Large Shareholder Trading and Takeovers: The Disciplinary Role of Voting With Your Feet *

Radhakrishnan Gopalan

This Version: November 2006

*I wish to thank Sreedhar Bharath, Sugato Bhattacharyya, Amy Dittmar, Charles Hadlock, Han Kim, Marcin Kacperczyk, Vik Khanna, Vikram Nanda, M. P. Narayanan, Thomas Noe, Amiatosh Purnanandam, Uday Rajan, Amit Seru, Vijay Singal, Deon Strickland, Anjan Thakor, Sunil Wahal, seminar participants at Arizona State University, the Ross School of Business Finance Brown bag lunch, the Law & Economics Workshop at the University of Michigan Law School, Virginia Tech for useful comments, and Paul Michaud for programming assistance for accessing the CDA/Spectrum database. The author is from the Olin School of Business at Washington University. E-mail: gopalan@wustl.edu. The usual disclaimer applies. Contact Address: Olin School of Business, Campus Box No. 1133, One Brookings Drive St. Louis MO-63130, USA. Phone: 314.935.9196.

Large Shareholder Trading and Takeovers: The Disciplinary Role of Voting With Your Feet

ABSTRACT

This paper highlights the governance role of large shareholder trading and provides empirical evidence in support. Large shareholder trading can influence firm governance by affecting the probability of takeovers. Takeovers are more likely when an incumbent large shareholder sells, because selling depresses prices and increases stock liquidity. The paper highlights this mechanism in a model and analyzes a large shareholder's choice between direct intervention and selling. The model generates predictions on firm characteristics that facilitate intervention and takeovers. The paper tests the main predictions using institutional trading data on firms that undertake large acquisitions. Using acquisitions to identify firms with potential agency problems, the paper relates the largest institutional block holder's trading in the post acquisition period to firm performance and subsequent changes in firm governance. The main findings are: (i) Trading by the largest block holder predicts post acquisition performance; (ii) controlling for performance, block holder selling increases takeover probability by over 35%; (iii) small firms with more liquid stock are likely to become targets and (iv) the institution is aware of the takeover possibility and trades in response.

Large Shareholder Trading and Takeovers: The Disciplinary Role of Voting With Your Feet

1 INTRODUCTION

The growth and widespread presence of institutional shareholding has increased interest in understanding their role in monitoring firms and influencing firm decisions.[1] When institutions monitor firms and learn about declining firm prospects they can, a) take a public activist role b) privately communicate with management to affect changes or c) sell their shares. It is often highlighted that many institutional investors choose to sell their shares at the first sign of trouble; i.e., follow the "Wall Street Rule" (e.g., Coffee (1991), Bhide (1994)).[2] Despite the prevalence of institutional selling, there is limited research on whether and how, such selling impacts firm decisions. In the first study on the impact of institutional selling on firm decisions, Parrino, Sias and Starks (2003) (PSS from now) show that Board of Directors respond to institutional sale by removing CEOs.[3] This finding along with the prevalence of selling motivates the question I raise in this paper: Can and how does, institutional selling influence firm governance?[4]

In answering this question, I highlight the interaction between institutional trading and the market for corporate control. I argue that institutional trading, or in general large shareholder trading, can influence firm governance by affecting the probability of takeovers.[5] This argument is formalized in a model that analyzes a large shareholder's choice between direct intervention and selling. The tradeoff involved is as follows: Direct intervention ensures firm value improvement but entails private costs. Selling, on the other hand, may result in trading profits and through the impact on takeovers, affect the value of any retained shareholding. The model shows that the takeover probability increases when an incumbent large shareholder sells, because selling depresses the stock price and, if the shareholder unbundles the block and sells

[1]By the end of 2001 (last year of the sample), 58% of all NYSE firms had an institutional block holder with more than 5% shareholding as against 38% by the end of 1985 (first year of the sample).

[2]The prevalence of selling is reflected in the following comment by Lowenstein (1988, p. 91), "[Institutional investors] implicitly praise or criticize management, by buying or selling ... There is almost no dissent from the Wall Street Rule."

[3]See also Brancato (1997).

[4]One potential answer to this question is that, institutional selling influences governance by triggering CEO turnover (PSS). I discuss this in greater detail in Section 2.

[5]The theory is generally applicable to all large shareholders. I test the predictions using institutional trading data. Hence I use large shareholder and institution interchangeably.

in the market, decreases shareholder concentration and potentially increases stock liquidity.[6] The model also generates predictions on the firm and shareholder characteristics that induce direct intervention vis-a-vis takeovers. I test the predictions using institutional trading data.

In the theoretical analysis, I consider an incumbent large shareholder who privately learns about declining firm prospects and the possibility of profitable restructuring. Restructuring can be implemented either by the incumbent or by an external bidder. If restructuring is possible, the incumbent chooses whether or not to restructure. In the absence of a restructuring possibility or when the incumbent chooses not to restructure, he optimally trades the firm's shares. Informed trading by the incumbent is facilitated by the presence of liquidity traders and the mechanism is similar to Kyle (1985). After the first round of trading, a bidder emerges and decides whether to bid for the firm. The bidder bids only if the incumbent does not restructure and if the bidder can sufficiently improve firm value. The bidder overcomes the costs of bidding by trading with liquidity traders.

The model builds on the papers that analyze a large shareholder's direct intervention vs trading choice, (e.g. Kahn and Winton (1998), and Maug (1998)) by incorporating the possibility of takeovers. Apart from generating testable predictions on large shareholder trading and its governance role, the analysis also provides a number of new insights. First, it shows that the takeover probability may be higher when the large shareholder sells in the market as against publicly solicits a bid. This is because the pre bid stock price is lower when the large shareholder sells. This result indicates that institutions who want to trigger a change in management to improve firm value, may sometimes prefer to sell a part of their holding instead of publicly solicit a bid. Second, the model shows that the possibility of a future takeover can distort the shareholder's trading. In a bid to induce a takeover, the shareholder may even sell an undervalued stock.[7] The model also shows that the impact of stock liquidity on firm control can be ambiguous. While liquidity does enable an incumbent large shareholder to exit (as argued by Coffee (1991) and Bhide (1994)), it also facilitates aggregation and entry by a new large shareholder– the bidder (Maug (1998)).

The model generates testable predictions relating large shareholder trading to firm performance and takeovers and also characterizes firms in which the large shareholder is more likely to intervene directly and those in which he is more likely to sell and facilitate intervention through takeovers. To test these predictions, I require a sample of firms that have

[6] The assumption is that stock liquidity is a function of shareholder concentration. This assumption is also made in Holmstrom and Tirole (1993), and Bolton and vonThadden (1998).

[7] Attari, Banerjee and Noe (2005), make a related point when analyzing the impact of large shareholder trading on shareholder activism.

large outside shareholders and are likely to experience either direct intervention or takeovers. An ex post selection methodology (based on direct intervention or takeovers) suffers from the drawback that it requires a control sample and the time period to identify shareholder presence and trading is not obvious. Hence I adopt an ex ante selection criteria and identify firms that have large institutional block holders, with more than 5% holding, and engage in "large" acquisitions. I use "large" acquisitions as an *event* to identify firms with agency problems. I identify the largest institutional shareholder of the acquirer at the time of the acquisition announcement and relate the institution's trading to any subsequent changes in firm governance such as a takeover or a disciplinary CEO turnover.[8] I use disciplinary CEO turnover as a proxy for direct intervention by the institution.[9]

To clarify, there are two mergers in the sample. All sample firms under take an initial merger. This merger is used as an *event* to identify firms with agency problems. Among the firms that undertake the first merger, some firms subsequently become takeover targets. I am interested in estimating the relationship between institutional trading and the second takeover. To avoid confusion, in subsequent discussion, the announcement of the first merger is referred to as the *event*. The empirical time line is illustrated in Figure 1.

The sample offers an ideal setting for testing the predictions. First, it helps focus on a set of firms that are likely to suffer from severe agency problems and highlight the mechanisms that help solve these problems. The presence of agency problems is highlighted by the fact that more than 31% of the sample firms experience either a takeover or a disciplinary CEO turnover in a four year period.[10] Second, the initial merger increases the uncertainty about future firm performance and enhances the importance of institutional monitoring. Apart from these advantages, the manageable sample size (there are 706 observations) enables hand collection of firm level governance measures including board structure, board and CEO equity ownership from proxy statements. Furthermore, given the widespread acquisition activity and its significant impact on shareholder wealth, it is of independent interest to understand institutional response to firm acquisition decisions and relate the response to subsequent performance. To ensure that the results are not specific to the sample, I repeat the main tests on a larger sample

[8]The empirical methodology is motivated by Mitchell and Lehn (1990), who show that firms undertaking large acquisitions are likely to become good takeover targets and, Lehn and Zhao (2004) show that in some cases, the firms experience disciplinary CEO turnover. The methodology is similar to Chen, Harford and Li (2004), who study the impact of institutional block holding on firm acquisition decisions.

[9]This choice is based on some well documented cases of institutional activism – New York Times, August 8, 1993, p. 15; Pensions and Investments, February 22, 1993, p. 12

[10]The annual takeover probability of a sample firm is 4.25%, more than three times that of all public firms in the US with a 5% institutional block holder, 1.3% (See section 5.C.2.).

of firms with institutional block holders.

The first prediction relates institutional trading to future firm performance. If the institution trades on private information, the trades are likely to be positively correlated with future stock returns and firm operating performance. Consistent with this prediction, I find that a one standard deviation increase in the shareholding of the largest institutional shareholder of the acquirer in the first quarter after the *event* results in a 4.2% higher abnormal return in the subsequent one year period.[11]

The second prediction relates institutional selling to firm characteristics. When choosing between selling and direct intervention, the institution is likely to sell in firms with a higher ex ante takeover probability and where direct intervention is less attractive. The theory shows that smaller firms and firms with more liquid stock are expected to have higher takeover probability. Furthermore, a smaller institutional holding not only makes direct intervention less profitable but also facilitates selling. Consistent with this prediction, I find that the institution is likely to sell a substantial fraction of its holding in firms with more liquid stock and if the institution's holding is small. I obtain very weak evidence of greater selling in smaller firms. One possible reason for this is the strong positive relationship between firm size and stock liquidity (Roll (1984)). The evidence of greater institutional selling in more liquid stocks is in line with models of informed trading (e.g. Kyle (1985)) and with the assertion in Coffee (1991) and Bhide (1994). The results of greater selling by the institution with smaller holdings is also suggested by Kahn and Winton (1998), who show that shareholders with smaller holdings prefer speculation over direct intervention.

Consistent with the model prediction, institutional selling has a large impact on subsequent takeover probability. Specifically, I find that if the largest institution sells more than 50% of its holding in the one year following the *event*, the takeover probability in the next four years increases by 35% over that of a comparable firm. This increase is not explained by the fall in stock price or by other known determinants of takeovers. Consistent with the institution unbundling its block and selling to small investors, I find that stock sales by the largest institutional block holder are accompanied by a reduction in shareholder concentration, measured as the concentration of institutional shareholding. As predicted by the model, the reduction in concentration is greater for the firms that subsequently become targets.

Among the institutional shareholders of a firm, selling by the largest institution–as compared to selling by all other institutions– has a greater impact on takeovers. While the other

[11] I test all the predictions on the largest institutional shareholder of the acquirer at the time of the *event*. To conserve space, hereafter I refer to this shareholder as the institution.

institutions do mimic the trading behavior of the largest institution to some degree, they do not sell disproportionately in firms that subsequently become targets.

If the institution sells when takeovers are preferable to direct intervention, then in a sample of firms subject to either direct intervention or takeovers, we expect greater institutional sale prior to takeovers. I use different proxies to identify firms subject to intervention and find supportive evidence. For example, among firms subject to either a takeover or a disciplinary CEO turnover, firms in which the institution sells a substantial fraction of its holding are 25% more likely to get taken over. As predicted by the model, smaller firms and firms with more liquid stock are likely to experience a takeover in comparison to a disciplinary CEO turnover.[12]

A positive correlation between institutional stock sale and takeovers, while being consistent with the model, may not imply a causal link between sales and takeovers. Such a correlation can also result if both selling and takeovers are caused by a fall in the stock price (*price fall* hypothesis) or if takeovers are *merely* an unintended consequence of institutional sale (*unintended consequence* hypothesis). I perform tests to distinguish the theory, from these alternatives. I document a strong causal relationship between institutional trading and stock returns– trading is correlated with subsequent returns. Further, institutional selling predicts takeovers even after controlling for abnormal stock returns. These results help distinguish the theory from the *price fall* hypothesis.

To distinguish from the *unintended consequence* hypothesis, I test if the institution is aware of the takeover probability. If the institution is aware of the takeover probability, then with multiple rounds of trading, it is likely to initially sell and slow down the rate of sale when takeovers are imminent. Consistent with this prediction, I find that the institution slows down the rate of selling closer to the time of the takeover. After controlling for stock returns, quarterly changes in institutional holding is a strong predictor of a takeover. A one standard deviation increase in institutional shareholding increases the takeover probability in the next quarter by 25% over that of an otherwise comparable firm. I also find that in cases where

[12]The results can be understood by means of two examples from the sample. Nellcor Inc (Nellcor) announced a merger with Puritan-Bennett in May 1995. Fidelity was the largest shareholder in Nellcor with an holding of 12.4%. In the one year following the merger, Nellcor had an abnormal return of -33% and Fidelity sold more than 50% of its holding. In July 1997, Mallinckrodt announced an acquisition of Nellcor. The second example involves St. Jude Medical (St. Jude) which announced a merger with Ventritex in October 1996. Fidelity was again the largest shareholder in St. Jude with a holding of 11.4%. In the next one year St. Jude had an abnormal return of -42% but Fidelity increased its holding to 12.5%. In March 1999, St. Jude's CEO Ronald Matricaria was replaced by Terry Shepherd. Apart from the different response of Fidelity to these two mergers, these firms also differed in their size. Nellcor (and St. Jude) had market capitalization of $360 million ($ 1.9 billion).

the institution has shareholding in the ultimate acquirer, the institution sells less. This is also consistent with the institution being aware of the takeover possibility before the market.

While the above tests are consistent with the institution knowing about the impending takeover, they do not establish that the institution knew about the takeover possibility when it initially sold shares. To this extent, these tests do not fully distinguish my theory from the *unintended consequence* hypothesis. One argument in favor of the theory is that, given the strong positive correlation between selling and takeovers, institutional block holders may learn about the impact of their stock sale on takeovers and take it into account when they decide to sell a firm's stock.

I do a variety of robustness tests. I repeat the tests relating institutional trading to takeovers after including firm level governance variables including takeover defences, board structure, CEO and Board equity ownership as additional controls.[13] Inclusion of these variables does not change the results. To ensure that the results are generalizable, I repeat the tests on a larger sample of firms with institutional block holders and obtain consistent results.

The paper's contribution is fourfold. First, it highlights the governance role of institutional trading. Second, it provides the first empirical test of the theories explaining the "Direct Intervention vs Trading" choice (Kahn and Winton (1998) and Maug (1998)). The evidence shows that while higher liquidity does enable incumbent institutions to exit, it also facilitates new entry and takeovers. Third, the paper is the first to highlight a potential route through which internal governance mechanisms, characterized by institutional monitoring, interact with external mechanisms, characterized by takeovers.[14] Fourth, the paper documents the predictive power of institutional trading on post acquisition performance. This provides further evidence that institutions are better informed (e.g. Wermers (1999)).

The rest of the paper is organized as follows: In Section 2, I discuss the related literature. In Section 3, I formalize the intuition in a model and develop the main predictions. In Section 4 I discuss the data and the summary statistics; the empirical results are presented in Section 5. Section 6 concludes. All proofs are in *Appendix A*.

[13] These are not included in the main specifications because of data limitations explained in Section 4.

[14] Cremers and Nair (2005), document a higher stock price for firms with pension fund block holders and lower takeover defences and from this conclude that internal and external mechanisms are complements

2 Related Literature

In this section I discuss the related literature. The papers are grouped into the ones on large shareholders, the ones on takeovers and the ones on interaction of the two governance mechanisms. In each group the discussion is confined to the immediately relevant papers.

Among papers analyzing a large shareholder's choice between direct intervention and selling, Kahn and Winton (1998) show that the choice depends on the level of the stock price and the large shareholder's holding while Maug (1998) argues that stock liquidity may encourage intervention, especially when shareholders acquire their holding from the market. As highlighted earlier, my paper extends the framework of these papers by including takeovers and analyzing the impact of trading on takeovers.[15] Closer to my analysis is that of Attari, Banerjee and Noe (2005), who theoretically analyze the role of passive institutional trading on shareholder activism. In comparison, I consider an activist large shareholder's choice between intervention and trading, when trading impacts takeovers. Hence, unlike Attari, Banerjee and Noe, my paper characterizes firms in which direct intervention is more likely and those in which takeovers are more likely. In the process, I also clarify the impact of stock liquidity on firm control. The modelling assumptions are also significantly different between the two papers.[16]

Institutions can influence firm decisions by either taking a public activist role or by privately communicating with management. Both these routes have been extensively studied. Papers studying public institutional activism report little or no market reaction to the announcement of activism. In a comprehensive study on proxy proposals, Gillian and Starks (2000) find little evidence of any change in shareholder wealth for firms publicly targeted by pension funds.[17] A number of papers document correlation between institutional presence and specific firm decisions. They offer this as evidence of institutional influence in firm decisions. For example, Denis, Denis and Sarin (1997), document greater CEO turnover following poor performance, Qui (2004) documents lower merger activity, Chen, Harford and Li (2004) show better quality mergers, in firms with institutional block holders. Hartzell and Starks (2003),

[15] Bolton and vonThadden (1998) study an initial entrepreneur's choice between dispersed ownership and outside intervention through takeovers and concentrated ownership and monitoring.

[16] Other papers analyzing impact of liquidity on control include Yung (2005) who shows that stock liquidity does not impact the average level of shareholder intervention. In analyzing the role of risk arbitrageurs in takeovers, Cornelli and Li (2002) show that liquidity facilitates participation of risk arbitrageurs and hence takeovers.

[17] Other papers looking at a subset of institutional activism report a mixed picture. While Smith (1996), and Strickland, Wiles, and Zenner (1996), report a positive market reaction for firms targeted by institutional investors that negotiated settlements, Wahal (1996), Del Guercio, and Hawkins (1999) find little evidence of change in shareholder wealth.

demonstrate that institutional presence improves the incentive structure of executive compensation.[18] Following Denis, Denis and Sarin (1997), I use disciplinary CEO turnover as a proxy for direct institutional intervention.

There is a growing body of research that studies the causes and consequence of institutional trading. Wermers (1999) and Sias, Starks and Titman (2001), show that institutional trade impacts prices and the impact is due to information revealed by the trade.[19] In a study of 101 Nasdaq stocks, Griffin, Harris and Topaloglu (2003) show that at daily frequencies, institutions follow a momentum strategy and that such trading is responsible for the contemporaneous correlation between institutional trading and stock returns. To control for their finding, while testing if institutional trading is informed, I measure the correlation between trading and *subsequent* returns. Nagle (2005) studies the impact of changes in firm characteristics, "Styles" on institutional trading. I use changes in firm characteristics as additional controls in the regressions.[20] In a detailed study on institutional trading, Parrino, Sias and Starks (2003) identify variables that predict institutional stock sale and show that institutional sale precedes disciplinary CEO turnover. In comparison, I show that institutional stock sale precedes takeovers. One way to understand the findings of the two papers is to say that institutions do not sell with an intention to influence governance, and that takeovers and CEO turnovers are *merely* two unintended consequences of institutional sale. Alternately, if the institution sold with an intention of influencing governance, then takeovers are more likely to be the intended consequence, because the institution can effect a CEO turnover simply by threatening to sell. Under this interpretation, PSS's findings may indicate Board of Directors preempting takeovers, which can be personally costly, by removing the CEO.

The role of takeovers in overcoming agency problems was highlighted during the hostile takeover period of late 1980s. With the subsequent reduction in number of hostile takeovers, there is some debate in the literature on the role of friendly mergers in overcoming agency conflicts. On the one hand, Morck, Shleifer and Vishny (1988, 1989), argue that synergy gains are the source of surplus in friendly takeovers, while on the other, Schwert (2000) finds that targets of hostile takeovers are indistinguishable from those of friendly takeovers and Hartzell,

[18]Authors have also shown institutional influence on firm anti-takeover amendments and R&D investment decisions (Brickley, Lease and Smith (1988), Bushee (1998), and Wahal and McConnell (2000)).

[19]Nofsinger and Sias (1999) show that the correlation between stock returns and institutional trade is due to a causal relationship between the trades and the returns. Lang and McNichols (1997) show that changes in institutional holdings are positively related to earnings performance.

[20]Another recent paper on institutional trading is Campbell, Ramadorai and Vuolteenaho (2005), which proposes a methodology to identify institutional trades from the TAQ database of NYSE and shows that institutional trades are typically very large or very small.

Ofek and Yermack (2004) show that in about 50% of friendly mergers, the target CEO does not remain with the combined firm. My model is agnostic about the source of gains for the target shareholders and the arguments work equally well if the source is synergy benefits.

One of the early papers to study the interaction of governance mechanisms is Shleifer and Vishny (1986), who highlight the role of large block holders in overcoming free rider problems and facilitating takeovers. Shivdasani (1993) provides empirical support from the hostile takeover period of 1980s. While I also argue that large shareholders facilitate takeovers, I explicitly identify the mechanism at work. Hirshleifer and Thakor (1998) study the interaction of governance by the Board of Directors and takeovers. They relate the choice of governance mechanism to career concerns of the Board and the power of the CEO.

I now present the basic model and derive the main predictions.

3 MODEL & PREDICTIONS

3.A MODEL OUTLINE

This subsection describes the key features of the model, that is, the agents and restructuring possibilities, the liquidity trading, and market structure and concludes with the model's sequence of events.

Agents and Restructuring Possibilities

The economy has one firm, multiple investors and a stock market with a competitive market maker. All agents are risk neutral and the risk free interest rate is 0. A fraction α of the firm's equity is owned by one large institutional investor ("LI" from now) and the balance $1-\alpha$ fraction is owned by many small investors. There are four dates 0, 1, 2, and 3, defining three time periods. At $t=0$, the firm has existing assets which realize a final cash flow at $t=3$. The cash flow depends on the state of the world and on possible restructuring of the firm. The state can be one of three types: Good (G), Bad (B) and Ugly (U). The commonly-known prior probability is p that the state is G, q that it is B and $1-p-q$ that it is U. The cash flow in the G state is $Y>0$. The cash flow in the U state is 0. The cash flow in the B state depends on whether the firm is restructured. Without restructuring, the cash flow in the B state is also 0. To improve the cash flows, the firm can be restructured once, either by LI or by an outside investor ("bidder" from now). Restructuring by LI may involve one or more of: Changes to firm strategy, replacing incumbent management etc. Restructuring by the bidder may involve one or more of: Replacing incumbent management, merging with synergistic assets etc. If LI restructures, the cash flow in the B state increases from 0 to $Z \in (0, Y)$. Alternatively, if the bidder restructures, the cash flow changes from 0 to $\widetilde{X}$; where $\widetilde{X}$ is the quality of the bidder. The actual bidder quality is private information of the bidder and at $t = 0$, it is common knowledge that the bidder quality is distributed uniformly over $[0, 1]$. To ensure that firm value is highest in the G state, assume $Y > E(X) = \frac{1}{2}$. The actual bidder quality becomes public knowledge when the bidder expresses his intention to restructure the firm. For most of the analysis (except for one result in *Proposition 3*) I am agnostic about the relationship between Z and $E(X)$. Firm restructuring by LI or the bidder involves private costs c_r^i and c_r^b respectively, with $0 < c_r^i < Z$ and $0 < c_r^b < \frac{1}{2}$.

At $t = 0$, LI privately observes the true state of the world. LI then chooses the trading and restructuring strategies. If the state is G or U, restructuring offers no benefits and LI chooses the trading strategy. If the state is B, LI chooses whether or not to restructure. The first round of trading in the firm's stock occurs at $t = 1$. Trading by the informed LI is facilitated by the presence of uninformed liquidity traders. I presently discuss the structure of liquidity trading. If the state is B and LI chooses to restructure, the actual restructuring is implemented at $t = 0$, and the altered cash flows are realized at $t = 3$. Firm restructuring by LI is publicly observable. Whenever LI chooses to restructure he does not trade.[21]

After trading at $t = 1$ the bidder, who knows his own quality, observes the stock price and possibly the restructuring by LI and decides on his strategy. The two possible actions for the bidder are (i) acquire more information, anonymously buy some shares at $t = 2$, take over the firm and restructure or (ii) do nothing. I assume that the bidder takes over only when he can profitably restructure the firm. Thus whenever LI restructures at $t = 0$, the bidder does not take over. On the other hand, if LI does not restructure at $t = 0$ the bidder may take over. The bidder takes over only if he knows the state is B, and if his quality is sufficiently high. If the stock price at $t = 1$ does not reveal the true state, the bidder can learn the state by incurring a cost $c_i \geq 0$.

