level of capital expenditures of 2.6% of lagged total assets.[13]

[11] In unreported robustness checks I include additional proxies to capture industry dynamics, such as growth in sales, changes in assets, or changes in growth opportunities at the industry level. Results are unchanged, mitigating concerns that the instrumental variable used is correlated with investment level through its link with industry maturity.

[12] Exclusion restrictions are not strictly necessary for identification of the system, due to the nonlinearity of the fitted probability in relation to the exogenous variables. However, it is generally advisable to have at least one, and, as explained above, I use the Percentage Access variable for that purpose. Since this variable is varying on an industry-year basis, I introduce industry and year fixed effects separately in the regressions rather than industry-year fixed effects.

[13] I repeat all the main analyses of the chapter using instead a Heckman (1979) selection model (with and without the use of the instrumental variable) as in, for example, Kisgen et al. (2009). Unreported results are very similar to the ones reported for the instrumental variables specification, with the coefficients being only smaller in magnitude. Statistical significance is unchanged. In addition, I repeat all the analyses including more terms to capture the relation between investment and firm size to ensure that this relation is not influencing the results of the instrumental variables regressions. More specifically, I add the squared term of the log of total assets and the total assets (without log) to the second-stage regressions. Results become slightly stronger.

4.4.2 Corporate Takeovers

Acquisitions of other firms are one of the most important events in the life of a company and a way to grow rapidly. As such, if firms adjust capital investment decisions as a result of accessing the bond market, there should also be a change in corporate takeovers. However, the expected relation between acquisitions and debt markets depends on how these acquisitions are paid for. Cash-financed acquisitions (including the share of mixed offers financed with cash) are more likely to be affected by the ease with which financing can be obtained and are more likely to raise concerns from creditors, as they often involve an increase in leverage and reduce the asset liquidity of the firm. Equity-financed acquisitions do not require raising debt, and may or may not result in a reduction in leverage or a decrease in the risk of the existing debt claims. As my hypotheses only have clear predictions for cash-financed acquisitions, I focus on these in the empirical analysis.

In Table 4.3 I present the results of an analysis similar to the one in Table 4.2 but with cash acquisitions scaled by total assets as the dependent variable. Once again, controlling for time-invariant firm characteristics is very important: the coefficient on accessing the public debt market switches from non-statistically different from zero to significantly negative from Model (1) to Model (2). In the latter model, with firm fixed effects, accessing the bond market is associated with a reduction in acquisitions spending of 1.3% of total assets. This effect is equivalent to a drop of 38.4% on the average cash-financed acquisitions spending of firms (which equals 3.4% of total assets). Although I do not directly test it, it is likely that part of this drop is due to replacement of cash with equity as the financing method in takeovers.

As with the analysis of capital expenditures, the fact that I uncover a negative relation between corporate takeovers and debt market access further reduces endogeneity concerns. Nevertheless, in Model (3) of Table 4.3 I show that the previously reported negative relation also holds using the instrumental variables procedure of Model (4) of Table 4.2, with the coefficient on the Access Dummy being statistically significant at the 99% level. However, its high point estimate should be interpreted with caution, as it is likely that its value is upward biased because of the large concentration of observations with a value of zero.

It is noticeable from the comparison between the previous two tables that the level of spending on acquisitions is more dramatically reduced than the level of spending on capital expenditures. Corporate acquisitions are typically associated with higher information asymmetry and provide more room for moral hazard than internal investments (Moeller et al.

Table 4.3
Analysis of Takeovers

This table presents the analysis of completed takeovers for the overall sample. The sample includes all Compustat firm-year observations of US-incorporated public firms between 1986 and 2008 with total assets and sales above 1 million dollars. Utilities (SIC codes between 4900 and 4999) and financials (SIC codes between 6000 and 6800) are excluded. Access Dummy takes value one for observations for which there is both a Standard and Poor's long-term issuer credit rating in Compustat and a bond outstanding in Mergent FISD in the last month of the fiscal year. All other variables are defined in the Appendix. All independent variables are lagged one year in relation to the dependent variable. Model (1) is estimated using OLS. Model (2) is estimated using firm fixed effects. Model (3) is the second stage of an instrumental variables estimation in which the first stage includes the same independent variables plus the fitted probability given by Model (3) in Table 4.2 as an instrument. All models except Model (3) include a dummy per interaction of Fama and French (1997) industry and year. Model (3) includes Fama and French (1997) industry and year fixed effects separately. The constant term is included but not reported. T-stats are in parenthesis and are based on robust standard errors clustered at the firm level. *, **, and *** represent significance at the 90%, 95%, and 99% confidence level.

	(1)	(2)	(3)
	Acqs/TA$_t$	Acqs/TA$_t$	Acqs/TA$_t$
	OLS	Firm Fixed Effects	Instrumental Variables
Access Dummy$_{t\text{-}1}$	0.001	-0.013***	-0.048***
	(0.541)	(-4.327)	(-8.827)
Total Assets$_{t\text{-}1}$	0.003***	-0.017***	0.005***
	(7.921)	(-14.415)	(11.633)
Market to Book	0.001***	0.000	0.001***
Ratio$_{t\text{-}1}$	(3.333)	(1.058)	(4.263)
Cash Flow$_{t\text{-}1}$	0.020***	0.003	0.021***
	(9.193)	(1.397)	(9.932)
Market Leverage$_{t\text{-}1}$	-0.031***	-0.106***	-0.024***
	(-14.666)	(-25.226)	(-10.487)
Firm Age$_{t\text{-}1}$	-0.009***	-0.000	-0.009***
	(-11.253)	(-0.094)	(-10.000)
Modified Altman	0.000	0.002***	0.000
Z- score$_{t\text{-}1}$	(1.182)	(5.825)	(0.856)
S&P 500$_{t\text{-}1}$	-0.012***	0.011***	-0.001
	(-6.043)	(2.577)	(-0.250)
NYSE listed$_{t\text{-}1}$	0.013***		0.016***
	(7.091)		(8.373)
Observations	82,374	82,374	82,374
Adjusted R-Squared	0.041	0.049	0.024

(2007); Morck et al. (1990)), resulting on average in bondholder losses (Billett et al. (2004)). The evidence that firms restrict more their level of acquisitions than of capital expenditures is thus supportive of the view that firms internalize debtors' concerns when making investment decisions.

Given that bond markets facilitate firms' access to financing, the results in this section suggest that the use of investment level (investment over total assets) may sometimes not be appropriate in tests of the financial constraints faced by firms. In unreported analyses, I find that firms that access the bond market significantly increase their assets and their investment scaled by capital stock. This evidence is consistent with the intuition that firms that use the public debt market can more easily access financing to purse investment opportunities at an individual firm level. However, my results on the level of investment show that the usage of more information-sensitive sources of debt capital, such as bond financing, leads firms to reduce their investment as a fraction of the total resources they control. Aggregated over the whole economy, this finding implies that, if all firms accessed public debt markets and the level of capital available would be unchanged, there would be less investment in the economy as a result of information asymmetry and agency costs.

4.4.3 Cross-Sectional Variation

So far the evidence presented suggests that firms reduce agency costs of debt by restricting the investment level when accessing markets with more uninformed investors. An additional way of testing whether this is the case is by examining the cross-sectional variation in the reduction in the level of investment. According to financial theory, the conflict of interests between debtholders and equityholders is stronger the closer the firm is to financial distress (Jensen and Meckling (1976)). As such, if firms adjust their actions to minimize agency costs of debt, they should reduce investment the most when they are less creditworthy. Of course, any empirical test has to make sure that such firms are not reducing investment *because* of being in financial difficulties. I thus split the sample according to different measures of credit risk and run separate regressions to understand the impact of bond market access on firm investment levels across the different subsamples. I use the firms' modified Altman Z-score (MacKie-Mason (1990)) and (predicted) credit rating level as measures of credit risk.[14] For

[14]Given that unrated firms, of course, do not have credit ratings, for the partition on credit ratings I use the fitted value of a regression on observed credit ratings (unreported). The independent variables are total assets, cash flow, market leverage, modified Altman Z-score, and PPE over total assets. I also include year and industry fixed effects. The fit of the model is good, with an adjusted R-squared of 69.48%.

the latter I split the group into firms predicted to have a non-investment grade rating (BB^+ and below) and the ones predicted to have an investment grade rating (BBB^- or above).