If the bidder decides to take over the firm, he anonymously buys some shares from the market at $t = 2$ and acquires a toehold. Here again, the presence of liquidity traders facilitates anonymous trading by the bidder. After the trading at $t = 2$, the bidder publicly announces his

[21]This is because of two reasons. First, since restructuring is publicly observable, LI is indifferent between trading and not trading after the restructuring. For simplicity I assume that LI does not trade after restructuring. Second, I preclude trading prior to restructuring (after observing the state) by assuming that the actual restructuring occurs at $t = 0$, prior to the first round of trading at $t = 1$. This assumption is made to simplify the analysis. Please see Gopalan (2005) for the impact of relaxing this assumption.

intention to restructure the firm. This also reveals his quality. All subsequent shares (if any) are acquired by the bidder at their expected value after restructuring. That is, all shareholders including LI free ride. After the bidder takes over the firm, the restructuring is implemented at $t = 2$ and the final cash flows are realized at $t = 3$.[22]

Liquidity trading

Trading in the firm's stock occurs at $t = 1$ and at $t = 2$. At both dates small investors get a stochastic liquidity shock and trade in response. At either date, with a probability $\frac{1}{3}$, no small investor gets a liquidity shock; with a probability $\frac{1}{3}$, θ fraction get a negative shock and sell their holdings and with a probability $\frac{1}{3}$, a similar θ fraction get a positive shock and buy additional shares. The total volume of liquidity trading can thus be 0 or $+/-\theta$ times the total shareholding of small investors. For example, at $t = 1$ the total shareholding of small investors is $1-\alpha$. Hence, the quantity of liquidity trading can be $-\theta[1-\alpha]$, 0 or $\theta[1-\alpha]$ with equal probability. The quantity of liquidity trading at $t = 2$ depends on the trading by LI at $t = 1$. The structure of liquidity trading is similar to Maug (1998). The LI and the bidder do not get a liquidity shock.

Given the structure of liquidity trading, there are two potential volumes at which informed investors (LI and the bidder) can trade without fully revealing themselves. They can trade a volume equal to the maximum level of liquidity trading or a volume equal to twice the maximum level of liquidity trading. The rest of the analysis assumes that informed investors always trade a volume equal to the maximum level of liquidity trading. This assumption is without loss of generality.[23]

Market Structure

The stock market consists of a competitive market maker who observes the total order flow and sets a price consistent with the information revealed by the order flow. The structure is similar to Kyle (1985). If LI does not restructure at $t = 0$, the market maker tries to learn the state from the order flow at $t = 1$. From the order flow at $t = 2$, the market maker tries to learn both the state and about the presence of a bidder. If LI restructures at $t = 0$, then

[22] An important element absent from the model is the firm manager and incentive contracts. Apart from takeovers, large shareholder trading can also affect firm decisions by impacting managerial wealth through incentive contracts. While I do not highlight this mechanism in the theoretical analysis, its importance when there is unrestricted communication between shareholder and management is not obvious. If the manager anticipates the price fall resulting from the shareholder's stock sale, then a threat to sell may be sufficient to effect changes. On the other hand, when the purpose is to facilitate the entry of an unobserved outsider, a threat to sell may not suffice.

[23] Please see Gopalan (2005) for the analysis without this assumption.

there is no further uncertainty and firm value is equal to Z.

Sequence of Events

The sequence of events is as follows. At $t = 0$, LI, who owns α fraction of the firm's equity observes the state. If the state is G or U, LI trades the firm's stock. If the state is B, LI chooses whether or not to restructure the firm. If LI chooses not to restructure, then he trades. If LI chooses to restructure, the restructuring is carried out at $t = 0$ and the altered cash flows are realized at $t = 3$. First round of trading occurs at $t = 1$, when liquidity traders may also trade. The market price is determined by a competitive market maker after observing the total order flow.

At $t = 2$, a bidder who knows his own quality appears. If LI restructures at $t = 0$, the bidder does nothing. Otherwise, depending on his quality, the bidder learns the state of the world from the market price and if required, by investing c_i in information acquisition. If the state is revealed to be B, the bidder buys shares from the market at $t = 2$. After the trading at $t = 2$, the bidder publicly announces his intention to takeover the firm. This also reveals his quality and subsequently all shareholders including LI sell their shares to the bidder at the expected firm value with a takeover. After taking over the firm the bidder implements the restructuring at $t = 2$ and final cash flows are realized at $t = 3$. *Figure 2* summarizes the sequence of events.

——————— Figure 2 GOES HERE ———————

3.B Analysis

Consider LI's actions at $t = 0$ after observing the state. If the state is G, LI buys more shares at $t = 1$ and if the state is U, LI sells shares. This is because in the G state, LI knows the firm is worth Y. This is greater than the expected firm value in the other states. Similarly in the U state, LI knows the firm is worth 0, strictly less than the expected firm value in the other two states. If the state is revealed as B, LI chooses whether or not to restructure. If LI chooses not to restructure, then he trades at $t = 1$.

I first analyze LI's trading choice in the B state when he decides not to restructure. Subsequently, I evaluate LI's payoff when he decides to restructure, and characterize LI's choice between restructuring and not restructuring.

3.B.1 Large Investor does not restructure

If LI decides not to restructure in the B state, he can (a) sell shares (b) do nothing and (c) buy shares. In this section, I evaluate LI's payoff for each of these actions and analyze LI's choice between the three. First I consider the case when LI sells in the B state.

Large Investor Sells

This case can be analyzed using backward induction. Given a market price at $t = 1$, I analyze the bidder's decision to bid at $t = 2$. Subsequently, I go back to $t = 1$, and evaluate the market price and LI's payoff. For analyzing the bidder's decision, LI's trading strategy at $t = 1$ is taken as given. That is, in the G state, LI buys and in the B and U states, LI sells. In all states, LI trades a volume equal to the maximum level of liquidity trading at $t = 1$, $\theta[1 - \alpha]$. Short sales are ruled out with the assumption, $\theta[1 - \alpha] \leq \alpha$.[24]

From the order flow at $t = 1$, the market maker tries to learn the state of the world. Since LI sells both in the B state and in the U state, the total volume at $t = 1$ (LI's trading volume plus the liquidity trading volume) is identical in these two states. Hence the market maker cannot differentiate between these two states. Given this, the stock price at $t = 1$ can take on three possible values reflecting the three possible information sets of the market maker. They are a) the price reveals the state to be G b) the price does not reveal any information about the true state and c) the price reveals the state to be either B or U. Since the bidder bids only in the B state, he will not bid in Case a, but may bid in Case b and Case c. Henceforth, I refer to all values corresponding to the last two cases with subscripts $NoInfo$ and Bu to indicate the state of the market. In both these cases, the bidder invests c_i, learns the true state and bids only if the state is B. The bidder's decision to acquire information and bid is contingent on his quality, the volume and price of shares he can buy at $t = 2$.

Consider the bidder's order quantity at $t = 2$. The bidder buys shares only when he knows the state is B, when according to the assumed strategies, LI sells at $t = 1$. Hence the total shareholding of small investors whenever the bidder buys is $[1 - \alpha] + [1 - \alpha]\theta$. Consequently, the maximum volume of liquidity trading at $t = 2$ when the bidder buys and the bidder's order quantity is $\theta[1 - \alpha][1 + \theta]$.

I now analyze the bidder's decision to acquire information and bid when the market price at $t = 1$ does not reveal any information about the state of the world.

[24] This is a valid assumption in the case of institutional investors filing 13F forms, which is the sample I use to test the predictions.

Let $E(P^S_{NoInfo})$ be the expected price at which the bidder acquires shares at $t = 2$. The superscript on P indicates that LI sells in the B state. When a bidder of quality X buys $\theta[1-\alpha][1+\theta]$ shares at a price $E(P^S_{NoInfo})$, his total gain from trade is $\theta[1-\alpha][1+\theta][X - E(P^S_{NoInfo})]$.[25] Since the bidder buys only when his information reveals the state to be B, he gets this payoff with a probability q, the posterior probability of the B state when the market price does not reveal any information. Thus the expected payoff for the bidder is, $q\theta[1-\alpha][1+\theta][X - E(P^S_{NoInfo})]$. The bidder bids if this payoff is greater than or equal to the sum of the cost of information acquisition (c_i) and the expected cost of restructuring (qc^b_r). This is a necessary and sufficient condition because, once the bidder publicly announces his intention to take over the firm (which happens after the trading at $t = 2$), all other shareholders free ride and the bidder does not get any surplus. The marginal bidder is indifferent between acquiring information and bidding and not acquiring information and consequently not bidding. The marginal bidder's quality can be given by the following equality

$$q\theta[1-\alpha][1+\theta][X - E(P^S_{NoInfo})] = c_i + qc^b_r \quad \text{or} \quad X^S_{NoInfo} = \frac{c_i + qc^b_r}{q\theta[1-\alpha][1+\theta]} + E(P^S_{NoInfo})$$

The probability of a bid δ^S_{NoInfo}, and the firm value conditional on a takeover W^S_{NoInfo}, can correspondingly be given as[26]

$$\delta^S_{NoInfo} = 1 - [\frac{c_i + qc^b_r}{q\theta[1-\alpha][1+\theta]} + E(P^S_{NoInfo})] \quad \text{and} \quad W^S_{NoInfo} = \frac{1 + \frac{c_i + qc^b_r}{q\theta[1-\alpha][1+\theta]} + E(P^S_{NoInfo})}{2} \tag{1}$$

I now evaluate the expected price at which the bidder acquires shares, $E(P^S_{NoInfo})$. When the bidder bids for $\theta[1-\alpha][1+\theta]$ shares at $t = 2$, the total order flow to the market maker can be 0, $\theta[1-\alpha][1+\theta]$, or $2\theta[1-\alpha][1+\theta]$ with equal probability.[27] From the order flow at $t = 2$, the market maker tries to learn the state, which he believes can be G, B or U, and about the presence of the bidder. An order flow of 0 at $t = 2$ does not reveal any new information to the market maker. This is because it can arise in all three states and both in the presence and in the absence of a bidder.[28] On the other hand, an order flow of $\theta[1-\alpha][1+\theta]$ reveals the state to be B or U because it cannot arise in the G state. This is because, the maximum liquidity

[25] In equilibrium, this quantity will be strictly positive for all bidders who choose to bid.

[26] In the subsequent analysis, δ^i_j denotes the probability of a takeover, W^i_j, the firm value conditional on a takeover, and $E(P^i_j)$, the expected price at which the bidder can acquire shares, when LI's trade at $t = 1$ in the B state is LI, and the state of the market after trading at $t = 1$ is j.

[27] The total order flow to the market maker is the sum of the bidder's order quantity and the quantity of liquidity trading, which can be $-\theta[1-\alpha][1+\theta]$, 0 or $\theta[1-\alpha][1+\theta]$ with equal probability.

[28] It can arise both when the liquidity trading volume is 0 and the bidder is absent and when the liquidity trading volume is $-\theta[1-\alpha][1+\theta]$ and the bidder is present.

trading volume in the G state at $t = 2$ is $\theta[1-\alpha][1-\theta] < \theta[1-\alpha][1+\theta]$.[29] An order flow of $2\theta[1-\alpha][1+\theta]$ at $t = 2$ reveals the presence of the bidder because it can arise only in the bidder's presence. Based on this discussion, the expected price at which the bidder acquires shares at $t = 2$ is

$$E(P^S_{NoInfo}) = \frac{1}{3}[W^S_{NoInfo} + \frac{q}{1-p}\delta^S_{NoInfo}W^S_{NoInfo} + pY + q\delta^S_{NoInfo}W^S_{NoInfo}] \tag{2}$$

The first term within the square brackets is the stock price when the order flow at $t = 2$ is $2 * \theta[1-\alpha][1+\theta]$. This is the expected firm value conditional on a takeover. The second term is the stock price when the order flow is $\theta[1-\alpha][1+\theta]$ and is the expected firm value when the state is either B or U, and is equal to the posterior probability of the B state, $\frac{q}{1-p}$ times the expected firm value conditional on the B state, $\delta^S_{NoInfo}W^S_{NoInfo}$. The third and fourth terms together equal the stock price when the order flow is 0. This is the expected firm value when LI does not restructure at $t = 0$. Substituting for W^S_{NoInfo} and δ^S_{NoInfo} from (1), provides a quadratic in $E(P^S_{NoInfo})$ which can be solved for $E(P^S_{NoInfo})$. The details are omitted for brevity.

The analysis when the market price at $t = 1$ indicates the state to be either B or U can be done on similar lines. The details are provided in *Appendix A*. The expected firm value with a takeover conditional on the B state is $\delta^S_j W^S_j$ where $j \in \{NoInfo, Bu\}$. The following lemma presents some preliminary results on this value.

Lemma 1 *The expected firm value with a takeover conditional on the B state is increasing in the market liquidity parameter θ, decreasing in the shareholding of LI α, the cost of information acquisition c_i, and in the cost of restructuring c^b_r.*

Lemma 1 gives a number of intuitive results. The firm value with a takeover increases in the market liquidity parameter θ, because greater liquidity enables the bidder to acquire more shares without revealing himself and this increases the probability of a takeover. Similarly an increase in the shareholding of LI α, decreases the level of liquidity trading and consequently the probability of a takeover. The firm value with a takeover is decreasing in the costs of information acquisition c_i, and in the cost of restructuring c^b_r, because an increase in these costs reduces the probability of a takeover.

I now evaluate LI's total payoff, which comprises of the payoff from selling and the payoff from the balance holding. To evaluate this, I first evaluate the price at which LI sells at $t = 1$.

[29] According to the assumed strategies, LI buys more shares at $t = 1$ in the G state. This reduces the shareholding of small investors and consequently the volume of liquidity trading at $t = 2$.

To recap, at $t = 1$ if the state is G, LI buys and if the state is B or U, LI sells. When LI buys, the total order flow (sum of LI's trading volume and liquidity trading volume) can be 0, $\theta[1-\alpha]$, or $2\theta[1-\alpha]$ with equal probability and when LI sells, the total order flow can be $-2\theta[1-\alpha]$, $-\theta[1-\alpha]$, or 0, with equal probability. From the order flow at $t = 1$, the market maker tries to learn the state of the world. Hence, an order flow of $-2\theta[1-\alpha]$ or $-\theta[1-\alpha]$ reveals the state to be either B or U, and an order flow of $\theta[1-\alpha]$, or $2\theta[1-\alpha]$ reveals the state to be G. On the other hand, an order flow of 0 does not reveal any information because it can occur both when LI buys and when he sells. Following this discussion, the expected price at which LI sells at $t = 1$ can be given as:

$$P^S = \frac{1}{3}[2\frac{q}{1-p}\delta^S_{Bu}W^S_{Bu} + pY + q\delta^S_{NoInfo}W^S_{NoInfo}]$$

The first term within the square brackets is the price when the order flow is either $-2*\theta[1-\alpha]$ or $-\theta[1-\alpha]$. This is the firm value when the market learns the state to be either B or U and is equal to the posterior probability of the B state, $\frac{q}{1-p}$ times the expected firm value conditional on the B state $\delta^S_{Bu}W^S_{Bu}$. The second and third terms together represent the price when the order flow is 0, and is the ex ante firm value when LI does not restructure.

LI's total payoff when he sells can be given as

$$V^S = \frac{\theta[1-\alpha]}{3}[2\frac{q}{1-p}\delta^S_{Bu}W^S_{Bu} + pY + q\delta^S_{NoInfo}W^S_{NoInfo}] + \frac{\alpha-\theta[1-\alpha]}{3}[2\delta^S_{Bu}W^S_{Bu} + \delta^S_{NoInfo}W^S_{NoInfo}] \quad (3)$$

The first term on the RHS represents LI's payoff from selling at $t = 1$, and the second term represents the payoff from the balance holding. The first term within the second set of square brackets is the firm value as evaluated by LI when the market price at $t = 1$ reflects the state to be either B or U . This occurs when the total order flow at $t = 1$ is either $-2*\theta[1-\alpha]$ or $-\theta[1-\alpha]$ (occurs with a probability $\frac{2}{3}$). The second term represents firm value as evaluated by LI when the market price does not provide any information about the state of the world. This occurs when the total order flow is zero, (occurs with a probability $\frac{1}{3}$).

A convenient way of writing LI's total payoff, which provides additional intuition for further analysis is as follows:

$$V^S = \frac{\theta[1-\alpha]}{3}[p[Y-\delta^S_{NoInfo}W^S_{NoInfo}] - [1-p-q]\delta^S_{NoInfo}W^S_{NoInfo} - \frac{2[1-p-q]}{1-p}\delta^S_{Bu}W^S_{Bu}] + \frac{\alpha}{3}[2\delta^S_{Bu}W^S_{Bu} + \delta^S_{NoInfo}W^S_{NoInfo}] \quad (4)$$

The first term on the RHS is LI's trading profits/loss and the second term is the value of the initial shareholding. I now analyze the case when LI does not trade in the B state.

Large Investor Does Not Trade

The analysis in this case broadly mirrors the earlier analysis and hence I only highlight the key differences between the two. The detailed analysis is provided in *Appendix A*. The two key differences between the two cases are the, a) market price at $t = 1$ and b) bidder's trading volume at $t = 2$.

LI's trading at $t = 1$ can be summarized as: In the G state LI buys, in the B state LI does not trade and in the U state LI sells. As LI's actions are different in the three states, the order flow at $t = 1$ conveys more information. Reflecting this, the stock price at $t = 1$ can take on five possible values. They are a) the price reveals the state to be G b) the price reveals the state to be either G or B c) the price does not reveal any information about the state d) the price reveals the state to be either B or U and e) the price reveals the state to be U. The bidder may bid in Case b, Case c and Case d.

Since LI does not trade in the B state, the total shareholding of small investors whenever the bidder buys is $1-\alpha$, the same as at $t = 0$. Consequently, the maximum volume of liquidity trading at $t = 2$ and the bidder's order quantity is $\theta[1-\alpha]$. The subsequent analysis is provided in *Appendix A*.

Large Investor Buys

Here again I only highlight the two main differences – the market price at $t = 1$ and the bidder's order quantity.

LI's trading strategy at $t = 1$ is: In the G and B states, LI buys and in the U state, LI sells. Given this trading strategy, the stock price at $t = 1$ can take on three possible values. They are a) the price reveals the state to be either G or B b) the price does not reveal any information about the state and c) the price reveals the state to be U. The bidder may bid in Case a and Case b.

Since LI buys in the B state, the total shareholding of the small investors whenever the bidder buys is $[1 - \alpha][1 - \theta]$. Consequently, the maximum volume of liquidity trading at $t = 2$ when the bidder buys and the bidder's order quantity is, $\theta[1 - \alpha][1 - \theta]$. The subsequent analysis, is provided in *Appendix A*.

Having analyzed the three possible trading strategies of LI in the B state, I now present the first set of results. The following proposition compares the takeover probability when LI sells, does not trade and buys in the B state.[30]

[30]Since takeovers occur only in the B state, the conditional (on the B state) and unconditional ordering of

Proposition 1 *In the B state, when LI does not restructure, the takeover probability is strictly greater when LI sells than when he does not trade. The takeover probability is strictly greater when LI does not trade than when he buys.*

The intuition for this proposition is as follows. The two differences between the three cases (when *LI* sells, does not trade, and buys) are the market price at $t = 1$ and the bidder's order quantity at $t = 2$. Both these impact the takeover probability. The market price at $t = 1$ affects the takeover probability in two important ways. First, the posterior probability of the B state as conveyed by the market price affects the probability with which the bidder is able to restructure. The probability of a takeover is increasing in the expected probability of restructuring. Second, the level of the stock price impacts the bidder's gains from trade at $t = 2$ and hence the probability of a takeover. The takeover probability is decreasing in the stock price. The bidder's order quantity impacts the takeover probability in an obvious fashion. The takeover probability is increasing in the order quantity. Overall, the impact of the stock price and bidder's order quantity result in *Proposition 1.*

Corollary 1 *The value of LI's initial shareholding in the B state when LI does not restructure, is highest when LI sells and is the lowest when LI buys.*

From (4) it is clear that the value of *LI*'s initial shareholding in the B state when *LI* does not restructure, is increasing in the probability of a takeover. Similarly, the value of *LI*'s initial holding when he does not trade and when he buys are also increasing in the takeover probability (please see *Appendix A*). Since the probability of takeover is highest when *LI* sells (*Proposition 1*), the value of *LI*'s initial holding is also maximized when *LI* sells.

The next proposition highlights the distortions that arise in *LI*'s trading because of the possibility of a takeover.

Proposition 2 *There exists a non-empty set of parameter values for which, in the B state when LI does not restructure, LI sells even if selling results in a trading loss. There also exists a non-empty set of parameter values for which, in the B state when LI does not restructure, LI does not buy even if buying results in a trading profit.*

The intuition for the proposition is as follows. *LI* chooses the trading action that maximizes the sum of the trading profit/loss and the value of his initial holding (see (4)). *Corollary 1* shows that the value of *LI*'s initial holding is maximum when he sells and is the minimum

takeover probabilities with *LI*'s actions are identical.

when he buys. When LI compares selling with not trading, selling results in an increase in the value of the initial holding along with a trading profit/loss. Hence LI sells even for a trading loss as long as the loss is less than the increase in value of the initial holding from the sale. Similarly when LI compares buying to not trading, buying results in a fall in the value of LI's initial holding and a trading profit/loss. Hence LI refrains from buying, as long as the trading profit is less than the reduction in value of the initial holding from the buying.

Comparing LI's payoff from the three strategies, it can be shown that for large values of Y, when LI does not restructure, LI sells in the B state.[31] In the following analysis I assume a sufficiently large Y so that in the B state, whenever LI does not restructure, LI sells. I now evaluate LI's payoff when he restructures at $t = 0$, and analyze the choice between restructuring and selling.

3.B.2 Large Investor Restructures

If LI chooses to restructure in the B state, his total payoff can be given as

$$V^{Res} = \alpha Z - c_r^i \tag{5}$$

Knowing that LI restructured at $t = 0$, the market price at $t = 1$ and $t = 2$ is Z and the bidder does not bid at $t = 2$.

In the B state, LI chooses between restructuring and selling by comparing his payoff when he restructures (5) with his payoff when he sells (4). The following proposition characterizes LI's choice of whether or not to restructure in the B state.

Proposition 3 *There exist cutoff values of*

1. *the bidder's cost of restructuring $c_r^b = \widehat{c_r^b}$, such that, for all values of $c_r^b > \widehat{c_r^b}$, LI restructures and for all values of $c_r^b \leq \widehat{c_r^b}$, LI does not restructure.*
2. *the market liquidity parameter $\theta = \widehat{\theta}$, such that, for all values of $\theta < \widehat{\theta}$, LI restructures and for all values of $\theta \geq \widehat{\theta}$, LI does not restructure.*
3. *LI's shareholding $\alpha = \widehat{\alpha}$, such that, for all values of $\alpha > \widehat{\alpha}$, LI restructures and for all values of $\alpha \leq \widehat{\alpha}$, LI does not restructure.*

[31] See Gopalan (2005) for proof.

The intuition for this proposition is as follows. An increase in c_r^b, decreases the takeover probability (*Lemma 1*) and consequently LI's payoff when he sells and makes restructuring more likely. An increase in the market liquidity parameter θ, increases both LI's gains from trade at $t = 1$, and also the takeover probability (*Lemma 1*). Hence it makes selling more attractive. An increase in α has three effects on LI's payoff. It increases the value of LI's initial holding both when he sells (4) and when he restructures (5) and it also reduces the probability of a takeover and consequently the expected firm value with a takeover (*Lemma 1*). While the first effect makes selling more attractive, the second and the third effects make restructuring more attractive. If the firm value when LI restructures Z, is greater than or equal to the average bidder quality, $\frac{1}{2}$, the first and second effects dominate and make selling less attractive for a higher α.

I now list the main empirical predictions of the model. Since I test the predictions using institutional investors who hold large blocks, I refer to the large shareholder as the block holder.

3.C Empirical predictions

I divide the empirical predictions into two sets. The first set of predictions relates block holder trading to firm performance and firm characteristics and the second set relates takeover probability to firm characteristics and block holder trading.

3.C.1 Block holder Trading

Trading by the block holder impacts takeovers because it is informed. Informed trading should predict both abnormal stock returns and abnormal operating performance. This forms the first prediction.

Prediction 1: *Trading by block holders will be positively correlated with contemporaneous and subsequent abnormal stock return and with abnormal operating performance.*

This prediction is not unique to the model and is common to all papers which argue that institutional trading is informed (Wermers (1999), Sias, Starks and Titman (2001)). I test this prediction to clarify the causal relationship between block holder trading and stock returns and to differentiate the theory from the *price fall* hypothesis which argues that block holders sell in response to poor stock returns.

Faced with a restructuring opportunity, *Proposition 3* shows that the block holder is more likely to sell from firms in which the bidder faces a lower cost of restructuring, when the firm has a more liquid stock, and when the block holding is small. If some of the costs of restructuring comprise of costs such as financing costs and costs of integrating the firms, then these are likely to increase in firm size. This predicts that the block holder is likely to sell in smaller firms. The next prediction formally states these results.

Prediction 2: *Block holders are more likely to sell when the stock is more liquid, when the block holding is small and in smaller firms.*

Models of informed trading (e.g. Kyle (1985)) also predict greater sale in firms with more liquid stock. A negative relationship between block holding and selling is consistent with the assertion of Bhide (1994) and with the results in Kahn and Winton (1998). Apart from private information and a need to induce takeovers, institutional block holders may sell for other reasons such as positive feedback trading, prudent norms, changes in firm characteristics etc. PSS and Nagel (2005) identify a set of such reasons. In the empirical tests I explicitly control for these alternate reasons.

3.C.2 Takeover probability

Proposition 1 shows that Ceteris Paribus, takeover probability is higher when the block holder sells. From *Lemma 1* and the discussion preceding *Prediction 2*, it is clear that takeovers are more likely when the stock is more liquid and for smaller firms. The next prediction collects these results.

Prediction 3a: *Takeovers are more likely when block holders sell their holding.*

Prediction 3b: *Takeover probability will increase with stock liquidity and decrease with firm size.*

If takeovers are triggered by informed selling by institutional block holders, then the effect is likely to be stronger for institutions that are better informed. Institutions with larger holdings are likely to be better informed. They are also likely to have greater ability and incentive to sell and trigger a takeover. Hence, among institutional shareholders of a firm, selling by the largest shareholder will have a greater impact on takeover probability. Jones, Lee, and Weis (1999) and Sias, Starks, and Titman (2001) report that among institutional investors, independent investment advisors are best informed. Hence, I expect the impact of institutional sale on takeovers to be greater for independent investment advisors.

Prediction 4: *Selling by institutions with larger holding and by independent investment advisors will have a greater impact on takeover probability.*

If according to the model, block holders choose between direct intervention and takeovers and sell their holding whenever they prefer takeovers, then in a sample of firms subject to either direct intervention or a takeover, takeovers should be preceded by greater selling. Further, the firms that are taken over are also likely to be smaller with more liquid stock (*Proposition 3*). This forms the next prediction.

Prediction 5: *Among firms subject to a takeover or internal restructuring (through direct intervention), takeovers are more likely when block holders sell and for small firms with more liquid stock.*

Since in many instances direct institutional intervention is not publicly observed, I use proxies such as disciplinary CEO turnover to test this prediction. The important difference between *Prediction 3* and *Prediction 5* is that a test of *Prediction 5* helps differentiate the theory from the *price fall hypothesis* which argues that block holders sell in response to poor performance. Conditioning on takeovers or internal restructuring is likely to result in a sample of firms with under performing stock prices and if in this sample, greater selling is observed prior to takeovers, then that will help distinguish the theory. Furthermore, a test of this prediction will also help us identify firm characteristics that result in effectiveness of internal and external governance mechanisms.

If block holders sell in a bid to trigger a takeover, then they are likely to be aware of the takeover possibility and with multiple rounds of trading they should slow the rate of selling when takeovers are imminent. The next prediction relates block holder trading in the quarter immediately preceding the takeover to takeover probability.

Prediction 6: *Block holders will slow down the rate of sale immediately before the takeover.*

A test of this prediction helps establish if the block holder is aware of the takeover probability before the market. This is one potential way, to differentiate the theory from the *unintended consequence* hypothesis.

If block holder stock sales facilitate a takeover, then firms with institutional block holders should have a higher takeover probability. This forms the last prediction.

Prediction 7: *Ceteris Paribus, firms with institutional block holders will have a higher takeover probability.*

An important assumption behind *Prediction 7* is that the institutional block holder does not intervene in a large fraction of firms which experience declining prospects but instead, sells and triggers a takeover. If the block holder intervenes in a large fraction of firms, then firms with institutional block holders may have a lower takeover probability than firms without block holders.

I now describe the data used to test the predictions.

4 Data and Summary statistics

4.A Data

There are three alternate methods to identify a sample to test the predictions. An ex post methodology involves identifying firms with institutional block holders and subject to either direct intervention or takeovers and a comparable control sample. PSS adopts such a methodology for estimating the impact of institutional selling on CEO turnover. There are two potential problems with such a methodology. First, the criteria for selecting the control sample is contentious (control sample problem), and second, the time period to be used to identify the presence of institutional shareholder and measure trading is not obvious (time period problem). If we look too close to the takeover, we may not detect any selling because news about the impending takeover may have already leaked out; on the other hand, it is also not obvious how far before the takeover we need to measure trading. A second methodology involves identifying firms that have institutional investors and suffer negative performance shocks and relate institutional trading to subsequent restructuring actions. Denis, Denis and Sarin (1997), adopt such an approach to document the impact of institutional presence on CEO turnover following poor performance. While this methodology potentially solves the control sample problem, it does not solve the time period problem. Hence for this study I adopt the third approach. I identify all firms that have institutional block holders and engage in "large" acquisitions. Prior literature has documented that "large" acquisitions result in wealth loss to the acquiring firm's shareholders, (e.g., Moeller, Schlingemann and Stulz (2005)) and has argued that these acquisitions are symptomatic of agency problems in the acquiring firms. Following this argument, Mitchell and Lehn (1990), show that firms undertaking such acquisitions are likely to become good targets and, Lehn and Zhao (2004) show that in some cases, the firms experience disciplinary CEO turnover.

To test the predictions, I identify firms that undertake "large" acquisitions and in which the largest institutional block holder has more than 5% shareholding at the time of the acquisition announcement. I relate the institution's trading in the post acquisition period to subsequent restructuring. The underlying assumption is that the institution gets private information about future firm value and uses the information to either directly intervene in firm governance or to trade. As mentioned earlier, I refer to the announcement of the initial acquisition, as the *event*. To ensure generalizability of the results, I repeat the test of the main prediction on a larger sample of firms with institutional block holders. This is explained in greater detail in Section 5.C. I now elaborate the sample selection criteria.

I identify the sample *events* from the M&A database in SDC. I first consider all completed mergers by public acquirers announced between *Jan 1, 1985* and *Dec 31, 2001*. Among these, to ensure that the merger represents a "large" investment, I confine the sample to mergers with public targets and those in which the target has a market capitalization of at least \$100 million *or* the target's market capitalization is greater than 5% of the acquirer's market capitalization. A similar criteria is employed by Lehn and Zhao (2004). I exclude mergers between financial targets and acquirers (4-digit SIC Code $\in [6000, 6999]$) due to the greater regulatory scrutiny of such mergers. Lastly, I require that the acquirer owns less than 50% of the target's shares six months prior to announcement and acquires 100% shareholding in the transaction. Applying these criteria results in a sample of 1594 *events*. The sample size is comparable to that of Moeller, Schlingemann and Stulz (2005), who report 2642 mergers involving public firms during the larger time period, 1980-2001. For the acquiring firms in the sample I identify institutional block holding from CDA/SPECTRUM.

Under the Securities Exchange Act of 1934 (Rule 13f), institutional investment managers who exercise investment discretion over accounts with publicly traded securities (section 13(f) securities) and who hold equity portfolios exceeding \$100 million are required to file Form 13f within 45 days after the last day of each quarter. Investment managers must report all holdings in excess of 10,000 shares and/or with a market value over \$200,000. From the CDA/Spectrum data, I identify the largest institutional shareholder of the acquirer at the time of the *event* and include those *events* in which the largest shareholder had more than 5% of the acquirer's shares. One potential problem with the Spectrum database is that the holdings are aggregated across the individual funds in a mutual fund family. Hence although I may identify a firm in which Fidelity on aggregate holds more than 5%, individual funds within Fidelity may own much less than 5%. In the context of the empirical tests, if the trading decisions are taken independently by individual fund managers, then the measure of institutional trading may not represent a conscious decision by an individual institution to buy or sell shares. To mitigate this, instead of a continuous measure of institutional trading, I identify instances of significant selling by the institution and relate such selling to future governance actions. It is likely that such significant selling indicates correlated trades by the individual fund managers and is based on some common research.

From the SDC M&A database, I identify takeovers that occur within 5 years after the initial *event* in which the sample firm is the target.[32] I also identify all disciplinary CEO turnovers that occur within 5 years after the initial *event*. Disciplinary CEO turnovers are identified by searching through news reports in the Lexis-Nexis database and following Parrino (1997) CEO turnovers are classified as disciplinary if it is reported that the CEO is fired, forced to step down, or departs due to unspecified policy differences. For other cases, if the departing CEO is under the age of 65, and the news announcement reports that the CEO is retiring, but does not announce the retirement at least six months before the effective date, or if the announcement does not report the reason for the departure as related to death, poor health, or the acceptance of another position, then CEO turnover is classified as a disciplinary turnover. *Events* in which the firm was taken over or experienced a disciplinary CEO turnover within one year after the *event* are excluded. This is done to ensure that the measure of institutional trading precedes the restructuring. Institutional trading is measured in the one year after the *event*. To avoid overlapping observations exclude *events* involving the same acquirer within a period of 1.25 years after a previous *event* are also excluded. This results in a final sample of 706 *events* by 616 different firms. For these firms I obtain corporate financial information from COMPUSTAT and stock price data from CRSP. In some of the tests, to be consistent with the theory, I exclude the firms that become bankrupt after the *event*.[33]

For the sample firms, I also collect information on Board size, proportion of inside directors on the Board, percentage equity held by all the Board of Directors, data on whether the CEO is also the chairman of the Board and percentage equity held by the CEO. The governance data is collected from the proxy statements immediately following the *event*. Since proxy statements are available only from 1994, the sample for the tests using these variables is confined to 1994-2001.

[32]In subsequent discussion, depending on context, I refer to the merged firm (post *event* period) or the acquirer (pre *event* period) as the firm.

[33]Inclusion of these firms does not impact the results reported here. According to the theory, institutions sell both when they want to trigger a takeover and also when the firm is worthless in the U state. In the empirical analysis, I equate bankruptcy with the U state.

4.B Summary Statistics

Table I provides the summary statistics for the key variables. Panel A summarizes the full sample while Panel B summarizes the sample of *events* after which the firm becomes a target and Panel C, the *events* after which the firm experiences a disciplinary CEO turnover. The firms in the sample are larger than the average NYSE firm (mean *Log(Market Capitalization)* of 6.83 in comparison to 5.97 for all NYSE firms); I use *Log(Turnover)*, *Bid-Ask Spread* and *Number of Analyst* as measures of stock liquidity. *Turnover* is the average of the daily turnover of the acquirer's stock and *Bid-Ask Spread* is the implicit bid ask spread calculated using the methodology of Roll (1984).[34] To avoid any spurious correlation between the measures and institutional trading in the post *event* period, both *Turnover* and *Bid-Ask Spread* are measured in the year before the *event*. *Number of Analyst* is the number of analysts following the firm's stock and is obtained from the IBES database.

The mean shareholding of the largest institutional shareholder of the acquirer at the time of the *event* is 10%, and represents an investment of approximately $100 million by the institution in the firm's equity.[35] This makes it likely that the institution will spend some effort in monitoring the firm. I use three different measures of institutional trading. *ChngQtr* measures the extent of trading in the one quarter following the *event*. It is the ratio of the total shares held by the institution one quarter after the *event* to the number of shares held at the time of the *event*. *ChngYr* measures the extent of trading during the one year following the *event*. It is measured similar to *ChngQtr*. In calculating both *ChngQtr* and *ChngYr*, I adjust for the institution's holding in the target (in the case of stock swap mergers) and also for stock splits. *Sale* is a dummy variable that takes a value 1 if $ChngYr < .5$. I use this to identify significant selling by the institution. Table I shows that in 34% of the *events*, the institution sells more than 50% of its holding within one year of the *event*. Panel A also indicates that on average institutions sell after an *event*.

Of the *events* in the sample, 55% are pure stock-swap mergers and 26% are pure tender offers.[36] *Announcement Return* is the cumulative abnormal return for the three day win-

[34] Since the Roll's measure is a linear transformation of the square root of the negative of the autocorrelation of daily returns, it is not defined for stocks with positive autocorrelations. To deal with this, following Roll (1984), I use the negative of the square root of the autocorrelation as the spread measure. This results in negative spreads for a number of *events*. In un-reported regressions, I repeat the tests with *Bid-Ask Spread*$= 0$ for firms with positive autocorrelation and with the Gibbs sampler estimate of Hasbrouck (2005) and obtain similar results.

[35] The mean market capitalization of an acquirer in the sample is $1 billion, 10% of this is $100 million.

[36] This is comparable with Moeller, Schlingemann and Stulz (2005), wherein 45% of mergers between public firms are stock-swap mergers.

dow $(-1,1)$, surrounding the *event*. *Announcement Return* is calculated after adjusting for a market model, whose parameters are estimated during the $(-250,-60)$ window. The mean announcement return for the sample is -1.9% and is significantly different from 0 at 1% level. This is comparable to Moeller, Schlingemann and Stulz (2005), who document a significant -1.3% announcement return for mergers involving public targets.

Abnormal is the buy and hold abnormal return based on size and book to market bench marks calculated for the one year period starting three months after the *event*.[37] I exclude the three month period following the *event* to obtain a measure of abnormal performance not contemporaneous with at least one of the measures of institutional trading. *Abnormal* is not contemporaneous with *ChngQtr*. I winsorize all variables at 1% and 99% levels.

Panel B provides the summary statistics for the sub-sample of *events*, after which the firm becomes a target within a five year period. I henceforth call this the *Target* sub-sample. If the firm has multiple *events* during the five year period, only the last *event* is classified as belonging to the *Target* sub-sample. There are 131 *events* in the *Target* sub-sample, and on average, the firm becomes a target eleven quarters after the *event*. The main highlights of Panel B in comparison to Panel A are the following. The firms involved in a takeover are smaller than the average firm (mean *Log(Market Capitalization)* of 6.5 in comparison to 6.83), they have more liquid stock (mean *Bid-Ask Spread* of -.44 in comparison to .007) and on average the institution sells a greater fraction during the first year (mean *ChngYr* of 66% in comparison to 75%). These results are consistent with the predictions. These *events* are less likely to be stock-swap mergers (46% to 55%) and more likely to be tender offers (34% to 26%). I use the Gompers, Ishii and Mertrick (2000) index (*G-Index*), to measure the extent of takeover defense. Firms that become targets have about the same level of takeover defense as the full sample. This is consistent with the evidence in Core, Guay and Rusticus (2005), who show that takeover probability does not depend on *G-Index*.[38] Firms that become targets are much less likely to have the CEO as the chairman of the Board (58% in comparison to 70%). In other respects these *events* are comparable to the full sample.

Panel C provides summary statistics for the sub-sample of *events* after which there is a disciplinary CEO turnover within a 5 year period. Henceforth I call this the *CEO* sub-sample. On average, the *CEO* turnover occurs eleven quarters after the initial *event*. Firms which experience *CEO* turnover are larger (mean *Log(Market Capitalization)* of 7.10 in comparison to 6.83), have less liquid stock, (mean *Bid-Ask Spread* of .45 in comparison to .007). These are in line with the prediction that bigger firms with less liquid stock are more likely to experience

[37]Please see Appendix B for details of the calculation.

[38]Alternatively I use the Bebchuck, Cohen and Farrel (2004) index and obtain similar results.

direct intervention. These firms have significantly higher value of *G-Index*, and also have CEOs with lower equity holding.

Table II provides a year wise break-up of the full sample and the two sub-samples. The sample is well distributed across the sample period, with some concentration during the bull market of the late 1990s. The distribution of the *Target* sub-sample is similar to the full sample. On the other hand, the *CEO* sub-sample is predominantly concentrated during the later half of the sample period. This is in line with the evidence that disciplinary CEO turnovers gained in popularity during the 1990s (Huson, Parrino and Starks (2001)). To correct for this, in some of the tests I include a time dummy for this time period.

Table III provides a break-up of the sample based on the identity of the largest institutional shareholder at the time of the *event*. The CDA/Spectrum identifies investors as belonging to one of five groups: Bank trust departments, insurance companies, investment companies, independent investment advisors, and others. The "Others" category includes public pension funds, endowments and also investment arms of companies. A large fraction of the sample has investment firms and independent advisors as the largest shareholder. Independent advisors invest in relatively small firms and a larger fraction of these firms become targets (relative to the firms with investment firms as the large shareholder). Independent advisors also sell a larger fraction of their holding in the period after the *event*. In subsequent tests I find that selling by independent advisors has a greater impact on takeover probability.

I now discuss the tests of the predictions.

5 Empirical Results

The discussion in this section is divided into three subsections (A-C). Subsection A, examines the relationship between firm performance, firm characteristics and trading by the largest institutional shareholder. Subsection B discusses the impact of institutional trading and firm characteristics on takeovers. Subsection C, discusses robustness tests and alternate specifications.

5.A Institutional Trading

This subsection discusses the tests of *Prediction 1* and *Prediction 2* that relate institutional trading to firm performance and firm characteristics.

5.A.1 Abnormal returns, operating performance and institutional trading

According to *Prediction 1*, institutional trading should be positively correlated with contemporaneous and subsequent abnormal stock return and abnormal operating performance. Recent research (e.g., Nofsinger, and Sias (1999), Wermers (1999)) finds a positive relation between contemporaneous changes in institutional ownership and returns. While this research does not differentiate among the institutional shareholders of a firm, I only look at the largest block holder's trading. Further, taking into account Griffin, Harris and Topaloglu's (2003) finding that contemporaneous correlation can result from momentum trading, I test the relationship between trading and *subsequent* returns. Panel A of Table IV provides preliminary univariate evidence. *Events* are classified into two categories, *Increase* and *Decrease* based on whether *ChngQtr* is greater than 1 or less than or equal to 1. Panel A shows that the mean (median) raw return in the *subsequent* twelve month period is 7.1% (0.7%) for the *Increase* category, and is significantly greater than that for the *Decrease* category, -3.1% (-6.5%).[39] The abnormal returns also follow a similar pattern. The median change in abnormal operating profitability *ChngProf*, which is the change in industry adjusted *EBIDTA/Total Assets* of the merged firm in the one year following the *event* is also significantly greater for the *Increase* category. This table provides preliminary evidence consistent with institutional trading predicting subsequent firm performance.

To formally test *Prediction 1*, I estimate the following OLS regression in Panel B of Table IV:

$$Abnormal_i = \beta_0 + \beta_1 * X_i + \gamma * Controls \qquad \text{(E-1)}$$

where the i subscript indicates the *event*. The dependent variable *Abnormal* is the buy and hold abnormal return for the one year period starting three months after the *event*, X is *ChngQtr* in Columns (1) and (2) and *ChngYr* in Columns (3) and (4). In Columns (2) and (4) I include *Controls* for other merger and firm specific characteristics. Rau and Vermaelen (1998) show that stock swap mergers under perform, and tender offers out perform benchmarks in the post acquisition period. To control for this, I include dummy variables identifying stock swap mergers and tender offers. I also include *Announcement Return* and *Log(Market Capitalization)* as additional controls. Since *ChngQtr* and *Abnormal* are measured on two successive non-overlapping time periods, any observed correlation can be attributed to institutional trading predicting *future* abnormal returns. In all regressions, otherwise mentioned, the reported standard errors are corrected for heteroscedasticity and clustered at individual firm level. The

[39] The stars indicate significance of the difference across the *Increase* and *Decrease* categories. The significance is estimated using bootstrap t-statistics.

results in Panel B indicate that both *ChngQtr* and *ChngYr* are significantly positively related to abnormal stock performance. The results are economically significant. For instance, the estimate in Column 2 indicates that a one standard deviation increase in *ChngQtr*, is correlated with a 4.2% increase in the abnormal performance in the subsequent 1 year period.

The coefficient on *Log(Market Capitalization)* is significant even after including institutional trading. This can either be because the institution does not fully anticipate the future performance of the *events*, or because of the inadequate proxies for expected returns. To check this, I repeat the regression with alternate measures of abnormal return.[40] Even with alternate measures, the coefficient on *Log(Market Capitalization)* continues to be significant. This indicates that block holders may not fully anticipate the future performance of the *events*.[41]

I do a number of robustness tests. Since *ChngYr* and *Abnormal* are contemporaneous, to ensure that the correlation is due to informed trading, I split *ChngYr* and *Abnormal* into four quarterly measures and regress quarterly abnormal returns on lagged quarterly changes in institutional holding. Consistent with the hypothesis, changes in institutional holding predict *future* abnormal returns. To ensure that the results are not disproportionately impacted by the first quarter after the *event*, I repeat the regression after excluding the first quarter and get similar results. I also get consistent results with size, beta, and standard deviation adjusted abnormal returns. These are not reported to conserve space.

Panel C reports the results of tests estimating the relationship between institutional trading and firm operating performance, by re-estimating (E-1) with *ChngProf* in place of *Abnormal*. *ChngProf* is the change in industry adjusted *EBIDTA/Total Assets* of the merged firm in the one year following the *event*. I measure industry adjusted *EBIDTA/Total Assets* as the difference between the firm's *EBIDTA/Total Assets* and the median *EBIDTA/Total Assets* of all firms with the same four digit SIC code. The results in Panel C indicate that both *ChngQtr* and *ChngYr* predict abnormal operating performance. The coefficient estimates are economically significant. The estimate in Column (2) indicates that a one standard deviation increase in *ChngQtr* is correlated with a 1.2% increase in *ChngProf*. I repeat the regression

[40] Since the measures of abnormal returns are all noisy to some extent, I place greater faith on results that hold across a set of benchmarks.

[41] Another reason for the significant coefficient on *Log(Market Capitalization)* consistent with the theory is that these mergers are disproportionately associated with subsequent direct intervention by the institution, say disciplinary CEO turnover. The theory predicts under performance prior to both takeovers and direct intervention but in the case of direct intervention, the institution retains its holding to effect the intervention. To check if this is indeed the case I repeat the regression after including a dummy variable to indicate *events* followed by a subsequent disciplinary CEO turnover. While the coefficient on *Log(Market Capitalization)* does increase, it is still significantly negative. Thus, this explanation only partially accounts for the result.

with raw profitability and get similar results.

The results in this section show that the largest institutional shareholder's trading is positively correlated with subsequent abnormal stock return and abnormal operating performance. These results are consistent with the hypothesis that institutional trading is based on private information. The results also contribute to the literature that studies the ability of institutional fund managers to pick stocks (e.g. Kacperczyk, Sialm and Zheng (2005)).

5.A.2 Institutional selling and firm characteristics

In this section, I identify the firm characteristics that are correlated with the choice of the largest institutional shareholder to sell a large fraction of its holding in the one year after the *event*. *Prediction 2* indicates that the institution is likely to sell when the stock is liquid, when the institution's holding is small and in smaller firms. In Table V, I test the prediction by estimating the following OLS model

$$\begin{aligned} Pr(Sale_i = 1) &= \Phi(\beta_0 + \beta_1 * (X)_i + \beta_2 * \textit{Initial Holding}_i \\ &\quad + \beta_3 * \textit{Log(Market Capitalization)}_i + \gamma * \textit{Controls}), \qquad \text{(E-2)} \end{aligned}$$

where $\Phi()$ is the logistic distribution function and X is a measure of stock liquidity. I use three alternate measures of liquidity. X is *Log(Turnover)* in Columns (1) & (2), *Bid-Ask Spread* in Columns (3) & (4) and *Number of Analyst* in Column (5) & (6). Since stock liquidity increases with turnover and analyst coverage and decreases with spread, *Prediction 2* implies $\beta_1 > 0$ in Columns (1), (2), (5) & (6) and $\beta_1 < 0$ in Columns (3) & (4). In Columns (2), (4) & (6) I control for other firm and merger specific characteristics. To control for the presence of other informed investors, I include the aggregate institutional holding (excluding that of the largest block holder) at the time of the *event*, *Total Institutional holding*. PSS show that some institutions sell stocks of firms that cut dividends because the securities become less prudent. To control for this, I include a dummy that indicates a reduction in dividends in the year following the *event*, *Dividend Cut Dummy*. A preference for prudent securities may also induce institutions to sell stocks of firms that have become more risky. Although PSS do not find evidence supporting this assertion, to ensure that the results are not driven by cross sectional difference in risk, I include an ex ante measure of risk, *Stock Volatility*. This is the stock volatility in the one year before the *event*. I do not measure volatility contemporaneous with institutional trading because informed trading can impact (firm specific) volatility (Durnev, Morck, Yeung and Zarowin (2003)). I also include merger specific characteristics including *Swap Dummy*, *Tender Dummy* and *Announcement Return*. The increased activism on the part of public pension funds in the 1990s has been partly attributed to the greater indexation of their portfolio leading to constraints on their ability to sell. To control for this, I include a time dummy variable *Y90s Dummy* that identifies the period 1991-2003.[42]

Results in Table V show that the institution sells its holding in more liquid stocks and when its holding is small. The coefficient on *Log(Market Capitalization*) although consistently negative is only significant in Column (5). This provides very weak evidence that the institution sells in small firms. As mentioned earlier, testing this prediction is difficult because there is a strong positive correlation between firm size and stock liquidity (Roll (1984)) and the measures of liquidity are noisy. I also find that institutions are more likely to sell in riskier firms, (positive coefficient on *Stock Volatility*).

The estimates of β_1 are economically significant. For example, the estimate in Column (2) indicates that a one standard deviation increase in *Log(Turnover)* is correlated with a 9.1% increase in the selling probability. The results from Section 5.A.1 show that institutional trading is informed. That result in combination with the results in Table V indicates that whenever institutions get negative information on firm value, greater stock liquidity induces them to sell their holdings. These tests offer strong support for the contention of Bhide (1994) and Coffee (1991).

I repeat all the regressions with alternate definitions of *Sale*. I let *Sale* equal 1 when the institution sells more than 40%, 60% or 70% of its holding and 0 otherwise. The results are robust to these alternate definitions. I also repeat the tests with *ChngYr* instead of *Sale* and get consistent results. In a recent paper studying the determinants of institutional trading, Nagel (2005) argues that a large fraction of institutional trading is driven by style investing and identifies changes in firm market capitalization, past stock returns and sales to market capitalization ratios as impacting the trading behavior of style investors. To see if the institutional selling is driven by style changes, I repeat the regressions after including changes in these variables in the one year surrounding the *event* as controls. Inclusion of these variables does not have a significant impact on the results reported.

5.B Takeovers

This section discusses the results of tests of *Predictions 3-7* which relate institutional trading and firm characteristics to takeovers.

[42]I include this variable in all the subsequent regressions but report its coefficient only in the specifications where it is significant.

5.B.1 Institutional selling, firm characteristics and takeovers

Prediction 3 indicates that firms are more likely to become targets if the block holder sells its holding or if the firms have a more liquid stock and if they are small. Before formally testing this prediction, I present some univariate evidence. Figure 3 classifies the sample successively into two sub-samples based on *Sale*, *Bid-Ask Spread*, and *Market Capitalization* and plots the average takeover probability for the two sub-samples. The average takeover probability when *Sale*= 1 is 23%, significantly greater than 16%, the takeover probability when *Sale*= 0. Similarly the takeover probability for firms with above median stock liquidity, (measured using *Bid-Ask Spread*) is 21%, significantly greater than 15% for the firms with below median stock liquidity. Small firms, classified on the basis of median *Market Capitalization* have a takeover probability of 23%, significantly greater than that for large firms, 12%. This figure offers preliminary evidence consistent with *Prediction 3*.

Table I shows that the institution sells a greater fraction of its holding in the one year after the *event* in the *Target* sub-sample. This result however does not indicate if the institution *consistently* sells a larger fraction in the *Target* sub-sample. To see this, Figure 4 (5) plot the mean (median) quarterly institutional holding for the four quarters following the *event* for the *Target* sub-sample, the *CEO* sub-sample, and for the other mergers, *Other*. The quarterly holdings are normalized with the shareholding at the time of the *event*. Figure 4 & 5 show that the institution sells more in the *Target* sub-sample in all quarters but the first quarter (in Figure 5). These figures show that the choice of using the four quarters after the *event* to measure institutional trading does not bias the results.