In Table 4.4 I re-run the fixed effects model of Tables 4.2 and 4.3.[15] Again I include industry fixed effects interacted with year fixed effects. I regress the firm characteristics and the Access Dummy on capital investment (Models (1) to (4)) and on cash-financed acquisitions (Models (5) to (8)), both scaled by lagged total assets. I run each specification twice: in Models (1) and (5), I only include the bottom tercile of the whole sample when sorted by the modified Altman Z-score in year *t-1*. In Models (2) and (6) I only include the corresponding top tercile. Lower levels of the Z-score are associated with a worse credit score, and thus for that subsample I expect the effect of accessing the public debt market on investment to be stronger.

In Table 4.4 I show that it is indeed the case that the effect of tapping the bond market is stronger among firms with a weaker credit profile. In the capital expenditures regressions, the coefficient of the variable Access Dummy is significantly lower in the regression including only the bottom tercile of the sample in terms of modified Altman Z-score than in the regression including only the corresponding top tercile. In the latter subsample the effect of accessing the bond market on investment level is not statistically different from zero. The p-value for a one-sided t-test that the coefficient of the Access Dummy is lower in the low Z-score regressions than in the high Z-score regressions is 0.010. However, in the acquisitions regressions there is no significant difference between the coefficients of the Access Dummy.

The difference in the capital expenditures regression gives support to the hypothesis that the effect of accessing debt markets on firm investment is stronger for companies in which the debtholders/equityholders conflict is more pronounced, i.e., firms with higher credit risk (Nash et al. (2003)). This result does not arise from firms that tap the public debt market being only in either of the subsamples used: the proportion of such firms in the bottom tercile of the distribution sorted by the modified Altman Z-score is 8.5% and in the top tercile subsample is 9.8%.

[15] In Table A.1 in the Internet Appendix (available with the working paper version of this chapter at http://papers.ssrn.com/sol3/papers.cfm?abstract_id=1899644) I run the cross-sectional analysis using the instrumental variables approach. Main conclusions are unchanged.

Table 4.4
Cross-Sectional Analysis

This table presents the cross-sectional analysis of capital expenditures and corporate takeovers for the overall sample. The sample includes all Compustat firm-year observations of US-incorporated public firms between 1986 and 2008 with total assets and sales above 1 million dollars. Utilities (SIC codes between 4900 and 4999) and financials (SIC codes between 6000 and 6800) are excluded. Models (1) and (5) include only the bottom tercile of the sample sorted by the modified Altman Z-score in the year *t-1*. Models (2) and (6) include the observations in the corresponding top tercile. Models (3) and (7) include only observations with a predicted credit rating below BBB^- (exclusive) for the year *t-1*. Models (4) and (8) include only observations with a predicted credit rating above BBB^- (inclusive) for the year *t-1*. The predicted credit rating is given by the fitted value of a regression on the S&P rating of all the rated firms, using as regressors the variables Total Assets, Cash Flow, Market Leverage, Modified Altman Z-Score, PPE over Total Assets, and year and industry fixed effects. Access Dummy takes value one for observations for which there is both a Standard and Poor's long-term issuer credit rating in Compustat and a bond outstanding in Mergent FISD in the last month of the fiscal year. All other variables are defined in the Appendix. The NYSE dummy is included but equals zero in all the models. All independent variables are lagged one year in relation to the dependent variable. All models are estimated using firm fixed effects and include a dummy per interaction of Fama and French (1997) industry and year. T-stats are in parenthesis and are based on robust standard errors clustered at the firm level. *, **, and *** represent significance at the 90%, 95%, and 99% confidence level.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	$Capex/TA_t$	$Capex/TA_t$	$Capex/TA_t$	$Capex/TA_t$	$Acqs/TA_t$	$Acqs/TA_t$	$Acqs/TA_t$	$Acqs/TA_t$
	Low Z-score	High Z-score	Low Rating	High Rating	Low Z-score	High Z-score	Low Rating	High Rating
Access $Dummy_{t-1}$	-0.016***	-0.002	-0.006**	-0.001	-0.008	-0.003	-0.020***	-0.005
	(-3.025)	(-0.662)	(-2.524)	(-0.352)	(-1.148)	(-0.704)	(-4.836)	(-1.107)
Total $Assets_{t-1}$	-0.021***	-0.017***	-0.017***	-0.018***	-0.022***	-0.008***	-0.017***	-0.025***
	(-11.444)	(-11.187)	(-18.279)	(-8.423)	(-9.670)	(-3.421)	(-13.270)	(-6.502)
Market to Book	0.007***	0.006***	0.007***	0.006***	0.001**	-0.003***	0.001	-0.003**
$Ratio_{t-1}$	(12.824)	(7.856)	(16.994)	(7.892)	(2.154)	(-2.899)	(1.270)	(-1.984)
Cash $Flow_{t-1}$	0.004	0.044***	0.012***	0.048***	0.000	0.002	0.003	0.018
	(1.421)	(4.921)	(5.552)	(3.365)	(0.017)	(0.168)	(1.309)	(0.771)

Continued on the next page

Table 4.4 – Continued from the previous page

Market Leverage$_{t\text{-}1}$	-0.076***	-0.070***	-0.077***	-0.075***	-0.073***	-0.107***	-0.106***	-0.109***
	(-13.743)	(-13.295)	(-24.111)	(-9.594)	(-10.307)	(-12.488)	(-23.603)	(-7.662)
Firm Age$_{t\text{-}1}$	-0.018***	-0.004	-0.012***	-0.012***	0.001	0.004	0.001	0.021***
	(-3.165)	(-1.203)	(-5.072)	(-2.826)	(0.260)	(0.841)	(0.300)	(2.989)
Modified Altman	0.002***	0.001	0.001***	0.001	0.002***	0.005**	0.002***	0.016***
Z- score$_{t\text{-}1}$	(5.322)	(0.391)	(5.296)	(0.495)	(5.364)	(2.299)	(5.339)	(4.978)
S&P 500$_{t\text{-}1}$	0.005	-0.007**	-0.002	0.002	0.004	-0.001	0.002	0.011**
	(0.754)	(-2.221)	(-0.509)	(0.711)	(0.377)	(-0.144)	(0.198)	(2.240)
Observations	28,186	28,185	72,500	18,018	27,458	27,458	71,108	17,026
Adjusted R-Squared	0.150	0.169	0.162	0.268	0.049	0.043	0.052	0.061

I also divide the sample on the basis of predicted credit ratings. In Models (3) and (7) I include only observations that have a predicted credit rating below investment grade in the year *t-1*. In Models (4) and (8) I include only observations that are predicted to be investment grade in the year *t-1*. The coefficient on the dummy for accessing the public debt market is significantly more negative in the regressions including only the subsample with weaker credit profile (non-investment grade) than in the the regressions including only the subsample with stronger credit profile (investment grade) (the p-value of a one-sided t-test is 0.089 for the capex regression and 0.007 for the acquisitions regression).

Overall the evidence presented in this subsection is consistent with the hypothesis that firms reduce their investment levels when accessing the bond market in order to induce uninformed investors to hold their debt, effectively internalizing the agency costs of debt in their decisions. As expected under this hypothesis, such change is significantly stronger for firms with higher credit risk, for which there are more concerns of wealth transfers from debtholders to equityholders.

4.5 Additional Analysis

If a firm reduces its investment level once it accesses the public debt market to satisfy bondholders, it should also adjust some of its other actions to further facilitate future access to the bond market. For example, regarding dividend policies, Aivazian et al. (2006) show that rated firms are more likely to smooth their dividend payments. Following this idea, in this section I analyze whether a firm accessing the bond market abides more closely by debt covenants and/or whether it changes the level of payouts to equityholders.[16]

4.5.1 Covenant Violations

It is unlikely that the changes in firm behaviour after accessing the public debt market that I report occur directly *as a result* of financial covenants. Private lenders use stricter covenants than lenders in public markets (Chava and Roberts (2008); Nini et al. (2010)). Furthermore, less than 5% of public bonds have investment covenants (Billett et al. (2007)). Merger re-

[16]In both analyses in this section I assume that the instrument I use in the previous instrumental variables regressions (percentage of firms accessing the bond market per industry-year) is exogenous in relation to covenant violations and shareholder payouts. Given that I control for industry and year fixed effects and for the main known determinants of both dependent variables, this assumption seems to be valid.

strictions are more widely used, but mostly only require the surviving entity of the merger to meet all the covenants and payments of previously issued debt (Billett et al. (2007); Nash et al. (2003)). There are doubts over whether these requirements restrict mergers at all, given their low threshold and the existence of several loopholes (Moody's (2006)). The restriction of investment through the use of covenants restricting the level of debt also does not seem to occur, as leverage is significantly higher for firms with non-private debt.