To formally test *Prediction 3*, I estimate the following model in Panel A of Table VI.

$$\begin{aligned} Pr(\mathit{Target}_i = 1) &= \Phi(\beta_0 + \beta_1 * X_i + \beta_2 * \mathit{Bid\text{-}Ask\ Spread}_i \\ &\quad + \beta_3 * \mathit{Log(Market\ Capitalization)}_i + \gamma * \mathit{Controls}), \qquad \text{(E-3)} \end{aligned}$$

where *Target* is a dummy variable that identifies *events* belonging to the *Target* sub-sample and $\Phi()$ is the logistic distribution function. X is *Sale* in Columns (2) & (3) and *ChngYr* in Columns (4) & (5). In Columns (1), (3) & (5) I include other merger and firm specific characteristics. I include the size and book to market adjusted abnormal return *Abnormal*, to ensure that the results are not driven by a mechanical drop in stock prices. Although a fall in stock price is an important route through which institutional sale impacts takeovers, price falls both when the institution directly intervenes and when it sells. On the other hand, takeovers occur only when the institution sells. Thus the theory predicts that institutional selling should be correlated with takeovers even after controlling for abnormal returns. I also control for firm growth rate and liquidity using *Sales Growth* and *Cash/Total Assets* respectively.[43] Following Palepu (1986), I include *Market to Book* ratio to control for firm undervaluation. Stultz (1988) and Harris and Raviv (1988) show that leverage can affect the probability of takeovers. Hence, I include leverage measured by *Debt/Total Assets*. All the firm financials are measured in the one year after the *event* and hence are contemporaneous with the measure of institutional trading. I also include the institutional holding at the time of the *event*, *Initial Holding*, along with *Stock Volatility*, and *Dividend cut dummy* to control for firm risk and firm performance. Shivdasani (1993) documents the predictive power of firm level governance variables such as board structure, equity ownership of insiders and board of directors for hostile takeovers. Firm proxy statements, from which this data is collected, is available only for the post 1994 period. Since inclusion of these variables limits the sample to the post 1994 period, I do not include them in the initial specifications. I run robustness tests including these variables and discuss the results in Section 5.C. Inclusion of these variables does not impact the results reported here.

The results in Column (1) indicate that smaller firms and firms with more liquid stock are more likely to become targets. This is consistent with the evidence in Figure 3. Results in Columns (2)-(5) show that takeover probability increases when the institution sells its holding. The results also indicate that firms with under performing stocks (negative coefficient on *Abnormal*), and firms that do not cut dividends (negative coefficient on *Dividend cut dummy*) are more likely to become targets.[44] The results are both statistically and economically significant. The estimate in Column (3) indicates that if the institution sells more than 50% of its holding within the first year after the *event*, the takeover probability in the next four years increases by 5.6%. In comparison, the unconditional takeover probability of any firm in the sample is 17.6%.[45] Thus institutional selling increases the takeover probability by more than 35%.[46]

I repeat the regressions after including industry fixed effects, where industry is defined at the level of two digit SIC code, with alternate definitions of abnormal returns and after including changes in firm characteristics, which are likely to impact institutional trading (Nagel (2005)). The results are consistent in all the specifications.

[43]Palepu (1986) argues that firms with a miss-match between growth rate and resource available are likely takeover targets. Following this argument, in unreported regressions, I include a dummy variable to identify firms with low growth rate and high liquidity and those with high growth rate and low liquidity. Inclusion of this variable does not impact the results reported here.

[44]Although, firms that cut dividends have low abnormal returns, the correlation between the two in the sample is low because a number of firms pay 0 dividends.

[45]This is measured for the sample with all non-missing observations.

[46]The takeover probability conditional on the institution not selling is 15.7%, while the takeover probability conditional on institution selling is 21.3%.

One of the routes through which institutional selling influences takeovers is by decreasing shareholder concentration and consequently increasing stock liquidity. This will happen if the institution unbundles its block and sells to a number of small investors. While the tests thus far show that institutional selling increases takeover probability, they do not indicate if the selling lowers shareholder concentration and if the lower concentration contributes to the increased takeover probability. To test this, I measure the change in concentration of institutional shareholding in the one year following the *event*. Following Hartzell and Starks (2003), I use herfindal index of institutional holding and the total shareholding of the top five institutional shareholders as measures of institutional concentration. *Change Herf* and *Change Top Five* measure changes in these two concentration measures in the one year following the *event*. Panel B classifies the sample into two sub-samples based on *Sale* and provides the mean and median values of the change in concentration of institutional shareholding for the two sub-samples. As can be seen, stock sale by the largest institutional investor is accompanied by a significant reduction in concentration of institutional shareholding. This indicates that the institution is more likely to unbundle its block and sells to a number of small investors rather than sell the block to another institution.

Panel C reports the results of tests relating the reduction in shareholder concentration to takeover probability. To measure reduction in shareholder concentration, I construct two dummy variables *Change Herf dummy* and *Change Top Five dummy* to indicate the *events* for which the change in the two concentration measures is below the 25^{th} percentile. I include these dummy variables instead of the institutional trading variable and re-estimate (E-3). The results in Panel C clearly show that a fall in concentration of institutional shareholding is accompanied by an increase in takeover probability.

If "informed" selling triggers takeovers, then selling by institutions which are ex ante better informed is likely to have a greater impact on takeover probability. Institutions with larger holdings are likely to be better informed. These institutions will also have greater ability and incentive to sell and trigger a takeover. Institutions with smaller holdings may prefer to free ride and benefit from the eventual takeover rather than sell to trigger one. This suggests that selling by the largest institution should be a much stronger predictor of takeovers. To see if this is the case, I identify all institutional shareholders of the firm, (other than the largest shareholder) who individually own more than 1% shareholding at the time of the *event*. I calculate $ChngYr^{Oth}$ to measure the extent of trading by these institutions in aggregate in the one year following the *event*. I code $Sale^{Oth} = 1$ if $ChngYr^{Oth} < .5$ and 0 otherwise. Preliminary comparison of *ChngYr* and $ChngYr^{Oth}$ indicates that although the other institutions mimic the large institution's trading to some extent (correlation between

ChngYr and $ChngYr^{Oth}$ is .19) they sell to a much lesser extent in firms that subsequently become targets ($ChngYr^{Oth}$=77 in comparison to *ChngYr*=66). To formally test the prediction, I re-estimate (E-3) in Panel C after including $ChngYr^{Oth}$ along with *ChngYr* and $Sale^{Oth}$ along with *Sale*. The results in Column (1) & (2) clearly shows that it is only selling by the largest institution that impacts takeover probability.[47]

Jones, Lee and Weis (1999) and Sias, Starks and Titman (2001) show that among institutional investors, independent investment advisors are better informed. In the context of the theory, this implies that selling by independent advisors should have a greater impact on takeover probability. To see if this is indeed the case, I identify the type of the institution from Spectrum and re-estimate (E-3) after including an interaction term between *ChngYr* and *Independent*, where *Independent* is a dummy variable identifying independent investment advisors. The results shown in Column (3) indicate that selling by independent investment advisors does indeed have a greater impact on takeovers.

The results in this section show that: a) Institutions sell more in firms that subsequently become targets b) Stock sales by the largest institutional shareholder is accompanied by a fall in shareholder concentration and this fall in concentration is associated with an increase in takeover probability and c) Among the institutional shareholders of a firm, selling by the largest institutional shareholder and by independent advisors has a greater impact on takeover probability.

5.B.2 Choice between direct intervention and takeovers

If the block holder chooses between direct intervention and takeovers and sells its holding whenever takeovers are preferable, then conditional on either takeovers or direct intervention, we should observe greater institutional sale prior to takeovers. I now test this prediction. Since firms subject to restructuring usually have under performing stocks (see PSS for evidence of under-performance prior to CEO turnover), a test of this prediction helps differentiate the theory from the *price fall* hypothesis. I use multiple proxies to identify firm restructuring. The first set of tests uses disciplinary CEO turnover as a proxy for restructuring through direct institutional intervention. We expect that in a sample of firms subject to either a disciplinary CEO turnover or takeover, there should be greater institutional sale prior to takeovers. This prediction is not necessarily contrary to the findings of PSS, who document institutional selling

[47] In unreported tests, I repeat the regression with trading by all block holders with more than 5% shareholding and by other institutional investors with less than 5% shareholding. Consistent with the prediction, I find that only selling by block holders predicts takeovers.

prior to disciplinary CEO turnover. This is because, PSS compare institutional trading in firms subject to CEO turnover to that in firms not subject to any form of restructuring. On the other hand, I compare disciplinary CEO turnover sample to a takeover sample. Furthermore, I only look at the trading by one institution, whereas PSS look at trading by all institutions with more than 1% shareholding.

Panel A of Table VII provides the results of estimating (E-3) on a sample of firms that experience either a takeover or a disciplinary CEO turnover. Similar to the earlier tests, institutional trading is measured using *Sale* in Columns (1) & (2) and *ChngYr* in Columns (3) & (4). All the coefficient estimates are of the correct sign, and those in Column (1) & 4 are significant. The results are consistent with block holder trading affecting the choice between internal and external governance. The estimates are also economically significant. The estimate in Column (1) indicates that if the block holder sells more than 50% of its holding, it is accompanied by an increase in the probability of takeover, as against a CEO turnover by 25% over that of a comparable firm. Consistent with the theory, smaller firms and firms with more liquid stock are more likely to experience takeovers in comparison to a disciplinary CEO turnover.

One potential concern with the earlier test is that a wrong classification of routine CEO turnover as disciplinary, biases the estimates in favor of the theory. This is because, even if block holders sell prior to disciplinary CEO turnover, they may not sell prior to routine CEO turnovers. To see if this is a problem, I repeat the tests with alternate proxies for restructuring. First I identify firms with declining operating performance. i.e. those with $ChngProf < 0$. The assumption is that these firms potentially require restructuring and among these firms greater block holder selling should occur in firms that become targets. The results shown in Column (1) & (2) of Panel B are consistent with this prediction. Among firms that experience a fall in operating profitability, the block holder sells to a greater extent in firms that subsequently become targets. In Columns (3) & (4) I repeat the regression on a sub-sample of firms that have $Abnormal < 0$ and obtain similar results.

The results in this section show that institutional trading impacts the choice between direct intervention and takeovers. Firms in which the largest institution sells its holding are more likely to experience a takeover while firms in which the institution retains its holding are more likely to experience direct intervention. Smaller firms with more liquid stock are more likely to experience a takeover as against direct intervention.

5.B.3 Are takeovers an *unintended consequence*?

A positive correlation between institutional stock sale and takeovers can result if takeovers are *merely* an unintended consequence of institutional sale, i.e. where the institution was not aware of the possibility of a takeover. In this section I analyze institutional trading close to the time of the takeover to test if institutions are aware of the takeover possibility. If institutions are aware of the impact of their trading on takeovers, then with multiple rounds of trading and after the stock price has fallen sufficiently so as to make takeovers imminent, institutions should slow down the rate of sales in anticipation of a takeover. I now present evidence consistent with this prediction.

For some preliminary evidence, I look at the institutional holding at the time of the actual takeover. If institutions anticipate a takeover then they are likely to retain a part of their holding till the takeover. In 67% of the firms that become targets, (88 out of 131), the institution retains a part of its holding till the takeover announcement.[48] As against this, in firms that do not experience a takeover, the institution retains some holding in only 56% of cases 11 quarters after the *event*. 11 quarters is the median time between the *event* and the takeover. While this offers some preliminary supportive evidence, the important question is whether institutions slow down the rate of selling in anticipation of a takeover. If institutions slow down selling in anticipation of a takeover, changes in institutional holding in the quarters preceding the takeover should be positively related to takeover probability. To formally test this, I relate quarterly changes in institutional holding to takeover probability using the following panel model in Table VIII.

$$Pr\left(\text{Target}_{it}=1\right)=\Phi\left(\ \beta_0+\beta_1 * (\Delta Hold)_{it}+\gamma * \mathit{Controls}+\text{Time Dummies}\ \right), \qquad \text{(E-4)}$$

where $\Phi()$ denotes the logistic distribution function; *Target* is a dummy that takes a value 1 if a firm is taken over in quarter $t+1$ and 0 otherwise. $\Delta\ Hold_{it}$ is the change in institutional shareholding in quarter t. This panel model is similar to a hazard model and enables use of time varying covariates.[49] I use a number of financial variables and stock market variables as controls. Following the discussion in Section 5.B.2, I control for firm performance using quarterly size and book to market adjusted abnormal return *Abnormal*, quarterly growth rate using *Sales Growth*, institutional holding at the beginning of the quarter using *Hold*, liquidity using *Cash/TA*, leverage using *Debt/TA*, along with *Stock Volatility*, and *Dividend cut dummy* to control for firm risk and firm performance.

[48] In these cases, the institution on average retains 52% of its initial holding till the takeover.

[49] See Shumway (2001) for a comparison of hazard models and panel data models.

The theory predicts $\beta_1 > 0$. I estimate the model under alternate specifications and present the results in Table VIII. Since all firms that get taken over within four quarters after the *event* are excluded, by construction *Target* is 0 for all firms for the first three quarters. Inclusion of this time period may bias the results in favor of the theory because the institution engages in rapid sale during this time period. Hence I exclude this time period from the estimation. In Column (1) I estimate the model after adjusting the standard errors for heteroscedasticity and clustering at an individual firm level. The results indicate that the institution slows down the rate of sales in anticipation of a takeover. The results are economically significant. The coefficient on $\Delta Hold_t$ indicates that a one standard deviation increase in institutional holding is accompanied by an increase in the takeover probability in the next quarter by .4%. In comparison the sample average takeover probability in any one quarter is 1%. Thus institutional trading increases takeover probability by over 40%.

In Column (2) I repeat the regression after including dummies for the quarters since *event*. In Column (3) I exclude the firms that were taken over within six quarters after the initial *event*. This is to ensure that these firms do not disproportionately influence the results. Since the institution does not short sell, one possible concern is that the results are influenced by institutional holding remaining constant after it reaches 0. To control for this, in Column (4) I include a dummy variable *Zero* to identify quarters in which the institutional holding is 0. The results are consistent in all the specifications. The results show that institutions are indeed aware of the takeover probability and slow down the rate of selling in response.

In unreported regressions I repeat the tests after including industry fixed effects at 4 digit SIC code and obtain consistent results.

5.B.4 Takeovers and institutional block holders

If institutional sale has an incremental impact on takeovers, then firms with institutional block holders should have a higher takeover probability. This prediction is similar to Shleifer and Vishny (1986), who highlight the role of block holders in facilitating takeovers by overcoming free rider problems. While I also argue that large shareholders facilitate takeovers, I explicitly identify the mechanism at work. As mentioned earlier, Shivdasani (1993) finds empirical support for the Shleifer and Vishny (1986) hypothesis among a sample of firms experiencing hostile takeovers. To test the prediction, I expand the sample to include the *events* for which the acquirer did not have an institutional shareholder with more than 5% shareholding. i.e. I retain all the sample selection criteria except the one requiring a 5% institutional block holder. For the *events* without an institutional block holder, I identify takeovers that occur subsequent to the initial *event*. The objective is to see if the firms with a 5% block holder have a higher takeover probability. To do this, I estimate the following model in Table IX

$$Pr(\text{Target}_i = 1) = \Phi\Big(\ \beta_0 + \beta_1 * (X)_i + \gamma * \ \ Controls\ \Big), \tag{E-5}$$

where X is *Block* in Columns (1), (2) & (3) and *Initial Holding* in Columns (4) & (5). *Block* is a dummy variable that identifies firms with institutional block holders with more than 5% shareholding at the time of the initial *event* and *Initial Holding* is the fractional holding of the largest institutional shareholder at the time of the *event*. I employ two alternate methods to control for other covariates. In Columns (2) and (5) I explicitly include other controls such as *Log(Market Capitalization)*, *Bid-Ask Spread*, *Sales Growth*, *Cash/Total Assets* and *Debt/Total Assets*. In Column (3), I employ a propensity score matching method to control for covariates. The advantage of the propensity score method is that it reduces the number of the control variables to one propensity score and enables use of interaction effects. To implement this method, I first estimate a logistic regression to predict the probability that a firm has an institutional block holder. The dependent variable in this regression is *Block*. I include *Bid-Ask Spread*, *Log(Market Capitalization)*, *Log(Turnover)* and *Log(Turnover)*^{2} as independent variables. From this first stage, I obtain the predicted probability that a firm has an institutional block holder, *Pr(Block=1)*. This predicted probability is the propensity score. In the second stage regression, I estimate E-5 with *Pr(Block=1)* in place of the control variables. I also include an interaction term between the demeaned *Pr(Block=1)* and *Block*. The results of this second stage regression are given in Column (3).

All the coefficient estimates are of the correct sign, and statistically significant. The results are consistent with institutional block holding being correlated with a higher takeover probability. The estimates are also economically significant. The estimate in Column (2) indicates that presence of an institutional block holder is associated with a takeover probability which is 25% greater than that of a comparable firm.

One advantage of estimating the propensity score is that we can view the results graphically. To do this, I first divide the sample into four equal sized quartiles based on the estimated *Pr(Block=1)*. Within each quartile I identify firms that actually have a block holder and those that don't. Figure 6 plots the mean takeover probability within these two groups for the four quartiles. Since the two groups within each quartile are matched on *Pr(Block=1)*, any difference in the takeover probability can be attributed to the actual presence of a block holder. Figure 6 shows that firms with block holders have a higher takeover probability. One concern with Figure 6 is that the range of *Pr(Block=1)* in the first quartile is quite large $(0.11, 0.54)$. As a result *Pr(Block=1)* may not be equal in the two groups. To correct for this, Figure 7 splits the sample into four groups so as to ensure an approximately equal spread of *Pr(Block=1)* within each group and plot the average takeover probability for these groups. Figure 7 is similar to Figure 6 and offers further evidence that presence of block holders increases the takeover probability.

5.C Robustness and Alternate Specifications

5.C.1 Governance Characteristics

In this subsection I test if firm level governance characteristics impact institutional trading and takeovers and also estimate if the earlier results relating institutional selling to takeovers are robust to the inclusion of governance characteristics. Specifically I consider the following governance variables: Gompers-Ishii-Mertrick index of takeover defences, *G-Index*, a dummy identifying presence of dual class shares, *Dual Class*, a dummy identifying firms where the CEO owns more than 5% shareholding, *CEO Equity Dummy*, a dummy identifying firms in which the Board of Directors collectively own more than 5% shareholding *Board Equity Dummy*, a dummy identifying firms in which the CEO is also the chairman of the board, *CEO Chairman* and the fraction of inside directors in the Board, *Inside Directors*.

According to the theory, institutions choose between direct intervention and takeovers and sell in firms with a higher ex ante takeover probability and where direct intervention is less attractive. To derive predictions on how firm level governance variables influence institutional trading, I should be able to identify how these variables affect the costs of takeovers and direct intervention. Since it is difficult to distinguish the incremental impact of these variables on direct intervention vis-a-vis takeovers, I am unable to derive predictions on how they will impact institutional trading.

To estimate how the governance characteristics impact institutional trading, in Panel A of Table XI, I re-estimate (E-2) after including the governance characteristic one at a time. The results show that institutional trading is only related to the presence of dual class shares. Institutions are more likely to sell in firms with dual class shares. None of the other governance characteristics is significantly related to institutional selling. In Panel B of Table XI, I test the impact of the governance characteristics on takeover probability by re-estimating (E-3) after including the governance variables. The results in Panel B show that inclusion of the governance variables has no impact on the coefficient on *ChngYr*. The results also show that firms in which the CEO owns more than 5% of the shareholding, where the CEO is also the Chairman of the Board and in which the Board has a larger fraction of insider directors are less likely to become targets.

5.C.2 Alternate Sample

One important concern with the empirical analysis thus far is the use of the specific sample of firms undertaking acquisitions. To see if the results are generalizable, I repeat the test of *Prediction 3* on a larger sample of firms. To construct this sample, I identify all firm-years from Spectrum in which the largest institutional block holder had more than 5% shareholding at the end of the first calendar quarter during the period 1985-2001.[50] I then measure the extent of trading by this institution in the following one year, *ChngYr* and identify firms that were taken over in the next one year period. Before formally testing *Prediction 3*, a comparison of the unconditional sample to the sample conditional on an acquisition, shows that not only is the takeover probability much lesser in the unconditional sample (annual probability of 1.3% in comparison to 4.25%) but the institution also sells less in the one year period (Mean *ChngYr* of 88 in comparison to 75). This highlights the fact that conditioning on an initial acquisition, provides a sample with a lot more takeover activity and more institutional trading and consequently with greater power to test the theory.

To formally test *Prediction 3* in the larger sample, I estimate the following model in Panel B of Table XI.

$$\begin{aligned} Pr(Target_i = 1) \quad = \quad & \Phi(\beta_0 + \beta_1 * ChngYr_i + \beta_2 * Log(Turnover)_i + \beta_3 * Log(Market\ Capitalization)_i \\ & + \gamma * Controls_i + \text{Time Fixed Effects} + \text{Industry Fixed Effects} \\ & + \text{Institution Fixed Effects}) \qquad \text{(E-6)} \end{aligned}$$

where $\Phi()$ is the logistic distribution function, $Target_i$ is a dummy variable that takes a value 1 for firms which became targets and 0 otherwise. Other controls include, *Abnormal*, *Sales Growth*, *Cash/Total Assets*, and *Debt/Total Assets*. The stock return and the firm financials are measured contemporaneous with *ChngYr*. I also include the institutional holding *Initial Holding*. Column (1) estimates the model on the full sample and without the firm financials. I do so because inclusion of firm financials significantly reduces the number of observations, especially among firms that subsequently become targets.[51] Consistent with the earlier results, selling by the institution strongly predicts subsequent takeover. In Column (2), I repeat the

[50] I do not consider the institutional holding at the end of the fourth quarter because of concerns of window dressing.

[51] If I stipulate non-missing values for the firm financials, the sample average takeover probability reduces from 8.1% to 1.3%.

regression after including the financials. In Column (3), I include industry fixed effects at the level of four digit SIC code. In Column (4), I include institution fixed effects. The results in all specifications are consistent with the theory.

There are instances in the sample wherein the institutional block holder also has shareholding in the ultimate acquirer. In these cases the institution is likely to possess information about the ultimate acquirer and the need to sell to attract a bidder may be less. Hence, we expect the institution to sell less in cases where it holds shares in the ultimate acquirer. To test this prediction, in Column (5), I include an interaction term between *ChngYr* and *Holding in Acquirer*, where *Holding in Acquirer* is a dummy variable that identifies the cases where the institution also has shareholding in the ultimate acquirer. Consistent with the prediction, the coefficient on this term is significantly positive, indicating that the institution sells less in these cases. This provides further evidence that the institutional block holder is aware of the takeover probability.

The tests with the larger sample confirm the earlier results and show that they are generalizable.

6 Conclusion

This paper highlights the governance role of large shareholder trading and provide supportive evidence. Trading by a privately informed large shareholder can impact the probability of takeovers. I formalize this intuition in a model and show that takeover probability increases when a large shareholder sells. The model shows that large shareholders are likely to directly intervene in larger firms, firms with less liquid stock and when their holding is large. In firms with the opposite set of characteristics they are likely to sell and facilitate intervention through takeovers. The analysis also highlights that large shareholders may engage in loss making trades in a bid to induce a takeover.

I test the model predictions using institutional trading data on a sample of firms that undertake large acquisitions. The sample helps focus on a set of firms with potential agency problems and highlight the mechanisms that help solve these problems. A summary of the results is as follows: Institutional block holder trading significantly predicts subsequent firm performance. Controlling for the stock returns and other known determinants, institutional block holder selling has a large and positive impact on takeover probability. If the largest block holder sells more than 50% of its holding in the one year following an acquisition, the takeover probability in the next four years increases by 35%. The block holder is aware of the takeover possibility and slows down the rate of sales.

Apart from highlighting the governance role of large shareholder trading, the results offer a potential explanation for the observed preference of Board of Directors to avoid institutional shareholder exit (PSS). The evidence highlights the complementary role of internal and external governance mechanisms and also helps understand the role of market liquidity on firm control. While, liquidity does induce incumbent institutions to liquidate their holding, it also enables a new entrant to acquire holding and takeover the firm. The paper also highlights the firm characteristics that induce direct intervention and takeovers.

In the real world there is heterogeneity among large shareholders in their ability to directly influence firm value. While financial institutions have greater ability in collecting private information on future firm prospects, other large shareholders, say competing firms or downstream/upstream firms have greater ability in improving firm value by influencing firm decisions. In such a setting, this paper highlights an important role shareholders with lower intervention ability can play in facilitating entry of shareholders with greater intervention ability. An important extension of the analysis is to examine the welfare implications of the large shareholder's choice and relate it to optimal regulations for public firms. One immediate implication of the analysis is that improvements in market liquidity should be accompanied by easing of takeover regulations.