However, if a firm wants to take into account its debtholders' preferences to ensure better access to financing in the future, it is likely that it becomes more concerned with violating existing debt covenants. Such violations, although fairly common, send a negative signal to debtholders and allow them to intervene more actively in the firm (Nini et al. (2010)). I thus examine whether borrowers violate covenants less often once they access the bond market. I do so by running a Probit regression on the likelihood of having a new covenant violation in a given year using as regressors the same variables as in Table 4.2.[17]

In Model (1) of Table 4.5 I report that firms accessing the bond market are significantly less likely to violate debt covenants in comparison to other firms. In Model (2) I use an instrumental variables Probit, using as instrument in the first stage the probability that a firm accesses the bond market estimated as in the Model (3) of Table 4.2. I again find evidence that using the bond market is negatively associated with covenant violations. This result is consistent with firms adjusting their actions to increase their appeal to debt investors once they start accessing the bond market. However, it should be interpreted with caution. It is also possible that the negative relation between new violations of covenants and public debt market access is partly driven by banks reducing the tightness of debt covenants once they have a smaller claim on the firm's debt. As such, I interpret the evidence in Table 4.5 merely as consistent with my hypothesis.

4.5.2 Payouts to Equityholders

Following the argument expressed above, I expect that firms accessing the bond market adjust their payouts to equityholders in order to leave more money in the firm, thereby reducing debtholders' concerns. To test whether this effect appears in the data, I analyze the relation between shareholder payouts and firms' use of the bond market using the methodology of

[17]For this purpose I use the data kindly made available by Amir Sufi on his website (http://faculty.chicagobooth.edu/amir.sufi/data.htm) and described in detail in the data appendix of Nini et al. (2010).

Table 4.5
Analysis of Violation of Covenants

This table presents the analysis of new violations of covenants for the overall sample. The sample includes all Compustat firm-year observations of US-incorporated public firms between 1986 and 2008 with total assets and sales above 1 million dollars. Utilities (SIC codes between 4900 and 4999) and financials (SIC codes between 6000 and 6800) are excluded. Access Dummy takes value one for observations for which there is both a Standard and Poor's long-term issuer credit rating in Compustat and a bond outstanding in Mergent FISD in the last month of the fiscal year. New Covenant Violation is equal to one if the company is reported to having been in violation of a financial covenant in any of the 4 quarters preceding the end of the financial year and was not in violation of any covenant the year *t-1*. I obtain the data on covenants violation from Amir Sufi's website (http://faculty.chicagobooth.edu/amir.sufi/data.htm). For its detailed description see the data appendix of Nini et al. (2010). All other variables are defined in the Appendix. All independent variables are lagged one year in relation to the dependent variable. Model (1) is estimated using a Probit regression. Model (2) is estimated using an instrumental variables Probit regression in which the first stage includes the same independent variables plus the fitted probability given by Model (3) in Table 4.2 as an instrument. Model (1) includes a dummy per interaction of Fama and French (1997) industry and year. Model (2) includes Fama and French (1997) industry and year fixed effects separately. The constant term is included but not reported. T-stats are in parenthesis and are based on robust standard errors clustered at the firm level. *, **, and *** represent significance at the 90%, 95%, and 99% confidence level.

	(1)	(2)
	New Covenant Violation$_t$	New Covenant Violation$_t$
	Probit	Instrumental Variables
Access Dummy$_{t\text{-}1}$	-0.061*	-0.179*
	(-1.840)	(-1.734)
Total Assets$_{t\text{-}1}$	-0.006	0.001
	(-0.991)	(0.181)
Market to Book	-0.019***	-0.016***
Ratio$_{t\text{-}1}$	(-3.135)	(-2.788)
Cash Flow$_{t\text{-}1}$	0.090**	0.062
	(2.020)	(1.421)
Market Leverage$_{t\text{-}1}$	0.627***	0.632***
	(15.603)	(14.739)
Firm Age$_{t\text{-}1}$	-0.083***	-0.081***
	(-6.316)	(-6.181)
Modified Altman	0.010**	0.011**
Z- score$_{t\text{-}1}$	(2.553)	(2.932)
S&P 500$_{t\text{-}1}$	-0.226***	-0.193***
	(-4.364)	(-3.328)
NYSE listed$_{t\text{-}1}$	-0.258***	-0.242***
	(-9.163)	(-8.085)
Observations	47,412	48,109
Pseudo R-Squared	0.056	

Table 4.2. I measure the shareholder payouts of each firm by adding the total dividends paid in a given year and the value spent on shares repurchases, scaled by lagged total assets (Brown et al. (2007)).

In Table 4.6 I show that firms tapping the bond market have significantly lower levels of payouts to equityholders. More specifically, when including firm fixed effects, accessing the bond market is associated with a reduction in total payouts to shareholders of 0.4% of total assets (Model (2)), which is equivalent to a reduction of 14.0% in payouts for the average firm. These results provide strong support to the hypothesis that firms accessing the bond market adjust their actions to reduce debtholders' concerns. Furthermore, they are difficult to explain outside my theoretical framework. Explanations based on an omitted characteristic of the firm driving both the decision to access the bond market and the reduction in investment level, such as the maturity of the industry or the reduction in firm-specific growth opportunities, predict an increase in payouts to equityholders, which is in sharp contrast to my empirical findings. Furthermore, in Model (3) I confirm that the negative relation between bond market access and equity payouts is robust to estimation using the instrumental variables approach. As in the case of acquisitions, it is not recommended to use the point estimate for inferring the economic impact due to the large concentration of observations with a zero as the dependent variable, but the statistical significance of the results is again very high.

4.6 Alternative Explanations

In this section I address alternative explanations for the findings reported in the previous sections. I start by examining whether the increase in debt levels associated with accessing the public debt market, reported by Faulkender and Petersen (2006), disciplines managers and forces them to reduce wasteful spending (Jensen (1986)), resulting in the reduction in investment level that I report. Given that previous analyses control (linearly) for leverage, such effect would have to arise from a non-linear impact of leverage on managers' actions or from the fact that the impact of debt on managers' actions is better captured by some other metric. In addition, it must be noted that this interpretation is inconsistent with the reduction in payouts that I find in Table 4.6. The free cash flow theory of Jensen (1986) predicts that managers of more leveraged firms make decisions that are better aligned with the interests of shareholders. As such, if it is the discipline introduced by public debt that forces managers to reduce investment, the same discipline should lead them to make better takeover decisions.

Table 4.6
Analysis of Payouts to Equityholders

This table presents the analysis of payouts to equityholders for the overall sample. The sample includes all Compustat firm-year observations of US-incorporated public firms between 1986 and 2008 with total assets and sales above 1 million dollars. Utilities (SIC codes between 4900 and 4999) and financials (SIC codes between 6000 and 6800) are excluded. Access Dummy takes value one for observations for which there is both a Standard and Poor's long-term issuer credit rating in Compustat and a bond outstanding in Mergent FISD in the last month of the fiscal year. All other variables are defined in the Appendix. All independent variables are lagged one year in relation to the dependent variable. Model (1) is estimated using OLS. Model (2) is estimated using firm fixed effects. Model (3) is the second stage of an instrumental variables estimation in which the first stage includes the same independent variables plus the fitted probability given by Model (3) in Table 4.2 as an instrument. All models except Model (3) include a dummy per interaction of Fama and French (1997) industry and year. Model (3) includes Fama and French (1997) industry and year fixed effects separately. The constant term is included but not reported. T-stats are in parenthesis and are based on robust standard errors clustered at the firm level. *, **, and *** represent significance at the 90%, 95%, and 99% confidence level.

	(1)	(2)	(3)
	Payouts/TA$_t$	Payouts/TA$_t$	Payouts/TA$_t$
	OLS	Firm Fixed Effects	Instrumental Variables
Access Dummy$_{t\text{-}1}$	-0.004***	-0.004**	-0.037***
	(-3.081)	(-2.541)	(-6.927)
Total Assets$_{t\text{-}1}$	0.002***	0.001*	0.004***
	(7.349)	(1.705)	(10.236)
Market to Book	0.004***	0.002***	0.004***
Ratio$_{t\text{-}1}$	(8.980)	(3.622)	(9.167)
Cash Flow$_{t\text{-}1}$	-0.002	-0.006*	-0.001
	(-0.652)	(-1.870)	(-0.456)
Market Leverage$_{t\text{-}1}$	-0.044***	-0.057***	-0.038***
	(-22.360)	(-21.638)	(-16.767)
Firm Age$_{t\text{-}1}$	0.008***	0.019***	0.009***
	(13.835)	(11.256)	(14.157)
Modified Altman	-0.001***	-0.002***	-0.001***
Z- score$_{t\text{-}1}$	(-4.267)	(-5.271)	(-5.233)
S&P 500$_{t\text{-}1}$	0.018***	0.020***	0.026***
	(7.772)	(5.720)	(8.746)
NYSE listed$_{t\text{-}1}$	0.005***		0.008***
	(3.900)		(5.558)
Observations	79,123	79,123	79,123
Adjusted R-Squared	0.080	0.038	0.064

I test whether firms that use the public debt market make better acquisitions by running an event study at the time of the announcement of takeovers. To ensure that I include acquisitions that meaningfully affect the bidder's value, I only include completed deals with a relative size (defined as deal value over lagged bidder total assets) above 1%. I then regress the abnormal returns from two days before until two days after the announcement date on a dummy for firms accessing the bond market and on a set of deal and firm characteristics commonly used in the literature (e.g., Masulis et al. (2007)). I again include the interaction of year and industry dummies to capture industry-specific shocks in the OLS model. To capture the exogenous effect of accessing the bond market on bidder returns I also use an instrumental variables approach as the one of Models (3) and (4) of Table 4.2. Since the second-stage regression on announcement returns includes only acquiring firms, I only include these firms in the Probit regression on the likelihood of accessing the bond market.

In Models (1) and (2) of Table 4.7 I show that firms accessing the bond market do not have significantly different abnormal returns at the time of the announcement of an acquisition. This result is inconsistent with what would be predicted under a free cash flow theory explanation of the negative relation between public debt market access and corporate investment level. In Table A.2 in the Internet Appendix I split the sample based on the firms' creditworthiness using the modified Altman Z-score and the predicted credit rating. Firms more sensitive to debtholders' concerns (proxied by a lower modified Altman Z-score or by an estimated credit rating below BBB$^-$) do not experience significantly different abnormal returns. These results are inconsistent with the possibility that the increase in debt brought by accessing the bond market results in a disciplining of managers by more than what is already directly captured in the coefficient of market leverage in the regressions.

An additional alternative interpretation of the negative relation between public debt market access and investment level is related to debt overhang (Myers (1977)). It may be that firms do not reduce their investment level to reduce agency costs of debt and access debt markets on more favourable conditions, but rather because they have a large stock of debt they do not pursue some of the positive NPV projects they have available. However, this explanation is not consistent with the reduction in shareholders' payouts that I report. In addition, there are three other reasons to believe that it is not what is driving the results on the reduction in investment level.

Firstly, I control for leverage in all my analysis. To the extent that debt overhang is related to the stock of existing debt, this variable should capture most of its effect. Secondly, although

the effect of the bond market access is stronger for companies closer to financial distress, within the subsample of firms with lower creditworthiness firms accessing the bond market are in a significantly better financial condition than firms without such access, as measured by modified Altman Z-score, debt coverage, or interest coverage (unreported). As such, within this subsample it seems unlikely that debt overhang would be more of a problem for the firms using public debt than for the firms not using it, and that it would drive the results I report regarding the lower investment levels of firms accessing the public debt market.

Table 4.7
Analysis of Announcement Returns

This table presents the analysis of cumulative abnormal returns at the announcement of takeovers for a subsample of acquisitions. The subsample includes acquisitions completed by all the firms used in previous analyses for which there is data available on SDC. Only offers for more than 50% of the equity with information available on deal value in SDC are included. Offers with a relative size below 1% are excluded. Access Dummy takes value one for observations for which there is both a Standard and Poor's long-term issuer credit rating in Compustat and a bond outstanding in Mergent FISD in the last month of the fiscal year. All other variables are defined in the Appendix. All independent variables from accounting statements are obtained from the financial year prior to the deal announcement. Model (1) is estimated using OLS. Model (2) is the second stage of an instrumental variables estimation in which the first stage includes the same independent variables plus the fitted probability given by Model (3) in Table 4.2 as an instrument, but including only the observations that relate to the subsample of acquisitions. Model (1) includes a dummy per interaction of Fama and French (1997) industry and year. Model (2) includes Fama and French (1997) industry and year fixed effects separately. The constant term is included but not reported. T-stats are in parenthesis and are based on robust standard errors clustered at the firm level. *, **, and *** represent significance at the 90%, 95%, and 99% confidence level.

	(1)	(2)
	Bidder CAR	Bidder CAR
	OLS	Instrumental Variables
Access Dummy	0.001	-0.007
	(0.676)	(-1.074)
Bidder Total Assets	-0.005***	-0.004***
	(-5.760)	(-3.873)
Bidder Market to Book	-0.002***	-0.002***
Ratio	(-3.075)	(-2.878)

Continued on the next page

Table 4.7 – Continued from the previous page

Bidder Cash Flow	-0.013	-0.018*
	(-1.292)	(-1.876)
Bidder Market	0.023***	0.029***
Leverage	(3.675)	(4.507)
Bidder Firm Age	0.001	0.001
	(0.447)	(0.865)
Bidder Modified	0.001	0.001**
Altman Z-score	(1.619)	(2.086)
Bidder S&P 500	0.007**	0.008***
	(2.454)	(3.101)
Bidder NYSE listed	-0.000	0.000
	(-0.060)	(0.157)
Relative Size	0.005***	0.005***
	(2.967)	(3.177)
Hostile/Unsolicited	-0.013**	-0.014**
	(-2.084)	(-2.591)
Percentage of Cash	0.000	0.000
	(0.852)	(0.896)
Target Public	-0.033***	-0.033***
	(-8.899)	(-9.143)
Percentage of Cash	0.000***	0.000***
* Target Public	(4.606)	(4.899)
Tender Offer	0.008*	0.008*
	(1.948)	(1.921)
Observations	13,517	13,499
Adjusted R-Squared	0.021	0.029

Finally, I check whether the results reported before are different in periods with more macroeconomic risk, proxied by a recession indicator, or for firms with more short-term debt, defined as debt maturing in less than 4 years as a fraction of total debt (Barclay and Smith (1995)). Underinvestment should be more prevalent in bad economic times, when equity-holders are even more reluctant to invest as they have to give a higher fraction of wealth to debtholders (Chen and Manso (2010)). Also, debt overhang should be less of an issue in firms with a higher fraction of short-term debt, as in such cases the debt is more likely to be renegotiated before the investment options expire.

In Table 4.8 I show that there is no evidence in favor of an underinvestment story. In this analysis I use interaction terms rather than splitting the sample because such split is equivalent to a time-based split for the recession indicator and few firms using the bond market appear in

Table 4.8
Underinvestment Analysis

This table presents the analysis of capital expenditures and corporate takeovers for the overall sample. The sample includes all Compustat firm-year observations of US-incorporated public firms between 1986 and 2008 with total assets and sales above 1 million dollars. Utilities (SIC codes between 4900 and 4999) and financials (SIC codes between 6000 and 6800) are excluded. Access Dummy takes value one for observations for which there is both a Standard and Poor's long-term issuer credit rating in Compustat and a bond outstanding in Mergent FISD in the last month of the fiscal year. Recession Indicator is a dummy variable taking value one in a given year if more than three months were considered as part of a recessionary period by the National Bureau of Economic Research (NBER). ST Debt equals the fraction of debt maturing in three or less years over the total debt outstanding of the firm (Barclay and Smith (1995)). Firms in which ST Debt is above one are excluded from Model (3) and (4). All other variables are defined in the Appendix. The NYSE dummy is included but equals zero in all the models. All independent variables are lagged one year in relation to the dependent variable. All models are estimated using firm fixed effects and include a dummy per interaction of Fama and French (1997) industry and year. T-stats are in parenthesis and are based on robust standard errors clustered at the firm level. *, **, and *** represent significance at the 90%, 95%, and 99% confidence level.