References

1. Attari, Mukarram, Suman Banerjee and Thomas H. Noe, 2005, Crushed by a rational stampede: Strategic share dumping and shareholder insurrections, *Journal of Financial Economics* Forthcoming.
2. Bebchuk, Lucian Arye, Alma Cohen and Allen Ferrell, 2004, What matters in corporate governance? *Harvard Law School John M. Olin Center Discussion Paper No. 491. http://ssrn.com/abstract=593423.*
3. Bennett, James A., Richard W. Sias and Laura T. Starks, 2003, Greener pastures and the impact of dynamic institutional preference, *Review of Financial Studies* 16, 1203-1238.
4. Bhide, Amar, 1993, The hidden costs of stock market liquidity, *Journal of Financial Economics* 34, 31-51.
5. Bolton, Patrick and Ernst-Ludwig vonThadden, 1998, Blocks, liquidity and corporate control, *Journal of Finance* 53, 1-26.
6. Brancato, Carolyn K., 1997, Institutional investors and corporate governance, Irwin, Chicago, IL.
7. Brickley, James A., Ronald C. Lease and Clifford W. Smith Jr., 1988, Ownership structure and voting on antitakeover amendments, *Journal of Financial Economics* 20, 267-291.
8. Bushee, Brian J., 1998, The influence of institutional investors on myopic R&D investment behavior, *Accounting Review* 73, 305-333.
9. Campbell, John Y., Tarun Ramadorai and Tuomo Vuolteenaho, 2005, Caught on tape: Institutional order flow and stock returns, *Harvard Institute of Economic Research Discussion Paper No. 2080 http://ssrn.com/abstract=770764.*
10. Chen, Xia, Jarrad Harford and Kai Li, 2005, Institutional investors and corporate acquisition decisions, *University of British Columbia Working Paper.*
11. Core, John, E., Wayne R. Guay and Tjomme O. Rusticus, 2005, Does weak governance cause weak stock returns? An examination of firm operating performance and investors expectations, *Journal of Finance* Forthcoming
12. Cornelli, Francesca and David D. Li, 2002, Risk arbitrage in takeovers, *Review of Financial Studies* 15, 837-868.
13. Coffee, John, C., 1991, Liquidity versus control: The institutional investor as corporate monitor, *Columbia Law Review* 91, 1277-1368.
14. Cremers, Martijn, K. J. and Vinay B. Nair, 2005, Governance mechanisms and equity prices, *Journal of Finance* Forthcoming.
15. Griffin, John M., Jeffrey Harris and Selim Topaloglu, 2003, The dynamics of institutional and individual trading, *Journal of Finance* 58, 2285-2320.
16. Del Guercio, Diane and Jennifer Hawkins, 1999, The motivation and impact of pension fund activism, *Journal of Financial Economics* 52, 293-340.
17. Denis, David, Diane Denis and Atulya Sarin, 1997, Ownership structure and top executive turnover, *Journal of Financial Economics* 45, 193-221.
18. Downes, Gile R. Jr., Ehud Houminer and R. Glen Hubbard, 1999, Institutional investors and corporate behavior, *The American Enterprise Institute Working Paper.*
19. Durnev, Artyom, Randall Morck, Bernanr Yeung and Paul Zarowin, 2003, Does greater firm-specific return variation mean more or less informed stock pricing?, *Journal of Accounting Research* 41, 797-836.
20. Felton, Robert F., 1997, Putting a value on governance, *Directors and Boards* 21, 4447.
21. Gillan, Stuart L. and Laura T. Starks, 1998, A survey of shareholder activism: Motivation and empirical evidence. *Contemporary Finance Digest* 2, 1034.

22. Gillan, Stuart L. and Laura T. Starks, 2000, Corporate governance proposals and shareholder activism: The role of institutional investors, *Journal of Financial Economics* 57, 275- 305.

23. Gompers, Paul A., Joy L. Ishii and Andrew Metrick, 2003, Corporate governance and equity prices, *Quarterly Journal of Economics* 118, 107-155.

24. Gopalan, Radhakrishnan, 2005, The governance role of large shareholder trading- A theoretical analysis, *University of Michigan Working Paper.*

25. Harris, Milton and Arthur Raviv, 1988, Corporate control contests and capital structure, *Journal of Financial Economics* 20, 55-86.

26. Hartzell, Jay C. and Laura T. Starks, 2003, Institutional investors and executive compensation, *Journal of Finance* 58, 2351-2374.

27. Hartzell, Jay C., Eli Ofek and David Yermack, 2004, Whats in it for me? CEOs whose firms are acquired, *Review of Financial Studies* 17, 37- 61.

28. Hasbrouck, Joel, 2005, Trading costs and returns for US equities: The evidence from daily data, *New York University, Stern School of Business Working Paper.*

29. Hirshleifer, David and Anjan V. Thakor, 1998, Corporate control through board dismissals and takeovers, *Journal of Economics & Management Strategy* 7, 489-520.

30. Holmstrom, Bengt and Jean Tirole, 1993, Market liquidity and performance monitoring, *Journal of Political Economy* 101, 678-709.

31. Holmstrom, Bengt and Steven N. Kaplan, 2003, The state of U.S. corporate governance: What's right and what's wrong? *The Bank of America Journal of Applied Corporate Finance* 15, 8-

32. Huson, Mark R., 2001, Does governance matter? Evidence from CalPERS interventions, *Faculty of Business working paper*, University of Alberta.

33. Huson, Mark R., Robert Parrino and Laura T. Starks, 2001, Internal monitoring mechanisms and CEO turnover: A long-term perspective, *Journal of Finance* 56, 2265-2297.

34. Jones, Steve, Darrell Lee and Edward Weis, 1999. Herding and feedback trading by different types of institutions and the effects on stock prices, *Working paper*, Indiana University.

35. Kacperczyk, Marcin, Clemens Sialm and Lu Zheng, 2005, On the industry concentration of actively managed equity mutual funds, *Journal of Finance* 60, 1983-2012.

36. Kahn, Charles and Andrew Winton, 1998, Ownership structure, speculation and shareholder intervention, *Journal of Finance* 53, 99-129.

37. Kyle, Albert, 1985, Continuous auctions and insider trading, *Econometrica* 53, 1335-1355.

38. Lang, Mark and Maureen McNichols, 1997, Institutional trading and corporate performance, *Stanford University working paper.*

39. Lehn, Kenneth, and Mengxin Zhao, 2004, CEO turnover after acquisitions: Do bad bidders get fired?, *University of Pittsburgh Working paper.*

40. Lowenstein, Louis, 1988, Whats wrong with Wall Street?, *Addison-Wesley, Reading,* MA.

41. Maug, Ernst, 1998, Large shareholders as monitors: Is there a trade-off between liquidity and control?, *Journal of Finance* 53, 65-94.

42. McConnell, John J. and Henri Servaes, 1990, Additional evidence on equity ownership and corporate value, *Journal of Financial Economics* 27, 595-613.

43. Mitchell, Mark L. and Kenneth Lehn, 1990, Do bad bidders become good targets?, *Journal of Political Economy* 98, 372-398.

44. Moeller, Sara B., Frederik P. Schlingemann and Rene M. Stulz, 2005, Wealth destruction on a massive scale: A study of acquiring firm returns in the recent merger wave, *Journal of Finance* 60, 757-782.

45. Morck, Randall, Andrei Shleifer and Robert W. Vishny, 1988, Characteristics of targets of hostile and friendly takeovers. In Allan J. Auerbach ed., *Corporate Takeovers Causes and Consequences*, (National Bureau of Economic Research, IL Chicago).

46. Morck, Randall, Andrei Shleifer and Robert W. Vishny, 1989, Alternate mechanisms for corporate control, *American Economic Review* 89, 842-852.

47. Nagel, Stefan, 2005, Trading styles and trading volume, *Stanford University Working Paper.*

48. New York Stock Exchange, 1993, *Fact Book*, New York Stock Exchange, New York.

49. Nofsinger, John R. and Richard W. Sias, 1999, Herding and feedback trading by institutional and individual investors, *Journal of Finance* 54, 2263-2295.

50. Palepu, Krishna, 1986, Predicting takeover targets: A methodological and empirical analysis, *Journal of Accounting and Economics* 8, 3-35.

51. Parrino, Robert, 1997, CEO turnover and outside succession: A cross-sectional analysis, *Journal of Financial Economics* 46, 165197.

52. Parrino, Robert, Richard W. Sias and Laura T. Starks, 2003, Voting with their feet: Institutional ownership changes around forced CEO turnover, *Journal of Financial Economics* 68, 3-46.

53. Qiu, Lily Xiaoli, 2004, Which institutional investors monitor? Evidence from acquisition activity, *Yale ICF Working Paper No. 04-15.*

54. Rau, Raghuvendra and Theo Vermaelen, 1998, Glamour, value and the post-acquisition performance of acquiring firms, *Journal of Financial Economics* 49, 223-253.

55. Roll, Richard, 1984, A simple implicit measure of effective bid-ask spread in an efficient market, *Journal of Finance* 39, 1127-1139.

56. Schwert, William G., 2000, Hostility in takeovers: In the eyes of the beholder?, *Journal of Finance* 55, 2599-2640.

57. Shivdasani, Anil, 1993, Board composition, ownership structure and hostile takeovers, *Journal of Accounting and Economics* 16, 167-198.

58. Shleifer, Andrei and Robert Vishny, 1986, Large shareholders and corporate control, *Journal of Political Economy* 94, 461-488.

59. Shumway, Tyler, 2001, Forecasting bankruptcy more accurately: A simple hazard model, *Journal of Business* 74, 101-124.

60. Sias, Richard W., Laura T. Starks and Sheridan Titman, 2001, The price impact of institutional trading, http://ssrn.com/abstract=283779.

61. Smith, Michael P., 1996, Shareholder activism by institutional investors: Evidence from CalPERS, *Journal of Finance* 51, 227-252.

62. Strickland, Deon, Kenneth W. Wiles and Marc Zenner, 1996, A requiem for the USA: Is small shareholder monitoring effective? *Journal of Financial Economics* 40, 319-338.

63. Stultz, Rene, 1988, Managerial control of voting rights: Financing policies and the market for corporate control, *Journal of Financial Economics* 20, 25-54.

64. Wahal, Sunil, 1996, Pension fund activism and firm performance, *Journal of Financial and Quantitative Analysis* 31, 1-23.

65. Wahal, Sunil and John J. McConnell, 2000, Do institutional investors exacerbate managerial myopia?, *Journal of Corporate Finance* 6, 307-329.

66. Wermers, Russ, 1999, Mutual fund herding and the impact on stock prices, *Journal of Finance* 54, 581-622.

67. Yung, Chris, 2005, Insider trading with private information and moral hazard, *Finance Research Letters* 2, 51-57.

A APPENDIX A - Proofs

A.A Analysis when LI sells on observing $S = B$

A.A.1 Price at $t = 1$, reveals state to be either B or U

For ease of notation I let $\theta[1-\alpha][1+\theta] = \gamma$. In this case, the bidder invests c_i and bids for γ shares when the state is revealed to be B. The total gains from trade for a bidder of quality X is $\gamma[X - E(P^S_{Bu})]$, where $E(P^S_{Bu})$ is the expected price at which the bidder can acquire shares at $t = 2$. The bidder gets this gain when the state is B, which occurs with a probability $\frac{q}{1-p}$. Thus the expected payoff of the bidder is $\frac{q}{1-p}\gamma[X - E(P^S_{Bu})]$. The marginal bidder'squality can be given by the following equality

$$\frac{q}{1-p}\gamma[X - E(P^S_{Bu})] = c_i + \frac{q}{1-p}c^b_r$$

$$\text{or} \qquad X^S_{Bu} = \frac{c_i + \frac{q}{1-p}c^b_r}{\frac{q}{1-p}\gamma} + E(P^S_{Bu}) = \frac{c_i[1-p] + qc^b_r}{q\gamma} + E(P^S_{Bu})$$

The probability of a bid, δ^S_{Bu} and the value of the firm conditional on a takeover W^S_{Bu} can be obtained by noting that bidder quality is distributed $U[0,1]$. I now evaluate $E(P^S_{Bu})$. When the bidder bids for γ shares at $t = 2$, the total order flow can be 0, γ or 2γ with equal probability. An order flow of 0 or γ, will reveal no information while an order flow of 2γ will reveal the presence of the bidder. $E(P^S_{Bu})$, can hence be given as

$$E(P^S_{Bu}) = \frac{1}{3}[W^S_{Bu} + 2\frac{q}{1-p}\delta^S_{Bu}W^S_{Bu}]$$

A.B Proof of Lemma 1

I prove the comparative statics results for $\delta^S_{Noinfo}W^S_{NoInfo}$. The results for $\delta^S_{Bu}W^S_{Bu}$ can be proved along similar lines. Let $C_{NoInfo} \equiv \frac{c_i + qc^b_r}{q\gamma}$. I note that $\frac{\partial C_{NoInfo}}{\partial \theta} < 0$, $\frac{\partial C_{NoInfo}}{\partial \alpha} > 0$, $\frac{\partial C_{NoInfo}}{\partial c_i} > 0$ and $\frac{\partial C_{NoInfo}}{\partial c^b_r} > 0$. Since θ, α, c_i, and c^b_r, impact $\delta^S_{NoInfo}W^S_{NoInfo}$ only through C_{NoInfo}, to prove the results, it is sufficient to show that $\frac{\partial(\delta^S_{NoInfo}W^S_{NoInfo})}{\partial C_{NoInfo}} < 0$. To show this, I first express $\frac{\partial(\delta^S_{NoInfo}W^S_{NoInfo})}{\partial C_{NoInfo}}$ in terms of $\frac{\partial E(P^S_{NoInfo})}{\partial C_{NoInfo}}$ and then substitute for $\frac{\partial E(P^S_{NoInfo})}{\partial C_{NoInfo}}$. I can express $\delta^S_{NoInfo}W^S_{NoInfo}$ as

$$\delta^S_{NoInfo}W^S_{NoInfo} = \frac{1 - [C_{NoInfo} + E(P^S_{NoInfo})]^2}{2}$$

Differentiating with respect to C_{NoInfo} I have

$$\frac{\partial(\delta^S_{NoInfo}W^S_{NoInfo})}{\partial C_{NoInfo}} = -[C_{NoInfo} + E(P^S_{NoInfo})][1 + \frac{\partial E(P^S_{NoInfo})}{\partial C_{NoInfo}}] \tag{A-1}$$

To evaluate $\frac{\partial E(P^S_{NoInfo})}{\partial C_{NoInfo}}$ I totally differentiate (2) with respect to C_{NoInfo}.

$$\frac{\partial E(P^S_{NoInfo})}{\partial C_{NoInfo}} = \frac{1}{3}[\frac{1}{2}\frac{\partial E(P^S_{NoInfo})}{\partial C_{NoInfo}} + \frac{1}{2} - \frac{q[2-p]}{1-p}\{C_{NoInfo} + E(P^S_{NoInfo})\}\{1 + \frac{\partial E(P^S_{NoInfo})}{\partial C_{NoInfo}}\}]$$

$$\frac{\partial E(P^S_{NoInfo})}{\partial C_{NoInfo}} = \frac{1 - \frac{2q[2-p]}{1-p}[C_{NoInfo} + E(P^S_{NoInfo})]}{5 + \frac{2q[2-p]}{1-p}[C_{NoInfo} + E(P^S_{NoInfo})]}$$

Substituting for $\frac{\partial E(P^S_{NoInfo})}{\partial C_{NoInfo}}$ in (A-1) I get

$$\frac{\partial(\delta^S_{NoInfo}W^S_{NoInfo})}{\partial C_{NoInfo}} = -\frac{6[C_{NoInfo} + E(P^S_{NoInfo})]}{5 + \frac{2q[2-p]}{1-p}[C_{NoInfo} + E(P^S_{NoInfo})]} \tag{A-2}$$

The LHS of the above equation is negative. This proves the lemma. Q.E.D.

A.C Analysis when LI does not trade on observing $S = B$

As discussed in the text, the bidder may bid when the price at $t = 1$ a) reveals the state to be either G or B, b) does not reveal any information about the state and c) reveals the state to be either B or U. In all three cases, the bidder will bid for β shares only if his information reveals the state to be B. I now analyze the cases in turn.

A.C.1 Price at $t = 1$, reveals state to be either G or B

For ease of notation I let $\theta[1-\alpha] = \beta$. The total gains from trade for a bidder of quality X, bidding for β shares is $\beta[X - E(P_{Gb}^{NT})]$. The bidder gets this gain when the state is B, which occurs with a probability $\frac{q}{q+p}$. Thus, the expected payoff of the bidder is $\frac{q}{q+p}\beta[X - E(P_{Gb}^{NT})]$. The marginal bidder, can be identified by the following equality

$$\frac{q}{q+p}\beta[X - E(P_{Gb}^{NT})] = c_i + \frac{q}{q+p}c_r^b$$
$$\text{or} \quad X_{Gb}^{NT} = \frac{c_i + \frac{q}{q+p}c_r^b}{\frac{q}{q+p}\beta} + E(P_{Gb}^{NT}) = \frac{c_i[q+p] + qc_r^b}{q\beta} + E(P_{Gb}^{NT})$$

The probability of a bid, δ_{Gb}^{NT} and the value of the firm conditional on a takeover W_{Gb}^{NT} can be obtained by noting that bidder quality is distributed $U[0,1]$. I now evaluate $E(P_{Gb}^{NT})$. When the bidder bids for β shares at $t = 2$, the total order flow to the market maker can be 0, β or 2β with equal probability. An order flow of 0, does not reveal any new information, while an order flow of β, reveals the state to be B. This is because the maximum volume of liquidity trading when the state is G is $\delta < \beta$ and when the state is U is $\gamma > \beta$. An order flow of 2β reveals the presence of the bidder. $E(P_{Gb}^{NT})$ can be given as

$$E(P_{Gb}^{NT}) = \frac{1}{3}[W_{Gb}^{NT} + \delta_{Gb}^{NT}W_{Gb}^{NT} + \frac{1}{p+q}\{pY + q\delta_{Gb}^{NT}W_{Gb}^{NT}\}]$$

A.C.2 Price at $t = 1$ reveals no information about the state

The total gains for a bidder of quality X, is $\beta[X - E(P_{NoInfo}^{NT})]$. The bidder gets this gain whenever the state is B, which occurs with a probability q. The marginal bidder's quality can be given by the following equality

$$q\beta[X - E(P_{NoInfo}^{NT})] = c_i + qc_r^b \quad \text{or} \quad X_{NoInfo}^{NT} = \frac{c_i + qc_r^b}{q\beta} + E(P_{NoInfo}^{NT})$$

The probability of a bid, δ_{NoInfo}^{NT} and the value of the firm conditional on a takeover W_{NoInfo}^{NT} can be obtained by noting that bidder quality is distributed $U[0,1]$. I now evaluate $E(P_{NoInfo}^{NT})$. When the bidder bids for β shares at $t = 2$, the total order flow to the market maker can be 0, β, or 2β with equal probability. Similar to the earlier case, an order flow of 0 does not convey any new information, while an order flow of β reveals the state to be B. An order flow of 2β reveals the presence of the bidder. $E(P_{NoInfo}^{NT})$ can hence be given as

$$E(P_{NoInfo}^{NT}) = \frac{1}{3}[W_{NoInfo}^{NT} + \delta_{NoInfo}^{NT}W_{NoInfo}^{NT} + pY + qPr_{NoInfo}W_{NoInfo}]$$

A.C.3 Price at $t = 1$, reveals state to be either B or U

In this case, the posterior probability of the B state is $\frac{q}{1-p}$. Hence, the marginal bidder's quality can be given by the following equality

$$\frac{q}{1-p}\beta[X - E(P_{Bu}^{NT})] = c_i + \frac{q}{1-p}c_r^b$$
$$\text{or} \quad X_{Bu}^{NT} = \frac{c_i + \frac{q}{1-p}c_r^b}{\frac{q}{1-p}\beta} + E(P_{Bu}^{NT}) = \frac{c_i[1-p] + qc_r^b}{q\beta} + E(P_{Bu}^{NT})$$

The probability of a bid, δ_{Bu}^{NT} and the value of the firm conditional on a takeover W_{Bu}^{NT} can be obtained by noting that bidder quality is distributed $U[0,1]$. The total order flows at $t = 2$ and the information revealed by them are the same as in earlier cases. $E(P_{Bu})$ can hence be given as

$$E(P^{NT}_{Bu}) = \frac{1}{3}[W^{NT}_{Bu} + \delta^{NT}_{Bu} W^{NT}_{Bu} + \frac{q}{1-p}\delta^{NT}_{Bu} W^{NT}_{Bu}]$$

A.C.4 LS's total payoff

Finally, LI's payoff if $S = B$ and he does not trade is equal to the expected value of LI's holding with a takeover. This can be given as:

$$V^{NT} \quad = \quad \frac{\alpha}{3}[\delta^{NT}_{Gb} W^{NT}_{Gb} + \delta^{NT}_{NoInfo} W^{NT}_{NoInfo} + \delta^{NT}_{Bu} W^{NT}_{Bu}] \tag{A-3}$$

A.D Analysis when LI buys on observing $S = B$

In this case, the bidder may bid when the price at $t = 1$ a) reveals the state to be either G or B and b) does not reveal any information about the state. Whenever the bidder bids, he will bid for δ shares.

A.D.1 Price at $t = 1$, reveals state to be either G or B

For ease of notation I let $\theta[1-\alpha][1-\theta] = \delta$. The posterior probability of the B state is $\frac{q}{q+p}$ and the bidder bids for δ shares. The marginal bidder's quality can be given by the following equality

$$\frac{q}{q+p}\delta[X - E(P^B_{Gb})] = c_i + \frac{q}{q+p}c^b_r \qquad \text{or} \qquad X^B_{Gb} = \frac{c_i + \frac{q}{q+p}c^b_r}{\frac{q}{q+p}\delta} + E(P^B_{Gb}) = \frac{c_i[q+p] + qc^b_r}{q\delta} + E(P^B_{Gb})$$

The probability of a bid, δ^B_{Gb} and the value of the firm conditional on a takeover W^B_{Gb} can be obtained by noting that bidder quality is distributed $U[0,1]$. The total order flow to the market maker at $t = 2$ can be $\{0, \delta, 2\delta\}$ with equal probability. An order flow of 0 or δ, does not convey any new information, as it can arise in either state. On the other hand an order flow of 2δ, reveals the presence of the bidder. Hence, $E(P^B_{Gb})$ can be given as

$$E(P^B_{Gb}) = \frac{1}{3}[W^B_{Gb} + \frac{2}{q+p}\{pY + q\delta^B_{Gb} W^B_{Gb}\}]$$

A.D.2 Price at $t = 1$, reveals no information about the state

The posterior probability of the B state in this case is q. The marginal bidder's quality can hence be given as

$$q\delta[X - E(P^B_{NoInfo})] = c_i + qc^b_r \quad \text{or} \quad X^B_{NoInfo} = \frac{c_i + qc^b_r}{q\delta} + E(P^B_{NoInfo})$$

The probability of a bid, δ^B_{NoInfo} and the value of the firm conditional on a takeover W^B_{NoInfo} can be obtained by noting that bidder quality is distributed $U[0,1]$. The total order flow to the market maker can be $\{0, \delta, 2\delta\}$ with equal probability. An order flow of 0 does not reveal any new information while an order flow of δ reveals that the state is not U (since the level of liquidity trading in the state U is $\gamma > \delta$), and an order flow of 2δ reveals the bidder's presence. $E(P^B_{NoInfo})$ can hence be given as

$$E(P^B_{NoInfo}) = \frac{1}{3}[W^B_{NoInfo} + pY + q\delta^B_{NoInfo} W^B_{NoInfo} + \frac{1}{q+p}\{pY + q\delta^B_{NoInfo} W^B_{NoInfo}\}]$$

A.D.3 LS's total payoff

To evaluate LI's payoff when he buys on observing $S = B$, I first evaluate the price at which he can buy shares. According to the assumed trading strategy, when $S = G$ or $S = B$, LI buys and when $S = U$, he sells. Whenever LI buys at $t = 1$, the total order flow can be any one of 0, β, or 2β with equal probability, and when he sells, the total order flow can be any one of -2β, $-\beta$, or 0 with equal probability. Thus, an order flow of either 2β or β, reveals the state to be either G or B. On the other hand, an order flow of 0 does not reveal any new information about the state. Therefore, the expected price at which LI can buy shares at $t = 1$ can be given as

$$P^B = \frac{1}{3}[pY + q\delta^B_{NoInfo}W^B_{NoInfo} + \frac{2}{q+p}\{pY + q\delta^B_{Gb}W^B_{Gb}\}]$$

LI's total payoff can be given as

$$\begin{aligned} V^B &= \frac{-\beta}{3}[pY + q\delta^B_{NoInfo}W^B_{NoInfo} + \frac{2}{q+p}\{pY + q\delta^B_{Gb}W^B_{Gb}\}] \\ &+\frac{\alpha+\beta}{3}[2\delta^B_{Gb}W^B_{Gb} + \delta^B_{NoInfo}W^B_{NoInfo}] \\ &= \frac{\beta}{3}[p[\delta^B_{NoInfo}W^B_{NoInfo} - Y] - [1-p-q]\delta^B_{NoInfo}W^B_{NoInfo} + \frac{2p}{q+p}[\delta^B_{Gb}W^B_{Gb} - Y]] \\ &+\frac{\alpha}{3}[2\delta^B_{Gb}W^B_{Gb} + \delta^B_{NoInfo}W^B_{NoInfo}] \end{aligned} \tag{A-4}$$

A.E Proof of Proposition 1

The probability of takeover when LI sells on observing $S = B$ is $\frac{1}{3}[\delta^S_{NoInfo} + 2Pr^S_{Bu}]$, and the probability of a takeover when LI does not trade on observing $S = B$ is $\frac{1}{3}[Pr^{NT}_{Gb} + \delta^{NT}_{NoInfo} + \delta^{NT}_{Bu}]$. To prove the first part of the proposition I need to show:

$$\begin{aligned} &\frac{1}{3}[\delta^S_{NoInfo} + 2Pr^S_{Bu}] > \frac{1}{3}[Pr^{NT}_{Gb} + \delta^{NT}_{NoInfo} + \delta^{NT}_{Bu}] \\ \text{or} \quad & Pr^S_{Bu} - \delta^{NT}_{Bu} + \delta^S_{NoInfo} - \delta^{NT}_{NoInfo} + Pr^S_{Bu} - Pr^{NT}_{Gb} > 0 \end{aligned} \tag{A-5}$$

I prove the inequality by showing that each pair of terms on the left hand side is positive. Taking the first two I have to show:

$$\begin{aligned} Pr^S_{Bu} - \delta^{NT}_{Bu} &> 0 \\ \text{or to show} \quad 1 - [\frac{c_i[1-p] + qc^b_r}{q\gamma} + E(P^S_{Bu})] - [1 - [\frac{c_i[1-p] + qc^b_r}{q\beta} + E(P^{NT}_{Bu})]] &> 0 \\ \text{or} \quad \frac{c_i[1-p] + qc^b_r}{q}[\frac{1}{\beta} - \frac{1}{\gamma}] + E(P^{NT}_{Bu}) - E(P^S_{Bu}) &> 0 \end{aligned}$$

Since $\gamma > \beta$ I know that the first term on the left hand side is positive. Thus to prove the above inequality, it is sufficient to show that $E(P^{NT}_{Bu}) - E(P^S_{Bu})$ is not too negative. I write $E(P^{NT}_{Bu}) - E(P^S_{Bu})$ as:

$$E(P^{NT}_{Bu}) - E(P^S_{Bu}) = \frac{1}{3}[W^{NT}_{Bu} + \frac{1-p+q}{1-p}\delta^{NT}_{Bu}W^{NT}_{Bu} - W^S_{Bu} - \frac{2q}{1-p}\delta^S_{Bu}W^S_{Bu}]$$

Substituting for W^{NT}_{Bu}, and W^S_{Bu} and rearranging the terms I have:

$$\frac{5[E(P^{NT}_{Bu}) - E(P^S_{Bu})]}{2} = \frac{c_i[1-p] + qc^b_r}{q}[\frac{1}{\beta} - \frac{1}{\gamma}] + \frac{1}{1-p}[\{1-p+q\}\delta^{NT}_{Bu}W^{NT}_{Bu} - 2q\delta^S_{Bu}W^S_{Bu}]$$

Here again since $\gamma > \beta$, the first term on the right hand side is positive. I prove $E(P^{NT}_{Bu}) - E(P^S_{Bu})$ is not too negative by contradiction. Let us assume that $E(P^{NT}_{Bu}) < E(P^S_{Bu})$ such that $\delta^{NT}_{Bu} > \delta^S_{Bu}$. In this case, the left hand side of the above inequality is negative. On the other hand the first term on the right hand side is positive and the second term is also positive, since $\delta^{NT}_{Bu} > \delta^S_{Bu}$ implies $\delta^{NT}_{Bu}W^{NT}_{Bu} > \delta^S_{Bu}W^S_{Bu}$ and $1 - p + q > 2q$. Hence a contradiction. So I have $\delta^{NT}_{Bu} < \delta^S_{Bu}$.

Taking the next two terms of (A-5) I have to show:

$$\begin{aligned} \delta^S_{NoInfo} - \delta^{NT}_{NoInfo} &> 0 \\ \text{or to show} \quad 1 - [\frac{c_i + qc^b_r}{q\gamma} + E(P^S_{NoInfo})] - [1 - [\frac{c_i + qc^b_r}{q\beta} + E(P^{NT}_{NoInfo})]] &> 0 \\ \text{or} \quad \frac{c_i + qc^b_r}{q}[\frac{1}{\beta} - \frac{1}{\gamma}] + E(P^{NT}_{NoInfo}) - E(P^S_{NoInfo}) &> 0 \end{aligned}$$

Since $\gamma > \beta$, I know that the first term on the left hand side is positive. Thus to prove the above inequality, it is sufficient to show that $E(P^{NT}_{NoInfo}) - E(P^S_{NoInfo})$ is not too negative. I can show that by substituting for $E(P^{NT}_{NoInfo})$ and $E(P^S_{NoInfo})$ and following the proof by contradiction outlined earlier.

To show that the last set of terms of (A-5) are positive, I need to show:

$$
\begin{aligned}
Pr^S_{Bu} - Pr^{NT}_{Gb} &> 0 \\
\text{or to show} \quad \frac{c_i[q+p]+qc^b_r}{q\beta} - \frac{c_i[1-p]+qc^b_r}{q\gamma} + E(P^{NT}_{Gb}) - E(P^S_{Bu}) &> 0
\end{aligned}
$$

Since $\beta > \gamma$, $p \geq \frac{1}{2}$, is a sufficient condition for the first term to be positive. In the following analysis I make this assumption.

Assumption 1 $p \geq \frac{1}{2}$

Thus, to prove the inequality it is sufficient to show that $E(P^{NT}_{Gb}) - E(P^S_{Bu})$ is not too negative. To show this I write $E(P^{NT}_{Gb}) - E(P^S_{Bu})$ as:

$$
\begin{aligned}
E(P^{NT}_{Gb}) - E(P^S_{Bu}) &= \frac{1}{3}[W^{NT}_{Gb} + \delta^{NT}_{Gb}W^{NT}_{Gb} + \frac{1}{p+q}\{pY + q\delta^{NT}_{Gb}W^{NT}_{Gb}\} \\
&\quad -W^S_{Bu} - \frac{2q}{1-p}\delta^S_{Bu}W^S_{Bu}]
\end{aligned}
$$

Substituting for W^{NT}_{Gb}, and W^S_{Bu} and rearranging the terms I have:

$$
\begin{aligned}
\frac{5[E(P^{NT}_{NoInfo}) - E(P^S_{Bu})]}{2} &= \frac{c_i[q+p]+qc^b_r}{q\beta} - \frac{c_i[1-p]+qc^b_r}{q\gamma} + \frac{q+1}{p+q}[\delta^{NT}_{Gb}W^{NT}_{Gb} - \delta^S_{Bu}W^S_{Bu}] \\
&\quad + \frac{p}{p+q}[Y - \delta^S_{Bu}W^S_{Bu}] + \frac{2[1-p-q]}{1-p}\delta^S_{Bu}W^S_{Bu}
\end{aligned}
$$

From the earlier discussion I know that the first two terms on the right hand side are together positive. Since $Y > \delta^{NT}_{Gb}W^{NT}_{Gb}$ and $1-p-q > 0$, the last two terms are also positive. I can show $E(P^{NT}_{NoInfo}) - E(P^S_{Bu})$ is not too negative by following the steps of the proof by contradiction outlined earlier.

I now prove that the probability of a takeover is greater when LI does not trade than when he buys. The probability of takeover when LI buys is equal to $\frac{1}{3}[2\delta^B_{Gb} + \delta^B_{NoInfo}]$ and the probability of a takeover when LI does not trade is $\frac{1}{3}[Pr^{NT}_{Gb} + \delta^{NT}_{NoInfo} + \delta^{NT}_{Bu}]$. Thus I need to show:

$$
\begin{aligned}
&\frac{1}{3}[2\delta^B_{Gb} + \delta^B_{NoInfo}] < \frac{1}{3}[Pr^{NT}_{Gb} + \delta^{NT}_{NoInfo} + \delta^{NT}_{Bu}] \\
\text{or} \quad &\delta^B_{Gb} - Pr^{NT}_{Gb} + \delta^B_{NoInfo} - \delta^{NT}_{NoInfo} + \delta^B_{Gb} - \delta^{NT}_{Bu} < 0 \qquad \text{(A-6)}
\end{aligned}
$$

I prove the inequality by showing that each pair of terms on the left hand side are negative. Taking the first two I have to show:

$$
\begin{aligned}
\delta^B_{Gb} - Pr^{NT}_{Gb} &< 0 \\
\text{or to show} \quad \frac{c_i[q+p]+qc^b_r}{q}[\frac{1}{\beta} - \frac{1}{\delta}] + E(P^{NT}_{Gb}) - E(P^B_{Gb}) &< 0
\end{aligned}
$$

Since $\beta > \delta$, the first term on the right hand side is negative. Thus to prove the above inequality it is sufficient to show that $E(P^{NT}_{Gb}) - E(P^B_{Gb})$ is not too negative. I can show that by substituting for $E(P^{NT}_{Gb}) - E(P^B_{Gb})$ and following the proof by contradiction outlined earlier. The proofs to show that the other two pairs of terms of (A-6) are negative, are similar to the proofs outlined earlier and I omit them to conserve space. Q.E.D.

A.F Proof of Corollary 1

From Proposition 1 I know that the probability of takeover when $S = B$, is highest when LI sells and is the least when LI buys. From (4), (A-3) and (A-4) it is clear that the value of LI's shareholding is increasing in the probability of takeover. Q.E.D.

A.G Proof of Proposition 2

LI will choose to not trade as opposed to sell iff $V^{NT} \geq V^S$. Or if

$$\frac{\alpha}{3}[\delta_{Gb}^{NT}W_{Gb}^{NT} + \delta_{NoInfo}^{NT}W_{NoInfo}^{NT} + \delta_{Bu}^{NT}W_{Bu}^{NT}] \geq$$
$$\frac{\beta}{3}[p\{Y - \delta_{NoInfo}^{S}W_{NoInfo}^{S}\} - [1-p-q]\{\frac{2}{1-p}\delta_{Bu}^{S}W_{Bu}^{S} + \delta_{NoInfo}^{S}W_{NoInfo}^{S}\}]$$
$$+\frac{\alpha}{3}[2\delta_{Bu}^{S}W_{Bu}^{S} + \delta_{NoInfo}^{S}W_{NoInfo}^{S}]$$

Rearranging the terms I have:

$$\alpha[\delta_{Gb}^{NT}W_{Gb}^{NT} + \delta_{NoInfo}^{NT}W_{NoInfo}^{NT} + \delta_{Bu}^{NT}W_{Bu}^{NT} - 2\delta_{Bu}^{S}W_{Bu}^{S} - \delta_{NoInfo}^{S}W_{NoInfo}^{S}]$$
$$\geq \beta[p\{Y - \delta_{NoInfo}^{S}W_{NoInfo}^{S}\} - [1-p-q]\{\frac{2}{1-p}\delta_{Bu}^{S}W_{Bu}^{S} + \delta_{NoInfo}^{S}W_{NoInfo}^{S}\}]$$

The LHS represents the difference between the value of LI's holding when he does not trade and when he sells. The RHS represents LI's trading profits from selling. From Corollary 1 I know that the LHS is strictly negative. When LI is indifferent between selling and not trading the above inequality holds as an equality, implying a strictly negative RHS. Thus, when LI is indifferent between selling and not trading, he makes a trading loss. By continuity, there exist a non-empty set of parameter values for which LI makes a trading loss and strictly prefers selling.

LI prefers not to trade as opposed to buy iff $V^{NT} \geq V^B$. Or if

$$\frac{\alpha}{3}[\delta_{Gb}^{NT}W_{Gb}^{NT} + \delta_{NoInfo}^{NT}W_{NoInfo}^{NT} + \delta_{Bu}^{NT}W_{Bu}^{NT}] \geq$$
$$+\frac{\beta}{3}[p\{Pr_{NoInfo}W_{NoInfo} - Y\} + [1-p-q]Pr_{NoInfo}W_{NoInfo} + \frac{2p}{q+p}\{Pr_{Gb}W_{Gb} - Y\}]$$
$$+\frac{\alpha}{3}[2Pr_{Gb}W_{Gb} + Pr_{NoInfo}W_{NoInfo}]$$

Rearranging the terms I have,

$$\alpha[\delta_{Gb}^{NT}W_{Gb}^{NT} + \delta_{NoInfo}^{NT}W_{NoInfo}^{NT} + \delta_{Bu}^{NT}W_{Bu}^{NT} - 2Pr_{Gb}W_{Gb} - Pr_{NoInfo}W_{NoInfo}]$$
$$\geq \beta[p\{Pr_{NoInfo}W_{NoInfo} - Y\} + [1-p-q]Pr_{NoInfo}W_{NoInfo} + \frac{2p}{q+p}\{Pr_{Gb}W_{Gb} - Y\}]$$

The LHS is the difference between the value of LI's holding when he does not trade and when he buys. The RHS is the trading profits from buying. Again, from Corollary 1 I know that the LHS is strictly positive. Thus when LI is indifferent between buying and not trading, the above inequality holds as an equality, implying a strictly positive trading profit. By continuity, there exist a non-empty set of parameter values for which LI makes a trading profit, but prefers not to trade. Q.E.D.

A.H Proof of Proposition 3

To prove the proposition, I show that the difference between LI's payoff when he does not restructure and the payoff when he sells is decreasing in c_i, c_r^b, Z, and increasing in c_r^i, θ and α. The difference in payoffs can be written as

$$Dif = V^S - \alpha Z + c_r^i$$

Substituting for V^S and grouping the terms conveniently I have

$$Dif = \frac{\alpha}{3}[2\delta_{Bu}^{S}W_{Bu}^{S} + \delta_{NoInfo}^{S}W_{NoInfo}^{S} - Z]$$
$$+\frac{\beta}{3}[p\{Y - \delta_{NoInfo}^{S}W_{NoInfo}^{S}\} - [1-p-q]\{\frac{2}{1-p}\delta_{Bu}^{S}W_{Bu}^{S} + \delta_{NoInfo}^{S}W_{NoInfo}^{S}\}] + c_r^i$$

I prove each of the results by totally differentiating the above equation with respect to each of the parameters.

$$\frac{\partial Dif}{\partial c_i} = [\frac{2\alpha - 2\beta\frac{[1-p-q]}{1-p}}{3}]\frac{\partial(\delta_{Bu}^{S}W_{Bu}^{S})}{\partial c_i} + [\frac{\alpha - \beta[1-q]}{3}]\frac{\partial(\delta_{NoInfo}^{S}W_{NoInfo}^{S})}{\partial c_i}$$

From Lemma 2 I know that $\frac{\partial(\delta^S_{Bu}W^S_{Bu})}{\partial c_i} < 0$ and $\frac{\partial(\delta^S_{NoInfo}W^S_{NoInfo})}{\partial c_i} < 0$. Further since $\alpha \geq \beta$ from the no-short-sale assumption, I see that $\frac{\partial Dif}{\partial c_i} < 0$.

$$\frac{\partial Dif}{\partial c^b_r} = [\frac{2\alpha - 2\beta\frac{[1-p-q]}{1-p}}{3}]\frac{\partial(\delta^S_{Bu}W^S_{Bu})}{\partial c^b_r} + [\frac{\alpha - \beta[1-q]}{3}]\frac{\partial(\delta^S_{NoInfo}W^S_{NoInfo})}{\partial c^b_r}$$

From Lemma 2 I know that $\frac{\partial(\delta^S_{Bu}W^S_{Bu})}{\partial c^b_r} < 0$ and $\frac{\partial(\delta^S_{NoInfo}W^S_{NoInfo})}{\partial c^b_r} < 0$. Further since $\alpha \geq \beta$ from the no-short-sale assumption, I see that $\frac{\partial Dif}{\partial c^b_r} < 0$.

$$\frac{\partial Dif}{\partial Z} = \frac{-\alpha}{3}$$

$$\begin{aligned}\frac{\partial Dif}{\partial \theta} = & [\frac{2\alpha - 2\beta\frac{[1-p-q]}{1-p}}{3}]\frac{\partial(\delta^S_{Bu}W^S_{Bu})}{\partial \theta} + [\frac{\alpha - \beta[1-q]}{3}]\frac{\partial(\delta^S_{NoInfo}W^S_{NoInfo})}{\partial \theta} \\ & + \frac{1-\alpha}{3}[p\{Y - \delta^S_{NoInfo}W^S_{NoInfo}\} - [1-p-q]\{\frac{2}{1-p}\delta^S_{Bu}W^S_{Bu} + \delta^S_{NoInfo}W^S_{NoInfo}\}]\end{aligned}$$

From Lemma 2 I know that $\frac{\partial(\delta^S_{Bu}W^S_{Bu})}{\partial \theta} > 0$ and $\frac{\partial(\delta^S_{NoInfo}W^S_{NoInfo})}{\partial \theta} > 0$. Further since $\alpha \geq \beta$ from Assumption 1, the first two terms on the left hand side are positive. It can be shown that $Y \geq \widehat{P}$ is a sufficient condition to ensure that the third term is positive. Thus I have $\frac{\partial Dif}{\partial \theta} > 0$.

$$\frac{\partial Dif}{\partial c^i_r} = 1$$

$$\begin{aligned}\frac{\partial Dif}{\partial \alpha} = & \frac{1}{3}[2\delta^S_{Bu}W^S_{Bu} + \delta^S_{NoInfo}W^S_{NoInfo} - Z] \\ & -\frac{\theta}{3}[p\{Y - \delta^S_{NoInfo}W^S_{NoInfo}\} - [1-p-q]\{\frac{2}{1-p}\delta^S_{Bu}W^S_{Bu} + \delta^S_{NoInfo}W^S_{NoInfo}\}] \\ & +[\frac{2\alpha - 2\beta\frac{[1-p-q]}{1-p}}{3}]\frac{\partial(\delta^S_{Bu}W^S_{Bu})}{\partial \alpha} + [\frac{\alpha - \beta[1-q]}{3}]\frac{\partial(\delta^S_{NoInfo}W^S_{NoInfo})}{\partial \alpha}\end{aligned} \quad \text{(A-7)}$$

The terms within the first set of curly brackets represent the difference in the value of LI's existing shareholding, from a takeover instead of restructuring. The terms within the second set of curly brackets represent the reduction in the trading profits due to a reduction in the level of liquidity trading; the third and forth terms represent the reduction in payoff to LI because of a reduction in the probability of a takeover, due to reduced liquidity. It is thus obvious that the last three terms are negative. The first term is decreasing in Z. For a low value of $Z = \underline{Z} < \frac{1}{2}$, the first term will be positive such that for $Z = \underline{Z}$, $\frac{\partial Dif}{\partial \alpha} = 0$. For all $Z > \underline{Z}$, $\frac{\partial Dif}{\partial \alpha} < 0$ and for all $Z < \underline{Z}$, $\frac{\partial Dif}{\partial \alpha} > 0$.

The cutoff values $\widehat{c_i}$, $\widehat{Z}$, $\widehat{\theta}$, $\widehat{c^b_r}$, $\widehat{c^i_r}$ and $\widehat{\alpha}$ are given by those values of c_i, Z, θ, c^b_r, c^i_r and α that satisfy the equality $Dif = 0$. Q.E.D.

APPENDIX B - Key variable description

Merger Characteristics

- *Abnormal*$_i$: The buy and hold abnormal returns based on size and book to market bench marks calculated for the one year period starting three months after the *event*. To calculate this, I use the procedure employed by Rau and Vermallen (1998). Specifically, I form ten size decile portfolios at the end of every month on the basis of the market capitalization of NYSE and AMEX firms listed on both CRSP and COMPUSTAT. Then I rank each firm on the NYSE and AMEX listed on both CRSP and COMPUSTAT into one of ten portfolios formed on the basis of these breakpoints. This decile breakpoint formation and ranking procedure is repeated every month between January 1985 and December 2001. These deciles are further sorted into quintiles using book-to-market ratios. Portfolio returns are then calculated every month by averaging the monthly returns for these 50 portfolios. These returns are then used as benchmarks to calculate abnormal performance. Abnormal returns are calculated for each acquirer relative to its size and book-to-market benchmark (as the difference between its monthly return and that of its control portfolio) every month for 12 months starting from 3 months after the merger completion date (i.e. from month 4 to month 15). These are then used to calculate *Abnormal*$_i$.
- *Announcement Return*$_i$: The cumulative abnormal returns for the three day window $(-1, 1)$ surrounding the *event*. *Announcement Return*$_i$ is calculated after adjusting for a market model, whose parameters are estimated with the returns from the $(-250, -60)$ window.
- *ChngProf*$_i$: The change in the operating profitability in the one year period following the *event*. It is measured as *EBIDTA/Total Assets*$_{it+1}$-*EBIDTA/Total Assets*$_{it}$, where t is the year immediately following the *event*.

Liquidity Measures

- *Bid-Ask Spread*$_i$: The implicit bid ask spread for the firm's stock, calculated following the methodology of Roll (1984) during the year before the *event*.
- *Number of Analyst*$_i$: The number of analysts following the firm's stock in the one year period before the *event*.
- *Log(Turnover)*$_i$: The logarithm of average turnover of the acquirer's common stock, during the one year period before the *event*.

Measures of Institutional Trading

- *ChngQtr*$_i$: The ratio of the total shares held by the institution one quarter after *event* to the number of shares held at the time of the *event*.
- *ChngYr*$_i$:The ratio of the total shares held by the institution one year after *event* to the number of shares held at the time of the *event*.
- *Sale*$_i$: A dummy variable that takes a value one for those mergers in which the institution sells more than 50% of its holding within one year after the *event* and zero for the rest.

Governance Indicators

- *Board Equity ownership*$_i$: the fractional shareholding of all the Board of Directors.
- *CEO Chairman*$_i$: A dummy variable which takes a value of one if the CEO is also the Chairman of the Board and zero otherwise.
- *CEO Equity ownership*$_i$: The fractional shareholding of the CEO in the acquirer.
- *Dual Class*$_i$: A dummy variable identifying firms with dual class shares. 10% of acquirers in the sample have dual class shares.

  G-Index$_i$: The Gompers Ishii and Mertrick (2000) index of firm level takeover defence.
- *Inside Directors*$_i$: The fraction of Inside Directors in the Board of Directors.

Table I: Summary Statistics

This table reports the summary statistics of the key variables. *Market Capitalization$_i$* is the total market value of equity of the firm at the end of the calender year after the *event*, *Turnover$_i$* is the average turnover of the firm's common stock, during the one year period before the *event*, *Bid-Ask Spread$_i$* is the average implicit bid ask spread for the firm's stock during the year before the *event*, calculated using the methodology of Roll (1984), *Number of Analyst$_i$* is the number of analysts following the firm's stock in the one year before the *event*. The data is obtained from the IBES database. *Market to Book$_i$* is the ratio of market value of total assets to the book value of total assets of the firm calculated at the end of the calender year after the *event* according to the methodology of Kaplan and Zingales (1997). *Initial Holding$_i$* is the shareholding of the largest institutional shareholder of the firm at the time of the *event* and is obtained from Spectrum, *ChngQtr$_i$* is the the ratio of the total shares held one quarter after *event* by the largest institutional shareholder, to the number of shares held at the time of the *event*, *ChngYr$_i$* is a similar measure calculated over the one year period after the event, *Sale* is a dummy variable that takes a value 1 whenever *ChngYr$_i$*$<$ .5, *Announcement Return$_i$* is the cumulative abnormal return for the three day window $(-1, 1)$, surrounding the *event* and is measured after adjusting for a market model, *Abnormal$_i$* is the buy and hold abnormal return based on size and book to market bench marks during the one year period starting three months after the *event*, *Swap Dummy$_i$* is a dummy variable that identifies stock-swap mergers, *Tender Dummy$_i$* is a dummy variable that identifies tender offers. *G-Index$_i$* is the Gompers, Ishii, and Mertrick (2000) index of firm level takeover defence provisions from The Investor Responsibility Research Center (IRRC) database, *Dual Class$_i$* is a dummy variable identifying firms with dual class shares from the IRRC database. The following governance characteristics are obtained from the firm's proxy statement closest in time to the *event*: *CEO Chairman$_i$* is a dummy variable that identifies firms for which the CEO is also the Chairman of the Board, *Inside Directors$_i$* is the fraction of inside directors in the Board of Directors, *CEO equity ownership$_i$* is the equity ownership of the CEO in the firm, *Board equity ownership$_i$* is the equity ownership of all the Board of Directors in the firm.

In Panel A, I include all *events* from the sample. In Panel B I only include the *events* after which the firm became a target, and in Panel C I only include the *events* after which the firm experiences a disciplinary CEO turnover. I use the years 2-5 after the *event* to identify a takeover and a disciplinary CEO turnover. I exclude the *events* after which the firm became a target or experiences a disciplinary CEO turnover within one year. Data includes a sub-set of mergers announced between January 1, 1985 and December 31, 2001 identified based on criteria described in Section 5.