	(1)	(2)	(3)	(4)
	Capex/TA$_t$	Acqs/TA$_t$	Capex/TA$_t$	Acqs/TA$_t$
Access Dummy$_{t\text{-}1}$	-0.007***	-0.013***	-0.003	-0.015***
	(-3.620)	(-4.145)	(-1.290)	(-4.130)
Access Dummy$_{t\text{-}1}$ *	0.009***	-0.003		
Recession Indicator$_t$	(4.873)	(-0.958)		
Access Dummy$_{t\text{-}1}$ *			-0.009**	0.009
ST Debt$_{t\text{-}1}$			(-2.196)	(1.307)
Total Assets$_{t\text{-}1}$	-0.017***	-0.017***	-0.016***	-0.020***
	(-20.013)	(-14.415)	(-15.210)	(-13.586)
Market to Book	0.007***	0.000	0.007***	0.000
Ratio$_{t\text{-}1}$	(18.160)	(1.059)	(12.451)	(0.612)
Cash Flow$_{t\text{-}1}$	0.012***	0.003	0.016***	0.004
	(5.807)	(1.394)	(5.265)	(1.092)
Market Leverage$_{t\text{-}1}$	-0.078***	-0.106***	-0.085***	-0.111***
	(-26.001)	(-25.224)	(-23.265)	(-21.596)
Firm Age$_{t\text{-}1}$	-0.009***	-0.000	-0.012***	-0.000
	(-4.458)	(-0.095)	(-5.131)	(-0.083)
Modified Altman	0.001***	0.002***	0.001***	0.002***
Z- score$_{t\text{-}1}$	(5.306)	(5.826)	(3.549)	(4.426)
S&P 500$_{t\text{-}1}$	-0.003	0.011***	-0.005*	0.010*
	(-1.374)	(2.582)	(-1.852)	(1.935)
Recession Indicator$_t$	-0.034	-0.060**		
	(-0.714)	(-2.476)		
ST Debt$_{t\text{-}1}$			-0.002	-0.002
			(-1.123)	(-1.067)
Observations	84,556	82,374	58,724	57,238
Adjusted R-Squared	0.169	0.049	0.175	0.057

the bottom tercile of short-term debt usage. Nevertheless, conclusions do not depend on which method is used. The impact of economic conditions on the effect of bond market access on corporate investment level is not consistent across Model (1) and Model (2) of Table 4.8, taking the wrong sign in the regression on capital expenditures. The coefficient on the Access Dummy variable remains significantly negative. The proportion of short-term debt only significantly impacts the effect of accessing the bond market in the capital expenditures regression (Model (3)), but it has the opposite sign to what would be expected if the cause of the reduction in investment would be debt overhang. A higher fraction of short-term debt should alleviate the underinvestment problem, but in Model (3) its coefficient suggests that it aggravates the negative relation between public debt market access and capital expenditures. This result is however consistent with my interpretation that firms adjust their actions because they want to return to the debt market on more favourable conditions: firms with a higher fraction of short-term debt are more likely to tap the bond market sooner and thus reduce their investment level more dramatically. I do not find any effect of the proportion of short-term debt on takeovers. Overall the evidence suggests that the reduction in firm investment that I report cannot be explained by debt overhang.[18]

4.7 Robustness Checks

In order to ensure that the results reported before are robust to different specifications, I run further tests on the relation between the level of firm investment and its decision to access the bond market. I start by including a lagged term of the dependent variable to capture its persistence. I also combine the capital expenditures and acquisitions in one variable (Total Investment) and use it as the dependent variable. Results are reported in the Internet Appendix in Tables A.4 and A.5, respectively. These are consistent with the results reported before. Further, in order to ensure that the results are not driven by changes in the scaling variable, I test the robustness of previous analyses to the inclusion of the inverse of lagged total assets as an explanatory variable (unreported). Results are very similar.

To further mitigate concerns with reverse causality, I rerun the main analyses using a first differences approach. Results are similar to the ones reported for the fixed effects estimation, albeit slightly weaker in statistical terms, suggesting that the change in level of investment

[18] In Table A.3 in the Internet Appendix I show that similar results are obtained when using the instrumental variables model.

occurs mostly immediately upon access the bond market and is not just a difference in the level of investment that arises over time. This finding mitigates endogeneity concerns, as it is unlikely that an omitted factor could explain such large change in investment from one year to another.[19] Moreover, I re-run all the main analyses including a variable capturing the level of corporate acquisitions of the firm in the previous three years or its average over the whole sample period (unreported). Results remain qualitatively similar. This test is important because of the spike in acquisitions around the year in which a firm first accesses the bond market shown in Figure 4.1. The fact that all the results are unaltered by controlling for the magnitude of previous acquisitions or for the level of total acquisitions shows that the reduction in investment level that I report is not driven by the integration of merging firms. I also test for the possibility that firms are raising large amounts of debt when they first access the bond market but only slowly invest due to the lack of growth opportunities, and somehow that effect is not well controlled for in my regressions. However, such explanation does not seem to drive the results. Including controls for the level of cash or for changes in assets in the regressions does not materially affect any results. Furthermore, in Figure 4.1 I show that, inconsistent with such explanation, the level of investment after accessing the bond market does not reverse to its pre-access level over time.

Further, I study the role of accessing the public debt market on the sensitivity of the level of investment to investment opportunities, instead of its direct impact on the level of investment.[20] I follow Asker et al. (2011) and do that both by interacting the Access Dummy with a variable capturing investment opportunities and by replacing the instrument for accessing the bond market (the probability obtained from Model (3) in Table 4.2) with an interaction term between the instrument and a variable capturing investment opportunities. I use the lagged market to book ratio as a measure of investment opportunities. The results are in Models (1) and (2) of Table 4.9. In both specifications I find strong empirical evidence that accessing the bond market has a negative effect on the sensitivity of the firm's investment level to growth opportunities. This result is particularly important to dispel any concerns that the instrument I use is simply capturing a relation between industry characteristics and investment. If that would be the case, there would be no effect of the variable measuring the access the bond market on the sensitivity of firm investment to investment opportunities, as the latter already takes into account the industry the firm belongs to.

[19] I thank Michael Faulkender for suggesting this test.

[20] Making such analysis for the cash-financed takeovers is not suitable, as firms engage in takeovers both as a result of investment opportunities and as a result of the lack of it (Mitchell and Mulherin (1996)).

Table 4.9
Robustness Checks

This table presents robustness checks for the overall sample. The sample includes all Compustat firm-year observations of US-incorporated public firms between 1986 and 2008 with total assets and sales above 1 million dollars. Utilities (SIC codes between 4900 and 4999) and financials (SIC codes between 6000 and 6800) are excluded. Access Dummy takes value one for observations for which there is both a Standard and Poor's long-term issuer credit rating in Compustat and a bond outstanding in Mergent FISD in the last month of the fiscal year. All other variables are defined in the Appendix. All independent variables are lagged one year in relation to the dependent variable. Model (1) is estimated using firm fixed effects. Model (2) is the second stage of an instrumental variables estimation in which the first stage includes the same independent variables plus the fitted probability given by Model (3) in Table 4.2 as an instrument. Model (1) includes a dummy per interaction of Fama and French (1997) industry and year. Model (2) includes Fama and French (1997) industry and year fixed effects separately. The constant term is included but not reported. T-stats are in parenthesis and are based on robust standard errors clustered at the firm level. *, **, and *** represent significance at the 90%, 95%, and 99% confidence level.

	(1)	(2)
	Capex/TA$_t$	Capex/TA$_t$
	Firm Fixed Effects	Instrumental Variables
Access Dummy$_{t\text{-}1}$	-0.003***	-0.006***
$*$ MTB$_{t\text{-}1}$	(-3.570)	(-2.984)
Total Assets$_{t\text{-}1}$	-0.017***	0.001***
	(-20.180)	(2.781)
Market to Book	0.007***	0.008***
Ratio$_{t\text{-}1}$	(18.202)	(19.840)
Cash Flow$_{t\text{-}1}$	0.012***	0.044***
	(5.804)	(16.582)
Market Leverage$_{t\text{-}1}$	-0.079***	-0.046***
	(-26.101)	(-18.354)
Firm Age$_{t\text{-}1}$	-0.009***	-0.012***
	(-4.460)	(-13.911)
Modified Altman	0.001***	-0.001***
Z- score$_{t\text{-}1}$	(2.154)	(-3.214)
S&P 500$_{t\text{-}1}$	-0.003	-0.004
	(-1.268)	(-1.519)
NYSE listed$_{t\text{-}1}$		0.008***
		(4.417)
Observations	84,556	84,556
Adjusted R-Squared	0.169	0.231

Finally, I analyze the changes in cash holdings of firms once they start accessing the bond market. Since firms accessing the public debt market increase their leverage (Faulkender and Petersen (2006)) but reduce the level of investment (Tables 4.2 and 4.3), it is likely that they increase their cash holdings. I formally test whether that is the case by running a panel analysis similar to the one in Tables 4.2 and 4.4, with cash and equivalents over lagged total assets as the dependent variable. As expected, accessing the public debt market is associated with a significant increase in cash holdings (Table A.6 in the Internet Appendix). The higher level of cash holdings is consistent with the view that firms are adjusting their actions taking into account bondholders' preferences, as it gives a greater assurance of repayment of the debt.

4.8 Conclusion

Overall my findings are consistent with the hypothesis that firms accessing the public bond market take into account the need to satisfy uninformed debtholders and, as a result, reduce their levels of capital investment and corporate acquisitions. The mechanisms used to reduce agency costs of debt in bank lending, such as monitoring, are weaker in the public debt market. Instead, a firm can build its reputation and benefit in future interactions with debtholders by reducing the possibilities for risk shifting. Additional support for this interpretation is given by the finding that the effect of accessing the bond market on investment level is significantly stronger for firms closer to financial distress, which are more likely to suffer from debtholder/equityholder conflicts. In addition, firms tapping the public debt market are less likely to violate debt covenants violation and reduce their payouts to equityholders, consistent with the hypothesis that firms accessing the bond market want to reduce debtholders' concerns with wealth transfers to equityholders.

Appendix	# indicates a Compustat data item. All continuous variables are winsorized at the 1% and the 99% level.
Acqs/TA	Equals the ratio of cash invested in acquisitions in a given year (#AQC) to the firm's total assets in the prior year (#AT).
Bidder CAR	Bidder cumulative abnormal return in the window [-2; +2] relative to the announcement date of the deal (obtained from SDC), using the market model and CRSP data. The estimation period ends in days -46, runs for a period of 100 to 200 trading days and uses the CRSP value-weighted index as the market index.
Capex/TA	Capital expenditures (#CAPX) over lagged total assets (#AT).
Cash Flow	Following Sufi (2009). Net income before extraordinary items (#IB) plus depreciation and amortization expenses (#DPC), over total assets (#AT).
Firm Age	Number of years since IPO (current year minus year of #IPODATE). In regression analysis the natural logarithm of this variable plus one is used (Datta et al. (2000)).
Hostile/Unsolicited	Dummy taking value one if the deal is flagged as hostile or unsolicited by SDC, zero otherwise.
Market Leverage	Book value of debt over market value of assets, following Fama and French (2002). Book value of debt equals total liabilities (#LT). Market value of assets is given by liabilities (#LT) minus balance sheet deferred taxes and investment tax credit (#TXDITC) plus preferred stock (#PSTKL if available, else #PSTKRV) plus market equity (#CSHO times #PRCC_F).
Market to Book Ratio	Market value of assets divided by the book value of assets following Fama and French (2002). Market value of assets is given by liabilities (#LT) minus balance sheet deferred taxes and investment tax credit (#TXDITC) plus preferred stock (#PSTKL if available, else #PSTKRV) plus market equity (#CSHO times #PRCC_F).
Modified Altman Z-score	Following MacKie-Mason (1990). Equals 3.3 times earnings before interest and taxes (#EBIT), plus sales (#SALE), plus 1.4 times retained earnings (#RE), plus 1.2 times working capital (#WCAP), all scaled by total assets (#AT).
NYSE listed	Dummy taking value one if the firm is listed on New York Stock Exchange (Stock Exchange Code = 11 in Compustat), zero otherwise.

(Continued on the next page)

Payouts/TA	Equals the sum of total dividend payments (#DVT) and share repurchases, scaled by lagged total assets (#AT). I follow the method suggested by Banyi et al. (2008) and compute share repurchases as the Compustat item of purchase of common and preferred stock (#PRSTKC) minus any negative change relative to the previous year in the value of the preferred stock outstanding (#PSTK).
Percentage of Cash	Percentage of cash used to finance the deal as reported by SDC.
Percentage Access	Based on Faulkender and Petersen (2006). Ratio of companies with a credit rating and a bond outstanding on Mergent FISD to the total number of companies in the firm's Fama and French (1997) industry in a given year. In regression analysis I use the natural logarithm of one plus this variable.
Relative Size	Ratio of the deal value given by SDC to the bidder total assets (#AT).
S&P 500	Dummy taking value one if the firm belongs to the S&P 500 at the end of the financial year (obtained from the Index Constituents database from Compustat), zero otherwise.
Target Public	Dummy taking value one if the target firm is flagged as publicly listed on SDC, zero otherwise.
Tender Offer	Dummy taking value one if the deal is flagged as a tender offer by SDC, zero otherwise.
Total Assets	Total assets of the firm as reported in Compustat (#AT). When used in a regression I take the natural logarithm of this variable.

Chapter 5

Summary and Conclusion

Often firms do not have the internal resources necessary to pursue all profitable investment opportunities at their disposal. One of the most important roles of financial markets is to allocate unused resources from other economic agents to the firms that will better employ them, thereby enabling productive investment to take place. If markets were frictionless, resources would be assigned to all investment projects with a positive net present value, and no value-destroying investment would be pursued. However, there are informational and incentive problems in financial markets that result in agency costs that may hinder the efficient allocation of capital across the economy and, as a result, impact economic growth. These problems stem from the separation of ownership and control, which typically provides the party in control with superior information relative to the parties that have the ownership rights (information asymmetry), but that also reduces the incentives of the former to act in the interest of the latter (moral hazard). It is therefore of paramount importance to understand financing frictions as well as the mechanisms that can be used to reduce their impact. Mitigating the impact of these frictions allows for a better allocation of capital and can ultimately lead to higher economic growth.

In chapter 2 of this thesis we study a mechanism that can be used to reduce the imbalance of the information held by the managers of a publicly listed firm and its owners: the voluntary disclosure of inside information. More specifically, we examine why managers choose to disclose their synergy estimates when announcing a merger or acquisition. Through the hand-collection of data from press releases and other sources, we report that over 17% of the acquisition announcements of publicly listed targets in the United States between 1995 and 2008 involved some sort of quantified disclosure of the expected synergies. We then use this

data to test several predictions derived from the academic literature. Consistent with Verrecchia (1990), we find that managers are more likely to disclose synergies when they have more accurate information on the potential value-creation of the merger. More specifically, disclosure is more likely to occur when the merging firms operate in the same industry, if there have been more takeovers in the target's industry recently, when the bidder has access to the target's books (non-hostile deal), and when there is less information asymmetry about the target's value. If managers possess more reliable information the market will exert more pressure for its disclosure, and the litigation risk will be lower. We also find that disclosure of synergy estimates is more likely when the acquisition is financed with equity, suggesting that managers use disclosure to mitigate moral hazard concerns from investors. Consistent with this hypothesis, we find that bidder announcement returns are significantly higher when managers announce synergies. Furthermore, supporting the notion that the synergies disclosed are taking into account by shareholders, we find that announcement returns are increasing on the fraction of synergies that is expected to accrue to the bidder. Overall, the evidence in chapter 2 highlights the importance of managerial voluntary disclosure in reducing information asymmetries. The richness of the data on synergy disclosures can be helpful for future research to answer questions regarding other aspects of voluntary disclosure. For example, despite theoretical work on the link between voluntary disclosure and proprietary costs (e.g., Dye (1986)), a better understanding of this connection can be achieved by examining how managers adjust their synergy estimates depending on the degree of competition in their industry. In addition, the use of disclosure as a negotiation tool can be investigated through a close analysis of voluntary disclosure in hostile offers or in contested acquisitions.