	Panel A: Full sample (706)					
	Mean	Min	25^{th} Percentile	Median	75^{th} Percentile	Max
	Firm Characteristics					
Market Capitalization$_i$ ($ million)	1867.1	9.85	150.2	494.2	1855.6	19955.2
Turnover$_i$	1.43	.06	.54	.92	1.72	8.95
Bid-Ask Spread$_i$	.01	-4.69	-1.41	-.49	1.4	6.3
Number of analyst$_i$	7.7	1	3	6	10	35
Market to Book$_i$	2.41	.68	1.19	1.62	2.61	17.9
	Institutional holding and trading					
Initial holding$_i$ (%)	10.0	5.09	6.90	9.26	11.76	31.81
ChngQtr$_i$ (%)	94.0***	0.0	89.7	100*	104.9	177.9
ChngYr$_i$ (%)	74.8***	0.0	31.2	85.7***	105.7	222.6
Sale$_i$	.33	0	0	0	1	1
	Event characteristics					
Announcement Return$_i$ (%)	-1.9***	-30.4	-6.5	-1.2***	2.6	24.6
Abnormal$_i$ (%)	-4.1	-87.6	-6.5	-1.2	2.6	24.6
Swap Dummy$_i$	.54	0	0	1	1	1
Tender Dummy$_i$	.26	0	0	0	1	1
	Governance characteristics					
G-Index$_i$	9.0	2	7	9	11	16
Dual Class$_i$	.09	0	0	0	0	1
CEO Chairman$_i$	.7	0	0	1	1	1
Inside Directors$_i$ (%)	23	0	13	20	30	71
CEO equity ownership$_i$ (%)	4.9	0	0	1.3	5.1	70
Board equity ownership$_i$ (%)	13.3	0	2.4	7.1	21	83.5

Panel B: Target sub-sample (131)						
	Mean	Min	25^{th} Percentile	Median	75^{th} Percentile	Max
Firm Characteristics						
Market Capitalization$_i$ ($ million)	732.79***	20.65	124.5	300.8	678.3	16168
Turnover$_i$	1.40	.06	.54	.90	2	6.74
Bid-Ask Spread$_i$	-.37**	-4.7	-1.49	-.73***	.78	6.35
Number of Analyst$_i$	6.1	1	3	5	9	22
Market to Book$_i$	2.26	.83	1.15	1.57	2.51	17.94
Institutional holding and trading						
Initial holding$_i$ (%)	10.5	5.1	7.2	9.4	11.9	31.8
ChngQtr$_i$ (%)	89.5**	0.0	80.0	100.0**	102.6	177.9
ChngYr$_i$ (%)	66.0**	0.0	2.66	76.6**	100.4	222.6
Sale$_i$	.40	0	0	0	1	1
Event characteristics						
Announce$_i$ (%)	-1.7	-22.5	-6.7	-2.1	2.6	20.9
Abnormal$_i$ (%)	-10.4	-22.5	-6.7	-2.1	2.6	20.9
Swap Dummy$_i$	.47*	0	0	0*	1	1
Tender Dummy$_i$	.33*	0	0	0*	1	1
Governance characteristics						
G-Index$_i$	8.8	2	7	9	10	16
Dual Class$_i$	.1	0	0	0	0	1
CEO Chairman$_i$	.58***	0	0	1***	1	1
Inside Directors$_i$	.21	0	.13	.17	.29	.5
CEO equity ownership$_i$ (%)	4.7	0	0	1.6	4.2	70
Board equity ownership$_i$ (%)	16.5	0	3.3	11.2	24.5	83.5

Panel C: CEO Turnover sub-sample (61)						
	Mean	Min	25^{th} Percentile	Median	75^{th} Percentile	Max
Firm Characteristics						
Market Capitalization$_i$ ($ million)	2638.2**	10.52	291.6	977.1	3236.6	17661
Turnover$_i$	1.60	.10	.51	.88	2.14	8.95
Bid-Ask Spread$_i$	.45*	-3.6	-.90	.59**	1.51	5.96
Number of Analyst$_i$	8.6	1	3.5	7.5	11	33
Market to Book$_i$	3.04	.83	1.29	1.94	2.8	17.9
Institutional holding and trading						
Initial holding$_i$ (%)	9.7	5.09	6.78	9.10	11.39	21.17
ChngQtr$_i$ (%)	93.6	20.0	76.3	100.0	109.3	150.0
ChngYr$_i$ (%)	75.7	0.0	46.9	85.2	107.6	163.7
Sale$_i$	.28	0	0	0	1	1
Event characteristics						
Announce$_i$ (%)	0.0	-30.0	-4.3	.3	5.65	24.6
Abnormal$_i$ (%)	-5.6	-78.9	-39.1	-27.0	17.3	24.6
Swap Dummy$_i$	.61	0	0	1	1	1
Tender Dummy$_i$	.18	0	0	0	0	1
Governance characteristics						
G-Index$_i$	9.8**	4	7	10**	12	15
Dual Class$_i$	.08	0	0	0	0	1
CEO Chairman$_i$	.74	0	0	1	1	1
Inside Directors$_i$ (%)	.19*	0	.14	.17	.27	.5
CEO equity ownership$_i$ (%)	2.8*	0	0	0**	2.2	28.7
Board equity ownership$_i$ (%)	9.97	0	2.0	4.6	10.2	53.5

Table II: Year-wise Distribution

This table reports the year wise distribution of the sample. Column (1) gives the distribution for the entire sample; Column (2) gives the distribution of the *Target* sub-sample and Column (3) gives the distribution of the *CEO Turnover* sub-sample. Data includes a sub-set of mergers announced between January 1, 1985 and December 31, 2001 identified based on criteria described in Section 5.

The table shows that the full sample and the *Target* sub-sample are uniformly distributed over the sample period. The *CEO Turnover* sub-sample is concentrated in the latter half of the sample period. To correct for this, in some of the regressions I include a time dummy to identify this time period.

	Full Sample	Target sub-sample	CEO-Turnover sub-sample
1985	30	14	2
1986	29	8	2
1987	35	5	0
1988	23	1	1
1989	18	2	1
1990	15	3	0
1991	13	3	0
1992	17	3	1
1993	18	6	1
1994	35	6	6
1995	53	17	4
1996	52	12	10
1997	84	26	10
1998	84	13	9
1999	79	8	8
2000	71	3	4
2001	50	1	2
Total	706	131	61

Table III: Characteristics of the largest institutional block holder

This table reports the median characteristics of the sample classified based on the identity of the largest institutional shareholder of the firm at the time of the *event*. I use the CDA/Spectrum to identify the type of the institution. The CDA/Spectrum identifies investors as belonging to one of five groups: bank trust departments, insurance companies, investment companies, independent investment advisors, and others. The "Others" category includes public pension funds, endowments and also investment arms of companies. $Market\ Capitalization_i$ is the total market value of equity of the firm at the end of the calender year after the *event*, $Turnover_i$ is the average turnover of the firm's common stock, during the one year period before the *event*, $ChngYr_i$ is the the ratio of the total shares held one year after the *event* by the largest institutional shareholder, to the number of shares held at the time of the *event*, *Sale* is a dummy variable that takes a value 1 whenever $ChngYr_i < .5$. I use the years 2-5 after the event to identify takeovers and CEO turnover. Data includes a sub-set of mergers announced between January 1, 1985 and December 31, 2001 identified based on criteria described in Section 5.

The table shows that independent investment advisors invest in smaller firms and are likely to sell a larger fraction of their holding after the *event*. Firms with independent advisors are more likely to become targets in comparison to firms with investment firms.

	Bank trusts	Insurance firms	Investment firms	Independent advisors	Others
Market Capitalization$_i$ ($ million)	693.9	500.4	831.7	283.9	440.5
Turnover$_i$	.54	1.01	1.04	.92	.79
$ChngYr_i$	89.6	89	87.6	80.2	97.9
$Sale_i$	.28	.29	.31	.37	.33
Takeovers (Nos.)	10	11	54	47	9
CEO turnover (Nos.)	5	4	29	17	6
Number of observations	76	51	323	223	33

Table IV: Abnormal Returns, Operating Performance and Block holder Trading

Panel A reports the mean and median raw returns, abnormal returns and change in abnormal operating performance of *events* classified into two groups. *Increase* represents the *events* after which the shareholding of the largest institutional shareholder increased (in the first quarter after the *event*) and *Decrease* the *events* after which the shareholding decreased. $Return_i$ is the raw return for the one year period starting three months after the *event*, $Abnormal_i$(Size and Book to market) is the size and book to market adjusted abnormal return for the one year period starting three months after the *event*. The details of the calculation are provided in Appendix B. Similarly, $Abnormal_i$(Size), $Abnormal_i$(Beta) and $Abnormal_i$(Standard Deviation) are respectively the size, beta, and standard deviation adjusted abnormal returns for the the one year period starting three months after the *event*. $ChngProf_i$ is the change in industry adjusted $EBIDTA/Total\ Assets_i$ in the one year following the *event*. Data includes a sub-set of mergers announced between January 1, 1985 and December 31, 2001 identified based on criteria described in Section 5. ***, ** and * denote significance of the differences between the two categories at 1%, 5% and 10% respectively.

The table shows that *events* after which the institutional holding increased have a higher stock return and better operating performance in the subsequent 12 month period, in comparison to the *events* after which the institutional holding decreased.

Panel A: Abnormal Returns, Operating Performance and Block holder Trading				
	Mean		Median	
	$Increase_i$	$Decrease_i$	$Increase_i$	$Decrease_i$
	(1)	(2)	(3)	(4)
$Return_i$	7.3	-3.4***	0.7	-6.5***
$Abnormal_i$ (Size & Book to Mkt.)	-.84	-7.9*	-9.0	-14.8**
$Abnormal_i$ (Size)	-1.0	-8.8**	1.8	-1.5
$Abnormal_i$ (Beta)	-4.6	-11.8*	-1.8	-5.7
$Abnormal_i$ (Standard deviation)	-1.1	-7.8***	4.3	-1.1
$ChngProf_i$	-.3	-1.12	.6	-.06**

Panel B reports the results of the regressions relating the abnormal return following the *event* to changes in institutional holding and other *event* characteristics. Specifically, I run the pooled OLS regression: $Abnormal_i = \beta_0 + \beta_1 * (X)_i + \gamma * Controls_i$, where $Abnormal_i$ is the buy and hold abnormal return based on size and book to market bench marks for the one year period starting three months after the *event*, X is equal to $ChngQtr_i$ in Columns (1), (2) & (5) and $ChngYr_i$ in Columns (3) & (4). $ChngQtr_i$ is the ratio of the total number of shares held by the largest institutional shareholder one quarter after the *event* to the number of shares held at the time of the *event*, $ChngYr_i$ is a similar measure calculated for the one year period after the *event*. *Swap Dummy*$_i$ is a dummy variable identifying stock-swap mergers, *Tender Dummy*$_i$, is a dummy variable identifying tender offers, *Log(Market Capitalization)*$_i$ is the logarithm of the total market value of equity of the firm at the end of the calender year after the *event*, and *Announcement Return*$_i$, is the cumulative abnormal announcement return for the 3 day window $(-1, 1)$ around the *event* calculated using a market model. The standard errors reported within braces are corrected for heteroscedasticity and clustered at the level of individual firm. Data includes a sub-set of mergers announced between January 1, 1985 and December 31, 2001 identified based on criteria described in Section 5. ***, ** and * denote significance at 1%, 5% and 10% respectively.

The table shows that changes in the shareholding of the largest institutional shareholder (measured using *ChngQtr* and *ChngYr*) are positively correlated with contemporaneous and subsequent abnormal stock returns.

Panel B: Abnormal Returns and Block holder Trading				
	Abnormal_i	Abnormal_i	Abnormal_i	Abnormal_i
	(1)	(2)	(3)	(4)
ChngQtr_i	.13**	.14**		
	(.06)	(.06)		
ChngYr_i			.09**	.07*
			(.04)	(.04)
Swap Dummy_i		-.06		-.06
		(.05)		(.05)
Tender Dummy_i		.08		.07
		(.05)		(.05)
Log(Market $\text{Capitalization})_i$		-.05***		-.05***
		(.01)		(.01)
Announcement Return_i		-.17		-.17
		(.29)		(.29)
Observations	610	582	610	582
Adjusted R^2	.9	6.6	2.1	7.1

Panel C reports the results of the regressions relating changes in firm operating performance following the *event* to changes in institutional shareholding and other *event* characteristics. Specifically, I run the pooled OLS regression: $ChngProf_i = \beta_0 + \beta_1 * (X)_i + \gamma * Controls_i$, where $ChngProf_i$ is the change in industry adjusted *EBIDTA/Total Assets*$_i$ in the one year following the *event*, X is equal to $ChngQtr_i$ in Columns (1) & (2) and $ChngYr_i$ in Columns (3) & (4). The variable descriptions are the same as above. The standard errors reported within braces are corrected for heteroscedasticity and clustered at the level of an individual firm. Data includes a sub-set of mergers announced between January 1, 1985 and December 31, 2001 identified based on criteria described in Section 5. ***, ** and * denote significance at 1%, 5% and 10% respectively.

The table shows that changes in shareholding of the largest institutional shareholder (measured using *ChngQtr* and *ChngYr*) are positively correlated with changes in firm operating performance.

Panel C: Operating Performance and Block holder Trading				
	ChngProf_i	ChngProf_i	ChngProf_i	ChngProf_i
	(1)	(2)	(3)	(4)
ChngQtr_i	.033***	.036***		
	(.01)	(.01)		
ChngYr_i			.02*	.02*
			(.01)	(.01)
Swap Dummy_i		.02		.02
		(.02)		(.02)
Tender Dummy_i		.03		.03
		(.02)		(.02)
Log(Market $\text{Capitalization})_i$		.0004		-.0008
		(.004)		(.004)
Observations	624	597	624	597
Adjusted R^2	.4	.8	.4	.8

Table V: Block holder Trading and Firm Characteristics

The table reports the results of regressions relating the probability of a substantial sale by the institutional shareholder to firm and *event* characteristics. Specifically, I run the pooled OLS regression: $Pr(Sale_i = 1) = \Phi(\beta_0 + \beta_1 * (X)_i + \beta_2 * \textit{Initial Holding}_i + \beta_3 * \textit{Log(Market Capitalization)}_i + \gamma * \textit{Controls}_i)$, where $Sale_i$ is a dummy variable that takes a value one for the *events* after which the institution sells more than 50% of its holding within one year and zero otherwise, $\Phi()$ is the logistic distribution function, X is a measure of stock liquidity and is *Log(Turnover)*$_i$ in Columns (1) & (2), *Bid-Ask Spread*$_i$ in Columns (3) & (4) and *Number of Analyst*$_i$ in Columns (5) & (6). *Turnover*$_i$ is the average turnover of the firm's common stock, during the one year period before the *event*, *Bid-Ask Spread*$_i$ is the average implicit bid ask spread for the firm's stock during the year before the *event*, calculated using the methodology of Roll (1984), *Number of Analyst*$_i$ is the number of analysts following the firm's stock in the one year period before the *event* from the IBES database. *Initial Holding*$_i$ is the shareholding of the largest institutional shareholder at the time of the *event*, *Log(Market Capitalization)*$_i$ is the logarithm of the total market value of equity of the firm at the end of the calender year after the *event*. *Total Institutional Holding*$_i$ is the aggregate institutional holding (excluding the largest block holder) at the time of the *event*, *Stock volatility*$_i$ is the standard deviation of the daily returns of the firm's stock during the 1 year period before the *event* and *Dividend cut Dummy*$_i$, is a dummy variable identifying firms that cut dividends in the one year after the *event*, *Swap Dummy*$_i$, is a dummy variable identifying stock-swap mergers, *Tender Dummy*$_i$, is a dummy variable identifying tender offers, *Announcement Return*$_i$, is the cumulative abnormal return for the three day window $(-1, 1)$ surrounding the *event*, measured after adjusting for a market model, *Y90s Dummy*$_i$ is a dummy variable identifying the time period 1991-2002. The standard errors reported within braces are corrected for heteroscedasticity and clustered at the level of individual firm. Data includes a sub-set of mergers announced between January 1, 1985 and December 31, 2001 identified based on criteria described in Section 5. ***, ** and * denote significance at 1%, 5% and 10% respectively.

The table shows that the largest institutional shareholder is more likely to sell in the post *event* period if the firm's stock is more liquid (positive coefficient on *Log(Turnover)*$_i$, *Number of Analyst*$_i$ and the negative coefficient on *Bid-Ask Spread*$_i$), if the initial shareholding is small (negative coefficient on *Institutional shareholding*$_i$) and to a weaker extent in smaller firms (negative coefficient on *Log(Market Capitalization)*$_i$).

Block holder Trading and Firm Characteristics						
	Sale	Sale	Sale	Sale	Sale	Sale
	(1)	(2)	(3)	(4)	(5)	(6)
Log(Turnover)$_i$	.53***	.23*				
	(.11)	(.13)				
Bid-Ask Spread$_i$			-.09*	-.09**		
			(.05)	(.05)		
Number of Analyst$_i$					.05**	.02
					(.02)	(.02)
Initial holding$_i$	-6.13**	-7.48**	-5.27**	-7.38**	-5.27**	-8.26**
	(2.56)	(2.98)	(2.93)	(2.64)	(2.37)	(3.20)
Log(Market Capitalization)$_i$	-.07	-.09	-.04	-.08	-.14*	-.11
	(.05)	(.06)	(.08)	(.06)	(.08)	(.09)
Total Institutional holding$_i$		1.95**		1.17**		1.49***
		(.50)		(.49)		(.51)
Stock volatility$_i$		22.20***		28.60***		28.38***
		(6.18)		(5.78)		(6.23)
Dividend cut dummy$_i$		-.32		-.39		-.27
		(.26)		(.26)		(.26)
Swap dummy$_i$		.10		.07		-.02
		(.26)		(.25)		(.26)
Tender dummy$_i$		.25		.20		-.04
		(.27)		(.27)		(.28)
Announcement Return$_i$		-.29		-.32		-.42
		(1.06)		(1.06)		(1.10)
Y90s Dummy$_i$		.13		.05		.005
		(.27)		(.27)		(.30)
Observations	645	635	645	635	594	584

Table VI: Takeovers

Panel A reports the results of regressions relating takeover probability to institutional trading and firm & *event* characteristics. Specifically, I estimate the pooled OLS regression : $Pr(Target_i = 1) = \Phi(\beta_0 + \beta_1 * (X)_i + \beta_2 * (\textit{Bid-Ask Spread})_i + \beta_3 * (\textit{Log(Market Capitalization)})_i + \gamma * Controls_i)$, where $Target_i$ is a dummy variable that identifies firms that become targets any time during years 2-5 after the *event*, $\Phi()$ is the logistic distribution function, X is $Sale_i$ in Columns (2) & (3) and $ChngYr_i$ in Columns (4) & (5). $Sale_i$ is a dummy variable that takes a value one for the *events* after which the largest institutional shareholder sells more than 50% of its holding within one year and zero otherwise, $ChngYr_i$ is the ratio of the total number of shares held by the largest institutional shareholder one year after the *event* to the number of shares held at the time of the *event*, *Bid-Ask Spread*$_i$ is the average implicit bid ask spread for the firm's stock for the year before the *event*, calculated using the methodology of Roll (1984) , *Log(Market Capitalization)*$_i$ is the logarithm of the total market value of equity of the firm at the end of the calender year after the *event*. Other controls include, *Initial Holding*$_i$, the shareholding of the largest institutional shareholder at the time of the *event*, *Abnormal*$_i$, the buy and hold abnormal returns based on size and book to market bench marks for the one year period starting three months after the *event*, *Market to Book*$_i$, the ratio of market value of total assets to the book value of total assets calculated at the end of the calender year before the *event* according to the methodology of Kaplan and Zingales (1997), *Debt/Total Assets*$_i$, the ratio of total long term debt (COMPUSTAT item Data 19) to the book value of total assets (COMPUSTAT item Data 6) measured at the end of the year of the *event*, *Cash/Total Assets*$_i$, the ratio of book value of cash and marketable securities (COMPUSTAT item Data 1) to the book value of total assets (COMPUSTAT item Data 6) measured at the end of the year of the *event*, *Sales Growth*$_i$, the growth rate of net sales (COMPUSTAT item Data 12) in the one year after the *event*, *Swap Dummy*$_i$, a dummy variable that identifies stock-swap mergers, *Tender Dummy*$_i$, a dummy variable that identifies tender offers, *Stock volatility*$_i$, the standard deviation of the daily returns of the firm's stock in the one year before the *event* and *Dividend cut Dummy*$_i$, a dummy variable that identifies a cut in dividends in the one year after the *event*. The standard errors reported within braces are corrected for heteroscedasticity and clustered at individual firm level. Data includes a sub-set of mergers announced between January 1, 1985 and December 31, 2001 identified based on criteria described in Section 5. ***, ** and * denote significance at 1%, 5% and 10% respectively.

The table shows that firms are more likely to become targets if the largest institutional shareholder sells its holding (positive coefficient on $Sale_i$ and negative coefficient on $ChngYr_i$), if the stock is liquid (negative coefficient on *Bid-Ask Spread*$_i$) and if the firm is small (negative coefficient on *Log(Market Capitalization)*$_i$).

Panel A: Takeovers and Block holder Trading					
	$Target_i$	$Target_i$	$Target_i$	$Target_i$	$Target_i$
	(1)	(2)	(3)	(4)	(5)
$Sale_i$		.51**	.74***		
		(.23)	(.27)		
$ChngYr_i$				-.53**	-.68**
				(.23)	(.27)
Bid-Ask $Spread_i$	-.19***		-.17***		-.17***
	(.06)		(.06)		(.06)
Log(Market $Capitalization)_i$	-.28***		-.27***		-.27***
	(.08)		(.08)		(.08)
Initial $holding_i$	2.33		3.05		2.73
	(2.56)		(2.68)		(2.65)
$Abnormal_i$	-.75**		-.67**		-.66*
	(.31)		(.32)		(.33)
Market to $Book_i$	.006		.02		.01
	(.08)		(.08)		(.08)
Debt/Total $Assets_i$	.55		.46		.46
	(.75)		(.75)		(.74)
Cash/Total $Assets_i$	.11		.14		.18
	(1.04)		(1.04)		(1.03)
Sales $Growth_i$	-.15		-.21		-.22
	(.59)		(.56)		(.58)
Swap $dummy_i$	-.19		-.31		-.23
	(.33)		(.34)		(.34)
Tender $dummy_i$	.10		.12		.15
	(.33)		(.34)		(.34)
Stock $volatility_i$			-8.96		-8.62
			(10.84)		(10.84)
Dividend cut $dummy_i$			-.75*		-.77*
			(.40)		(.40)
Observations	505	584	505	584	505

Panel B reports the mean and median changes in concentration of institutional shareholding (in the one year following the *event*) of *events* classified into two groups. *Sale=1* represents the *events* after which the largest institutional investor sold more than 50% of its holding in the one year and *Sale=0* the the *events* after which the largest institutional shareholder did not sell more than 50% of its shareholding. *Change Herf* $_i$ is the change in Herfindal index of institutional shareholding in the one year following in the *event* and *Change Top Five* in the change in the aggregate shareholding of the top five institutional shareholders in the one year following the *event*. Data includes a sub-set of mergers announced between January 1, 1985 and December 31, 2001 identified based on criteria described in Section 5. ***, ** and * denote significance of the differences between the two categories at 1%, 5% and 10% respectively.

The table shows that concentration of institutional shareholding significantly decreased for the *events* in which the largest institution sold more than 50% of its holding.

Panel B: Changes in Concentration of Institutional Shareholding and Block holder Trading				
	Mean		Median	
	$\text{Sale}_i = 1$	$\text{Sale}_i = 0$	$\text{Sale}_i = 1$	$\text{Sale}_i = 0$
	(1)	(2)	(3)	(4)
Change Herf $_i$	-.0057	-.0015***	-.004	-.0005***
Change Top Five	-.034	-.006***	-.032	-.003***

Panel C reports the results of regressions relating takeover probability to changes in concentration of institutional shareholding and firm & *event* characteristics. Specifically, I estimate the pooled OLS regression : $Pr(Target_i = 1) = \Phi(\beta_0 + \beta_1 * (X)_i + \beta_2 * (\textit{Bid-Ask Spread})_i + \beta_3 * (\textit{Log(Market Capitalization)})_i + \gamma * Controls_i)$, where $Target_i$ is a dummy variable that identifies firms that become targets any time during years 2-5 after the *event*, $\Phi()$ is the logistic distribution function, X is *Change Herf* $Dummy_i$ in Columns (1) & (2) and *Change Top Five* $Dummy_i$ in Columns (3) & (4). *Change Herf* $Dummy_i$ is a dummy variable that identifies those *events* for which the change in Herfindhal index of institutional shareholding in the one year following the *event* is below the 25^{th} percentile and *Change Top Five* $Dummy_i$ is a dummy variable that identifies the *events* for which the change in total shareholding of the Top 5 institutional shareholders of the firm in the one year following the *event* is below the 25^{th} percentile. The control variables are similar to those in Panel A. The standard errors reported within braces are corrected for heteroscedasticity and clustered at individual firm level. Data includes a sub-set of mergers announced between January 1, 1985 and December 31, 2001 identified based on criteria described in Section 5. ***, ** and * denote significance at 1%, 5% and 10% respectively.

The table shows that firms are more likely to become targets if the there is a decrease in concentration of institutional shareholding (positive coefficient on *Change Herf* $Dummy_i$ and on *Chnge Top Five* $Dummy_i$).

Panel C: Takeovers and Changes in Concentration of Institutional Shareholding				
	Target_i	Target_i	Target_i	Target_i
	(1)	(2)	(3)	(4)
Change Herf Dummy_i	.79***	.86***		
	(.24)	(.34)		
Change Top Five Dummy_i			.82***	.78**
			(.24)	(.30)
Bid-Ask Spread_i		-.18***		-.18***
		(.06)		(.06)
$\text{Log(Market Capitalization)}_i$		-.26***		-.25***
		(.08)		(.08)
Observations	584	505	584	505

Panel D reports the results of regressions relating takeover probability to trading by different classes of institutional investors and firm & *event* characteristics. Specifically, I estimate the pooled OLS regression: $Pr(Target_i = 1) = \Phi(\beta_0 + \beta_1 * (X)_i + \beta_2 * (Z)_i + \beta_3 * (\textit{Bid-Ask Spread})_i + \beta_4 * (\textit{Log(Market Capitalization)})_i + \gamma * Controls_i)$, where $Target_i$ is a dummy variable that identifies firms that become targets any time during years 2-5 after the *event*, $\Phi()$ is the logistic distribution function, X is $Sale_i$ in Column (1) and $ChngYr_i$ in Columns (2) & (3). $Sale_i$ is a dummy variable that takes a value one for the *events* after which the largest institutional shareholder sells more than 50% of its holding within one year and $ChngYr_i$ is the ratio of the total number of shares held by the institution one year after the *event* to the number of shares held at the time of the *event*. Z is ${Sale_i}^{Oth}$ in Column (1), ${ChngYr_i}^{Oth}$ in Column (2) and $ChngYr_i * Independent_i$ in Column (3). ${Sale_i}^{Oth}$ is a dummy variable that is equal to 1 if all institutional shareholders with more than 1% shareholding (excluding the largest) sell in aggregate more than 50% of their holding in the one year after the *event* and zero otherwise, ${ChngYr_i}^{Oth}$ is the ratio of the number of shares held one year after *event* by all institutions with more than 1% shareholding (excluding the largest), to the number of shares held at the time of the *event* and $Independent_i$ is a dummy variable that identifies *events* in which the largest institutional shareholder is an independent investment advisor, $\textit{Bid-Ask Spread}_i$ is the average implicit bid ask spread for the firm's stock for the year before the *event*, calculated using the methodology of Roll (1984), $\textit{Log(Market Capitalization)}_i$ is the logarithm of the total market value of equity of the firm at the end of the calender year after the *event*. Other controls include, $\textit{Initial Holding}_i$, the shareholding of the largest institutional shareholder of the firm at the time of the *event*, $Abnormal_i$, the buy and hold abnormal returns based on size and book to market bench marks for the one year period starting three months after the *event*, $\textit{Market to Book}_i$, the ratio of market value of total assets to the book value of total assets calculated at the end of the calender year before the *event* according to the methodology of Kaplan and Zingales (1997), $\textit{Stock volatility}_i$, the standard deviation of the daily returns of the firm's stock in the one year period before the *event* and $\textit{Dividend cut Dummy}_i$, a dummy variable identifying firms that cut dividends in the one year after the *event*. The standard errors reported within braces are corrected for heteroscedasticity and clustered at the level of an individual firm. Data includes a sub-set of mergers announced between January 1, 1985 and December 31, 2001 identified based on criteria described in Section 5. ***, ** and * denote significance at 1%, 5% and 10% respectively.