In chapter 3 we again take advantage of the availability of data on takeover announcements and study the importance of incentives in the relation between institutional ownership and firm value. Takeovers are events characterized by a large information asymmetry between managers and shareholders, and are often seen as an example of moral hazard (Morck et al. (1990)). As such, they are an appropriate testing ground for the effectiveness of mechanisms to mitigate agency costs. We analyze the effect of stock liquidity as an incentive for institutional monitoring by examining the relation between the stock liquidity of the bidder and the market reaction to the merger's announcement. Using a sample of acquisitions made by U.S.-based firms and announced between 1998 and 2008, we find that the stock liquidity of the acquiring firm is negatively associated with announcement returns, especially in instances in which information collection by institutional shareholders is more likely to occur. This finding is consistent with the hypothesis put forward by Bhide (1993) that in firms with a higher stock

liquidity institutions are less likely to engage in monitoring, as it is easier for them to exit their position whenever confronted with negative news. Further support for this hypothesis is given by a cross-sectional analysis of the relation between bidder stock liquidity and announcement returns. We find that the negative relation between the two is more pronounced for bidders with potentially higher agency costs, when institutional monitoring becomes more valuable. In addition, we report that firms with lower stock liquidity are more likely to withdraw deals that are poorly received by the market, experience higher CEO turnover following a value-destroying deal, and have better post-merger operational performance. These results again suggest that institutions are more active in firms with low stock liquidity. This chapter adds to our understanding of one of the most important mechanisms to reduce agency costs in publicly listed firms: monitoring by large shareholders. We contribute to the literature on institutional ownership and firm value by showing that monitoring incentives and firm characteristics have to be taken into account when trying to establish a link between institutional ownership and firm value.

The last essay in this dissertation, chapter 4, takes a different perspective on agency costs. Rather than studying the mechanisms that are used ex-ante to mitigate such costs, I examine how firms adjust their decisions when they experience a change in the agency costs of obtaining outside financing. For this purpose I study the relation between accessing the public debt market and corporate investment. Using a panel of U.S. firms between 1985 and 2008, I find that firms that tap the bond market significantly reduce their level of investment in capital and in corporate takeovers, especially when they have a higher credit risk. These results are consistent with the hypothesis that firms adjust their investment decisions in order to encourage the less-informed investors in public markets to hold their debt on more favourable terms. This change in firm behaviour might be necessary because other mechanisms to reduce agency costs of debt, such as monitoring, become weaker when switching from borrowing from financial intermediaries to borrowing from financial markets (Chava and Roberts (2008); Diamond (1991)). Further evidence of the intent to reduce agency costs of debt is given by an analysis of other changes in firms' actions. I find that firms using the bond market become less likely to violate debt covenants, reduce the level of payouts to equityholders, and increase cash holdings. Overall, chapter 4 shows that the link between accessing new sources of financing and corporate investment is more complex than previously thought, and is heavily influenced by how information-sensitive the financing is. It is therefore of interest for future research to establish why and when firms start accessing financing from different sources.

In summary, this thesis presents evidence that frictions in the access to external finance, in

the form of information asymmetries and agency costs, have a real effect on firm investment. It also shows that some mechanisms, such as voluntary disclosure of information and monitoring by institutional shareholders, are effective in reducing the impact of agency costs on firm value. A deeper understanding of the problems raised by accessing external finance and of their potential solutions is central to the debate on how to design policies that are effective in addressing the difficulties experienced by firms in accessing financing for investment and innovation.

Nederlandse samenvatting (Summary in Dutch)

Bedrijven hebben vaak niet de interne middelen om alle rendabele investeringsmogelijkheden na te streven. Een van de belangrijkste rollen van de financiële markten is om een brug te vormen tussen investeringsmogelijkheden en kapitaal, waardoor productieve investeringen kunnen plaatsvinden. Als kapitaal markten perfect zouden functioneren, dan zou kapitaal worden toegekend aan alle investeringsprojecten met een positieve netto contante waarde, en zouden er geen waarde-vernietigende investering worden uitgevoerd. Echter, er zijn problemen omtrent de informatie voorziening en belangen binnen de financiële markten die leiden tot zogenoemde ägency"kosten die de efficiënte allocatie van kapitaal in de economie kunnen belemmeren en daarmee consequenties hebben voor economische groei.Deze problemen komen voort uit de scheiding van eigendom en zeggenschap, waarbij doorgaans de leidende partij met zeggenschap over betere informatie beschikt ten opzichte van de partijen die de eigendomsrechten bezitten(informatie-asymmetrie). Dit vermindert ook de stimulansvoor de leidinggevende om te handelen in het belang van de eigenaren (moral hazard). Het is daarom van het grootste belang om financieringsfricties en de manieren om de impact op de financiering van bedrijven te verminderente begrijpen. Het verminderen of verzachten van de gevolgen van financiering fricties zorgt voor een betere allocatie van kapitaal en kan uiteindelijk leiden tot economische groei. In hoofdstuk1 van dit proefschriftbestuderen we of het vrijwilligopenbaar maken van informatie, de onevenwichtigheid tussen demanagers, het dagelijks bestuur van eenbeursgenoteerdeonderneming, en haareigenarenkan beperken. We onderzoeken specifiek waarom managerservoor kiezen omde geschatte synergie waarde bijde aankondiging van eenfusie of overname openbaar te maken.We vindendat de kans op het openbaar maken van de informatie toeneemt naarmate managersover meerbetrouwbare informatie beschikken en naar matehet risico op een geschil lager is. We vinden ookdat de onthullingwaarschijnlijker wordt wanneerde overname wordtgefinancierd met eigen vermogen, wat suggereert dat

managersopenbaarmaking van informatiegebruiken om "moral hazard"problemente verminderen. In overeenstemming metdeze hypothese, vinden wij dat de aandelenkoersen van biedende ondernemingen profiteren van deaankondiging vansynergiën. In hoofdstuk2 maken we weergebruik van debeschikbaarheid van gegevensbetreffende de openbareaankondigingen van overnames en bestuderenwe het belang vanstimuli opde relatietussen institutionelebeleggers endewaarde van een onderneming. Overnameszijn gebeurtenissengekenmerkt door een groteinformatie-asymmetrie tussenmanagers enaandeelhouders,en worden vaakgezien als eenvoorbeeld vanmoral hazard. Als zodanigzijn overnamesgeschikt om de effectiviteitvan mechanismen omägency kosten"te beperken te bepalen.We vinden dat de aankondiging van een overname deliquiditeit van het aandeelvande overnemende ondernemingnegatiefbeïnvloedt, vooral in gevallen waarinde institutionelecontrole waarschijnlijker is. Deze bevindingis in overeenstemmingmet de hypothese datin aandelenmet een hogereliquiditeit,institutionele beleggersminder geneigd zijnom deel te nemenin het toezicht, omdat het voor hen gemakkelijkeris om hun positiete verkopenwanneerze geconfronteerd worden metnegatief nieuws. Daarnaastvinden wedat de kans dat managerseen acquisitie afblazen stijgt naarmate de liquiditeit van het aandeel vande overnemende partij laag is en de acquisitie slechtwordt ontvangendoor de markt.Dit resultaatsuggereert dat institutionele beleggersmanagersonder druk zetten in plaats vanhet verkopen vanhunaandeel in deonderneming. In de laatstestudiein dit proefschrift, hoofdstuk 3, neem ik eenandere kijk opagency kosten.In plaats vanhet bestuderen van demechanismen dieex-ante worden gebruikt omdeze kostente beperken,onderzoek ik hoebedrijvenhun beslissingenaan passen wanneerereen verandering plaats vindt indeagency kostenvoor het verkrijgen vanexternefinanciering.Ik vind dat bedrijven diegebruik maken van deobligatiemarkt, investeringen in kapitaal enin bedrijfsovernamesaanzienlijk verminderen, vooral als de ondernemingeen hoger kredietrisicoheeft.Deze resultaten zijn in lijnmet de hypothesedat bedrijvenhun investeringsbeslissingenaanpassen aande mindergeïnformeerdebeleggers om zeaan te moedigen omde schulden van de onderneming aante houdentegen gunstige voorwaarden. Bovendien blijktde intentie omagency kostenvan deschuld te verlagen uit de bevindingen dat bedrijvendie gebruik maken vanobligatiemarktminder geneigd zijn omconvenantente schenden,het niveau van deuitkeringenaan de aandeelhouderste verminderen enkasmiddelente verhogen.

Kortom, dit proefschrift toont dat fricties in de toegang tot externe financiering, in de vorm van informatie-asymmetrie en agency kosten, een reëel effect hebbenop bedrijfsinvestering. Het laat ook zien dat sommige mechanismen, zoals het vrijwillig openbaar maken van informatie en controle door institutionele aandeelhouders, effectief zijn in het verminderen

van de impact van agency kosten op de waarde van de onderneming. Eenbeter begrip van de problemenbetreffende de toegang tot externe financiering en de mogelijke oplossingen staan centraal in het debat over de wijze waarop hetfinancierings-eninvesteringsbeleidmoet worden aangestuurd. Door middel van financiering voor investeringen en innovatie kan uiteindelijk economische groei tot stand komen.

Resumo em Português (Summary in Portuguese)

Frequentemente, as empresas não dispõem dos recursos internos necessários para financiar todas as oportunidades de investimento que têm à sua disposição. Uma das funções mais importantes dos mercados financeiros é alocar recursos, que não são utilizados por outros agentes económicos, às empresas que melhor uso lhe poderão dar, possibilitando investimento produtivo. Se os mercados funcionassem sem fricções, os recursos seriam disponibilizados para todos os projectos de investimento que tivessem um valor actual líquido positivo, e não seria financiado qualquer projecto que destruísse valor. Contudo, existem problemas de informação e de incentivos nos mercados financeiros que podem restringir a capacidade de os mesmos alocarem capital de uma maneira eficiente, afectando, como consequência, o crescimento económico. Estes problemas têm a sua origem na separação entre a propriedade e o controlo na empresa, o que frequentemente proporciona, à parte em controlo, um nível de informação superior ao da parte que é proprietária, mas que também reduz os incentivos de quem exerce o controlo para agir no melhor interesse do proprietário. É portanto de extrema importância perceber as fricções que existem nos mercados financeiros e os mecanismos que podem ser utilizados para reduzir o impactos das mesmas no que respeita ao financiamento das empresas. A redução do impacto destas fricções permite uma melhor alocação de capital e poderá resultar num crescimento económico mais elevado.

No primeiro capítulo desta tese estudamos um mecanismo que pode ser usado para reduzir o desequilíbrio na informação possuída pelo gestor de uma empresa cotada em bolsa em relação aos accionistas: a revelação voluntária de informação privilegiada. Mais concretamente, examinamos as razões que levam os gestores a revelar estimativas de sinergias quando anunciam uma fusão ou aquisição. Mostramos que os gestores têm uma maior propensão para revelar estas estimativas quando possuem informação mais fidedigna e quando o risco de litigação é mais baixo. Também reportamos que a revelação é mais comum quando a aquisição é

financiada com capitais próprios, o que sugere que os gestores usam a revelação de informação para reduzir os receios de risco moral da parte dos investidores. Esta hipótese apoia-se no facto de o preço das acções do adquirente beneficiar do anúncio das sinergias.

No segundo capítulo tiramos uma vez mais partido da disponibilidade de informação relativa aos anúncios de aquisições de empresas e estudamos a importância de incentivos na relação entre participações institucionais e o valor da empresa. Aquisições de empresas são eventos caracterizados por uma grande assimetria de informação entre os gestores e os accionistas, e são frequentemente vistas como um exemplo de risco moral. Assim sendo, são um cenário adequado para testar a eficácia de mecanismos que diminuem os custos de agência. Mostramos que a liquidez das acções da empresa adquirente tem uma relação negativa com os retornos originados com o anúncio da aquisição, especialmente nos casos em que é mais provável que instituições que possuem acções da empresa invistam na obtenção de informação privada. Este resultado é consistente com a hipótese de que, em empresas com maior liquidez das acções, a probabilidade que instituições supervisionem os gestores é inferior, pois é mais fácil para estas instituições vender a sua posição accionista quando confrontadas com notícias negativas sobre a empresa. Além disso, a probabilidade de uma aquisição ser cancelada pelos gestores ou de o CEO ser substituído é mais alta quando a aquisição foi mal recebida pelo mercado, mas só nas empresas que têm acções menos líquidas; isto é consistente com, neste tipo de empresas, as instituições pressionarem os gestores em vez de venderem as suas posições. Finalmente, observamos que, após a fusão, a mudança na performance operacional das empresas com acções menos líquidas apresenta uma melhoria em relação à mudança na performance operacional das empresas com acções mais líquidas.

O último artigo desta tese, capítulo 3, parte de uma perspectiva diferente em relação aos custos de agência. Em vez de estudar os mecanismos que são usados ex-ante para diminuir estes custos, analiso como as empresas ajustam as suas decisões quando são sujeitas a uma alteração nos custos de agência relacionados com a obtenção de financiamento externo. Recorrendo a um painel de empresas dos Estados Unidos, verifico que as empresas que usam o mercado obrigacionista reduzem significativamente o seu nível de investimento em despesas de capital e em aquisicões de empresas, especialmente quando têm um risco de crédito mais elevado. Estes resultados são consistentes com a hipótese de que as empresas ajustam as suas decisões de investimento de maneira a incentivar os investidores nos mercados públicos, que estão menos bem informados, a comprar as suas obrigações em termos mais favoráveis. Como evidência adicional da intenção de reduzir os custos de agência da dívida, as empresas que utilizam o mercado obrigacionista tornam-se mais cumpridoras das convenantes da

dívida, reduzem o nível de pagamentos aos accionistas, e aumentam as reservas de numerário.

Em resumo, esta tese apresenta evidência de que as fricções no acesso a financiamento externo, sob a forma de assimetria de informação e de custos de agência, têm um impacto real no investimento das empresas. Também mostra que alguns mecanismos, tais como a revelação voluntária de informação ou a supervisão por parte de instituições, são efectivos na redução do impacto dos custos de agência no valor das empresas. Um conhecimento mais profundo dos problemas que surgem com o recurso a financiamento externo e das suas potenciais soluções é vital para o debate relativo ao desenho de políticas que são eficazes na redução das dificuldades experienciadas por empresas no acesso a financiamento para investimento e inovação, que são, em última análise, os impulsionadores do crescimento económico.

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Biography

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AGENCY COSTS, FIRM VALUE, AND CORPORATE INVESTMENT

Often firms lack the necessary internal resources to pursue all profitable investment opportunities at their disposal. One of the most important roles of financial markets is to allocate resources from different economic agents to the firms that will better employ them, thereby enabling productive investment to take place. However, there are informational and incentive-related problems in financial markets that result in agency costs. These costs can hinder the efficient allocation of capital across the economy and, as a result, can impact economic growth. This thesis examines the mechanisms that investors and managers use to reduce the agency costs of outside financing and the impact of such costs on firms' investment decisions and value. The first chapter shows that the voluntary disclosure of information can help overcoming the informational asymmetry between managers and investors. The second chapter provides evidence that institutional ownership of firms can improve firm decisions and increase firm value when coupled with the appropriate incentives. In particular, we show that stock illiquidity is a key incentive in this setting. The last chapter examines the impact of accessing the public debt market on corporate investment. The findings support the hypothesis that firms adjust their investment decisions to offset an increase in agency costs, which in turn enables them to access outside financing on more favorable terms.

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