The table shows that firms are more likely to become targets *only* when the largest institutional shareholder sells its holding (positive coefficient on $Sale_i$ and negative coefficient on $ChngYr_i$ (Column (2)) and when independent investment advisors sell (negative coefficient on $ChngYr_i * Independent_i$).

Panel D: Takeovers and Institutional Trading

	$Target_i$ (1)	$Target_i$ (2)	$Target_i$ (3)
$Sale_i$	.50** (.25)		
${Sale_i}^{Oth}$	.24 (.34)		
$ChngYr_i$		-.54** (.24)	-.40* (.24)
${ChngYr_i}^{Oth}$		-.21 (.40)	
$ChngYr_i$*$Independent_i$			-.65* (.34)
Bid-Ask $spread_i$	-.18*** (.06)	-.20*** (.06)	-.19*** (.06)
Log(Market Capitalization)$_i$	-.26*** (.07)	-.25*** (.07)	-.28*** (.07)
Observations	564	564	564

Table VII: Direct Intervention vs Takeovers

Panel A reports the results of regressions relating takeover probability to institutional trading, firm and *event* characteristics. Specifically, I estimate the pooled OLS regression : $Pr(Target_i = 1) = \Phi(\beta_0 + \beta_1 * (X)_i + \beta_2 * (\textit{Bid-Ask Spread})_i + \beta_3 * (\textit{Log(Market Capitalization)})_i + \gamma * Controls_i)$, where $Target_i$ is a dummy variable that identifies firms that become targets any time during years 2-5 after the *event*, $\Phi()$ is the logistic distribution function, X is $Sale_i$ in Columns (1) & (2) and $ChngYr_i$ in Columns (3) & (4). $Sale_i$ is a dummy variable that takes a value one for the *events* after which the largest institutional shareholder sells more than 50% of its holding within one year and zero otherwise, $ChngYr_i$ is the ratio of the total number of shares held by the largest institutional shareholder one year after the *event* to the number of shares held at the time of the *event*, $\textit{Bid-Ask Spread}_i$ is the average implicit bid ask spread for the firm's stock during the year before the *event* calculated using the methodology of Roll (1984), $\textit{Log(Market Capitalization)}_i$ is the logarithm of the total market value of equity of the firm at the end of the calender year after the *event*. Other controls include, $\textit{Initial Holding}_i$, the shareholding of the largest institutional shareholder at the time of the *event*, $Abnormal_i$, the buy and hold abnormal returns based on size and book to market bench marks for the one year period starting three months after the *event*, $\textit{Debt/Total Assets}_i$, the ratio of total long term debt (COMPUSTAT item Data 19) to the book value of total assets (COMPUSTAT item Data 6) measured at the end of the year of the *event*, $\textit{Stock volatility}_i$, the standard deviation of the daily returns of the firm's stock in the one year period before the *event* and $\textit{Dividend cut Dummy}_i$, a dummy variable that identifies a cut in dividends in the one year after the *event*. The sample includes only the *events* after which the firm either becomes a target or experiences a disciplinary CEO turnover. The standard errors reported within braces are corrected for heteroscedasticity and clustered at individual firm level. Data includes a sub-set of mergers announced between January 1, 1985 and December 31, 2001 identified based on criteria described in Section 5. ***, ** and * denote significance at 1%, 5% and 10% respectively.

The table shows that firms are more likely to become targets, relative to experiencing a disciplinary CEO turnover if the largest institutional shareholder sells its holding (positive coefficient on $Sale_i$ and negative coefficient on $ChngYr_i$), if the firm has a more liquid stock (negative coefficient on $\textit{Bid-Ask Spread}_i$) and if the firm is a small firm (negative coefficient on $\textit{Log(Market Capitalization)}_i$.

Panel A: Direct Intervention vs Takeovers - *Target* and *CEO* sub-samples

	$Target_i$ (1)	$Target_i$ (2)	$Target_i$ (3)	$Target_i$ (4)
$Sale_i$	.74* (.38)	.68 (.44)		
$ChngYr_i$			-.51 (.34)	-.73* (.39)
Bid-Ask $Spread_i$		-.36*** (.13)		-.37*** (.12)
Log(Market $Capitalization)_i$		-.52*** (.16)		-.56*** (.17)
Initial $holding_i$		8.57* (4.85)		8.51* (4.82)
$Abnormal_i$		-.56 (.50)		-.58 (.48)
Stock $volatility_i$		-7.61 (18.21)		-7.20 (17.45)
Dividend cut $dummy_i$		-.37 (.53)		-.42 (.52)
Y90s $Dummy_i$		1.35* (.72)	(.57)	1.34* (.71)
Observations	152	147	152	147

Panel B reports the results of regressions relating takeover probability to institutional trading, firm and *event* characteristics. Specifically, I estimate the pooled OLS regression : $Pr(Target_i = 1) = \Phi(\beta_0 + \beta_1 * (X)_i + \beta_2 * (Bid\text{-}Ask\ Spread)_i + \beta_3 * (Log(Market\ Capitalization))_i + \gamma * Controls_i)$, where $Target_i$ is a dummy variable that identifies firms that become targets any time during years 2-5 after the *event*, $\Phi()$ is the logistic distribution function, X is $Sale_i$ in Columns (1) & (3) and $ChngYr_i$ in Columns (2) & (4). $Sale_i$ is a dummy variable that takes a value one for the *events* after which the largest institutional shareholder sells more than 50% of its holding within one year and zero otherwise, $ChngYr_i$ is the ratio of the total number of shares held by the largest institutional shareholder one year after the *event* to the number of shares held at the time of the *event*, $Bid\text{-}Ask\ Spread_i$ is the average implicit bid ask spread for the firm's stock during the year before the *event* calculated using the methodology of Roll (1984), $Log(Market\ Capitalization)_i$ is the logarithm of the total market value of equity of the firm at the end of the calender year after the *event*. Other controls include, $Initial\ Holding_i$, the shareholding of the largest institutional shareholder at the time of the *event*, $Abnormal_i$, the buy and hold abnormal returns based on size and book to market bench marks for the one year period starting three months after the *event*, $Debt/Total\ Assets_i$, the ratio of total long term debt (COMPUSTAT item Data 19) to the book value of total assets (COMPUSTAT item Data 6) measured at the end of the year of the *event*, $Stock\ volatility_i$, the standard deviation of the daily returns of the firm's stock in the one year period before the *event* and $Dividend\ cut\ Dummy_i$, a dummy variable that identifies a cut in dividends in the one year after the *event*. The sample in Columns (1) & (2) includes the *events* after which the industry adjusted operating profitability of the merged firm declines, the sample in Columns (3) & (4) include the *events* with $Abnormal < 0$. The standard errors reported within braces are corrected for heteroscedasticity and clustered at individual firm level. Data includes a sub-set of mergers announced between January 1, 1985 and December 31, 2001 identified based on criteria described in Section 5. ***, ** and * denote significance at 1%, 5% and 10% respectively.

The table shows that among firms with decreasing operating profitability or among firm with negative abnormal returns, takeovers are more likely when institutions sell their holdings (positive coefficient on $Sale_i$ and negative coefficient on $ChngYr_i$).

Panel B: Direct Intervention vs Takeovers				
	Firms with declining operating profitability		Firms with negative abnormal returns	
	(1)	(2)	(3)	(4)
$Sale_i$	1.15***		.57*	
	(.39)		(.30)	
$ChngYr_i$		-1.06**		-.60**
		(.42)		(.30)
Bid-Ask $Spread_i$	-.13	-.13	-.18**	-.18**
	(.09)	(.09)	(.07)	(.08)
Log(Market $Capitalization)_i$	-.19	-.17	-.26**	-.26**
	(.12)	(.12)	(.09)	(.10)
Initial $holding_i$	6.20*	6.28*	3.48	3.49
	(3.67)	(3.57)	(3.40)	(3.55)
$Abnormal_i$	.05	.10	-.15	-.41
	(.47)	(.48)	(.81)	(.86)
Stock $volatility_i$	-.05	1.38	-14.86	-13.74
	(11.98)	(11.78)	(12.08)	(12.68)
Dividend cut $dummy_i$	-.23	-.27	-.68	-.68
	(.53)	(.54)	(.47)	(.48)
Y90s $Dummy_i$	.50	.47	-.25	-.31
	(.50)	(.50)	(.40)	(.43)
Observations	243	243	350	350

Table VIII: Block holder Trading Immediately Prior to Takeovers

The table reports the results of regressions relating takeover probability to institutional trading, firm & *event* characteristics. Specifically, I estimate the panel data model: $Pr(\text{Target}_{it} = 1) = \Phi(\beta_0 + \beta_1 * (\Delta Hold)_{it} + \beta_2 * (\Delta Hold)_{it-1} + \beta_3 * (\textit{Bid-Ask Spread})_i + \beta_4 * (\textit{Log(Market Capitalization)})_i + \gamma * \textit{Controls}_i + \textit{Time Dummies})$, where $Target_{it}$ is a dummy variable which takes a value 1 if the firm becomes a target in quarter $t+1$, $\Phi()$ is the logistic distribution function, $\Delta Hold_{it}$ is the change in holding of the largest institutional shareholder of the firm at the time of the *event* in quarter t, $\textit{Bid-Ask Spread}_i$ is the average implicit bid ask spread for the firm's stock during the year before the *event* calculated using the methodology of Roll (1984), $\textit{Log(Market Capitalization)}_i$ is the logarithm of the total market value of equity of the firm at the end of the calender year after the *event*. Other controls include, $Hold_{it-1}$, the shareholding of the institution at the end of quarter $t-1$, $Zero_{it}$, a dummy variable that identifies quarters for which the beginning institutional holding is 0, $Abnormal_{it}$, the buy and hold abnormal returns based on size and book to market bench marks for quarter t, $\textit{Debt/Total Assets}_{it}$, the ratio of total long term debt (COMPUSTAT item Data 19) to the book value of total assets (COMPUSTAT item Data 6) at the end of quarter t, $\textit{Cash/Total Assets}_{it}$, the ratio of book value of cash and marketable securities (COMPUSTAT item Data 1) to the book value of total assets (COMPUSTAT item Data 6) measured at the end of quarter t, $\textit{Sales Growth}_{it}$, the growth rate of net sales (COMPUSTAT item Data 12) in quarter t, $\textit{Stock volatility}_i$, the standard deviation of the daily returns of the firm's stock in the one year period before the *event*, $\textit{Dividend cut Dummy}_i$, a dummy variable that identifies a cut in dividends in the one year after the *event*. The regressions in Columns (2)-(4) have dummies for the quarters since *event*. In Column (3) I exclude the firms which became targets within 6 quarters after the initial *event*. The standard errors are all corrected for heteroscedasticity and clustered at an individual firm level. Data includes a sub-set of mergers announced between January 1, 1985 and December 31, 2001 identified based on criteria described in Section 5. ***, ** and * denote significance at 1%, 5% and 10% respectively.

The table shows that institutions either reduce the rate of selling or hold on to their shares in the quarter before the takeover (positive coefficient on $\Delta Hold_{it}$).

Block holder Trading Immediately Prior to Takeovers				
	(1)	(2)	(3)	(4)
Δ Hold$_{it}$	24.15***	24.15***	27.62**	24.4***
	(5.95)	(8.93)	(9.94)	(8.84)
Bid-Ask Spread$_i$	-.15***	-.14**	-.15**	-.14**
	(.05)	(.06)	(.06)	(.06)
Log(Market Capitalization)$_i$	-.17***	-.17**	-.15**	-.18***
	(.06)	(.07)	(.07)	(.07)
Hold$_{it-1}$	-.70	-2.06	-2.78	
	(2.54)	(2.46)	(2.71)	
Zero$_{it}$				-.43
				(.28)
Abnormal$_{it}$	-.15	-.13	-.42	-.09
	(.49)	(.46)	(.49)	(.46)
Debt/Total Assets$_{it}$	.28	.22	.27	.27
	(.65)	(.62)	(.65)	(.62)
Cash/Total Assets$_{it}$	-.06	-.08	-.09	-.11
	(.71)	(.81)	(.86)	(.82)
Sales Growth$_{it}$	-.38	-.39	-.33	-.37
	(.49)	(.54)	(.57)	(.54)
Observations	7173	6876	6293	6876
Quarter Dummies	No	Yes	Yes	Yes

Table IX: Takeovers and Institutional Block holders

The table reports the results of regressions relating takeover probability to the presence of institutional block holders and firm characteristics. Specifically, I estimate the pooled OLS regression :$Pr(\text{Target}_{it} = 1) = \Phi(\beta_0 + \beta_1 * (X)_i + \beta_3 * (Bid-AskSpread)_i + \beta_4 * (Log(MarketCapitalization)_i + \gamma * \text{Controls}_{\text{it}})$, where *Target*$_i$ is a dummy variable that identifies firms that become targets any time during years 2-5 after the *event*, $\Phi()$ is the logistic distribution function, X is *Block*$_i$ in Columns (1) - (3) and *Institution Holding*$_i$ in Columns (4) & (5). *Block*$_i$ is a dummy variable that identifies firms with an institutional block holder with more than 5% shareholding, *Institution Holding*$_i$ is the fractional holding of the largest institutional shareholder at the time of the *event*, *Bid-Ask Spread*$_i$ is the average implicit bid ask spread for the firm's stock during the year before the *event* calculated using the methodology of Roll (1984), *Log(Market Capitalization)*$_i$ is the logarithm of the total market value of equity of the firm at the end of the calender year after the *event*. Other controls include, *Debt/Total Assets*$_i$, the ratio of total long term debt (COMPUSTAT item Data 19) to the book value of total assets (COMPUSTAT item Data 6) measured at the end of the year of the *event*, *Cash/Total Assets*, the ratio of book value of cash and marketable securities (COMPUSTAT item Data 1) to the book value of total assets (COMPUSTAT item Data 6) measured at the end of the year of the *event*, *Y90s Dummy*, a dummy variable that identifies the time period 1991-2002. In Column (3) I use a propensity score matching method to control for covariates. Specifically I estimate the logistic regression $Pr(\text{Block}_i = 1) = \Phi(\beta_0 + \beta_1 * (Log(Turnover))_i + \beta_2 * (Log(Turnover))_i^2 + \beta_3 * (Bid-AskSpread)_i + \beta_4 * (Log(MarketCapitalization)_i$, and obtain predicted values of *Pr(Block*$_i$*=1)*. I then use the demeaned *Pr(Block*$_i$*=1)* along with an interaction term between demeaned *Pr(Block*$_{it}$*=1)* and *Block* as controls in Column (3). The standard errors reported within braces are corrected for heteroscedasticity and clustered at individual firm level. Data includes a sub-set of mergers announced between January 1, 1985 and December 31, 2001 identified based on criteria described in Section 5. ***, ** and * denote significance at 1%, 5% and 10% respectively.

The table shows that firms with institutional block holders and those where the largest institution holds a larger fraction are more likely to become targets (positive coefficient on *Block*$_i$ and *Initial Holding*$_i$).

Takeovers and Institutional Block holders					
	(1)	(2)	(3)	(4)	(4)
Block$_i$	.48***	.35*	.31*		
	(.17)	(.20)	(.18)		
Pr(Block=1)$_i$			.91		
			(1.07)		
Block$_i$ *Pr(Block=1)$_i$			-.13		
			(1.47)		
Initial holding$_i$				3.53***	2.76*
				(1.23)	(1.42)
Bid-Ask Spread$_i$		-.12***			-.12***
		(.04)			(.04)
Log(Market Capitalization)$_i$		-.22***			-.22***
		(.05)			(.05)
Cash/Total Assets$_i$		-.58			-.58
		(.70)			(.70)
Debt/Total Assets$_i$		.89*			.86*
		(.50)		(.50)	
Y90s Dummy$_i$	.37**	.02		.37**	.02
	(.21)	(.21)		(.17)	(.21)
Observations	1140	994	1140	1140	994

Table X : Block holder Trading, Takeovers and Governance Characteristics

Panel A reports the results of regressions relating the probability of a substantial sale by the institutional shareholder to firm and *event* characteristics. Specifically, I run the pooled OLS regression: $Pr(Sale_i = 1) = \Phi(\beta_0 + \beta_1 * (X)_i + \beta_2 * Initial\ Holding_i + \beta_3 * Spread_i + \gamma * Controls_i)$, where $Sale_i$ is a dummy variable that takes a value one for the *events* after which the institution sells more than 50% of its holding within one year and zero otherwise, $\Phi()$ is the logistic distribution function, X is firm level governance characteristic. It is *G-Index* in Column 1, *Dual Class* in Column 2, *CEO Equity Dummy* in Column 3, *Board Equity Dummy* in Column 4, *CEO Chairman* in Column 5, and *Inside Directors* in Column 6. *G-Index* is the Gompers, Ishii and Mertrick (2000) index of firm level takeover defence, *Dual Class* is a dummy variable identifying firms with dual class shares, *Board Equity Dummy* is a dummy variable that identifies firms in which the Board of Directors own more than 5% of the equity, *CEO Chairman* is a dummy variable which takes a value of one if the CEO is also the Chairman of the Board and zero otherwise, *CEO Equity Dummy*is a dummy variable that identifies firms in which the CEO owns more than 5% of the firm's equity. *Inside Directors* is the fraction of Inside Directors in the Board of Directors of the firm. *Bid-Ask* $Spread_i$ is the average implicit bid ask spread for the firm's stock during the year before the *event*, calculated using the methodology of Roll (1984), *Initial* $Holding_i$ is the shareholding of the largest institutional shareholder at the time of the *event*, *Stock* $volatility_i$ is the standard deviation of the daily returns of the firm's stock during the 1 year period before the *event* and *Dividend cut* $Dummy_i$, is a dummy variable identifying firms that cut dividends in the one year after the *event*. The standard errors reported within braces are corrected for heteroscedasticity and clustered at the level of individual firm. Data includes a sub-set of mergers announced between January 1, 1985 and December 31, 2001 identified based on criteria described in Section 5. ***, ** and * denote significance at 1%, 5% and 10% respectively.

The table shows that the largest institutional shareholder is more likely to sell in the post *event* period if the firm has dual class shares (positive coefficient on *Dual* $Class_i$). The table shows that none of the other governance variables are significantly correlated with the choice of the institution to sell a substantial fraction of its holding.

	Block holder Trading and Governance Characteristics					
	Sale (1)	Sale (2)	Sale (3)	Sale (4)	Sale (5)	Sale (6)
G-Index$_i$	-.003 (.04)					
Dual Class$_i$		.70* (.36)				
CEO Equity Dummy$_i$			.24 (.25)			
Board Equity Dummy$_i$				.09 (.22)		
CEO Chairman$_i$					.02 (.23)	
Insider Directors$_i$						.01 (.78)
Bid-Ask Spread$_i$	-.12* (.07)	-.13* (.07)	-.10* (.05)	-.10* (.05)	-.10* (.05)	-.10* (.05)
Initial holding$_i$	-9.52** (3.12)	-9.23** (3.13)	-7.38** (3.24)	-7.65** (3.24)	-7.52** (3.24)	-7.46** (3.28)
Stock volatility$_i$	16.21*	18.12* (9.34)	8.62 (8.94)	8.39 (7.70)	8.68 (7.69)	5.32 (7.91)
Abnormal$_i$	-.87** (.35)	-.91** (.35)	-.70** (.32)	-.70** (.32)	-.70** (.32)	-.65** (.33)
Observations	447	447	440	440	440	440

Panel B reports the results of regressions relating takeover probability to institutional trading and firm governance characteristics. Specifically, I estimate the pooled OLS regression : $Pr(Target_i = 1) = \Phi(\beta_0 + \beta_1 * (X)_i + \beta_2 * (ChngYr)_i + \beta_3 * (\textit{Bid-Ask Spread})_i + \beta_4 * (\textit{Log(Market Capitalization)})_i + \gamma * Controls_i)$, where $Target_i$ is a dummy variable that identifies firms that become targets any time during years 2-5 after the *event*, $\Phi()$ is the logistic distribution function, X is firm level governance characteristic described it detail in the discussion before Panel A. $ChngYr_i$ is the ratio of the total number of shares held by the largest institutional shareholder one year after the *event* to the number of shares held at the time of the *event*, *Bid-Ask Spread*$_i$ is the average implicit bid ask spread for the firm's stock for the year before the *event*, calculated using the methodology of Roll (1984), *Log(Market Capitalization)*$_i$ is the logarithm of the total market value of equity of the firm at the end of the calender year after the *event*. The standard errors reported within braces are corrected for heteroscedasticity and clustered at individual firm level. Data includes a sub-set of mergers announced between January 1, 1985 and December 31, 2001 identified based on criteria described in Section 5. ***, ** and * denote significance at 1%, 5% and 10% respectively.

The table shows that firms are more likely to become targets if the CEO owns less than 5% equity (negative coefficient on *CEO Equity Dummy*), if the CEO is not the chairman of the board (negative coefficient on *CEO Chairman*) and if the board of directors has a lower number of insider directors (negative coefficient on *Inside Directors*). The table also shows that takeovers are more likely when the largest institutional shareholder sells its holding (negative coefficient on $ChngYr_i$), if the stock is liquid (negative coefficient on *Bid-Ask Spread*$_i$) and if the firm is small (negative coefficient on *Log(Market Capitalization)*$_i$).

Takeovers and Governance Characteristics

	Target_i (1)	Target_i (2)	Target_i (3)	Target_i (4)	Target_i (5)	Target_i (6)
G-Index_i	-.007					
	(.05)					
Dual Class_i		-.72				
		(.54)				
$\text{CEO Equity Dummy}_i$			-.83**			
			(.35)			
$\text{Board Equity Dummy}_i$				.30		
				(.31)		
CEO Chairman_i					-.69**	
					(.29)	
$\text{Insider Directors}_i$						-2.89**
						(1.09)
ChngYr_i	-.76***	-.77***	-.62**	-.55**	-.59**	-.61**
	(.29)	(.29)	(.29)	(.27)	(.28)	(.29)
Bid-Ask Spread_i	-.16**	-.16**	-.17***	-.18***	-.16**	-.18***
	(.07)	(.07)	(.06)	(.06)	(.06)	(.07)
$\text{Log(Market Capitalization)}_i$	-.31***	-.32***	-.37***	-.28***	-.30***	-.35***
	(.09)	(.09)	(.08)	(.08)	(.08)	(.08)
Observations	505	675	505	675	505	

Table XI: Takeovers and Block holder Trading - Alternate Sample

Panel A reports the results of regressions relating the takeover probability to institutional trading and firm characteristics. Specifically, I estimate the pooled OLS regression: $Pr(\mathit{Target}_i = 1) = \Phi(\beta_0 + \beta_1 * (\mathit{ChngYr})_i + \beta_2 * (\mathit{Log(Turnover)})_i + \beta_3 * (\mathit{Log(Market\ Capitalization)})_i + \gamma * \mathit{Controls}_i +$ Time Fixed Assets. The sample includes all firms with an institutional block holder with more than 5% shareholding at the end of first quarter of any year between 1985-2001. I measure institutional trading in the subsequent one year period (year t). Target_i is a dummy variable that identifies firms that become targets in the next one year period. $\Phi()$ is the logistic distribution function, ChngYr_i is a ratio of institutional holding at the end of the year t to institutional holding at the beginning of year t, $\mathit{Log(Turnover)}_i$ is the logarithm of the average turnover of the firm's stock and is measured in year $t-1$, $\mathit{Log(Market\ Capitalization)}_i$ is the logarithm of the total market value of equity of the firm measured at the beginning of year t. Other controls include, $\mathit{Initial\ Holding}_i$, the shareholding of the largest institutional shareholder of the firm at the beginning of year t, $\mathit{Debt/Total\ Assets}_i$, the ratio of total long term debt (COMPUSTAT item Data 19) to the book value of total assets (COMPUSTAT item Data 6) at the end of year t, *Cash/Total Assets*, the ratio of book value of cash and marketable securities (COMPUSTAT item Data 1) to the book value of total assets (COMPUSTAT item Data 6) at the end of year t, *Sales Growth*, the growth rate in net sales (COMPUSTAT item Data 12) in year t, In Column (2) I include industry fixed effects. In Column (3) I include institution fixed effects. In Column (4) I include an interaction term between *ChngYr* and a dummy variable identifying those institutions which also had a holding in the acquirer, *Holding in Acquirer*. The standard errors reported within braces are corrected for heteroscedasticity. ***, ** and * denote significance at 1%, 5% and 10% respectively.

The table shows that firms are more likely to become targets if the largest institutional shareholder sells its holding (negative coefficient on ChngYr_i), if the firm has a more liquid stock (positive coefficient on $\mathit{Log(Turnover)}_i$ and if the firm is a small firm (negative coefficient on $\mathit{Log(Market\ Capitalization)}_i$. The table also shows that the largest institution sells a smaller fraction if it owns shares in the acquirer.

Takeovers and Block holder Trading - Alternate Sample					
	(1)	(2)	(3)	(4)	(5)
ChngYr_i	-.21***	-.29*	-.31*	-.30*	-.36**
	(.07)	(.16)	(.17)	(.18)	(.17)
ChngYr_i*Holding in Acquirer					1.24***
					(.34)
$\mathrm{Log(Turnover)}_i$	.26***	.22***	.14*	.16*	.14*
	(.03)	(.08)	(.08)	(.08)	(.08)
$\mathrm{Log(Market\ Capitalization)}_i$	-.16***	-.27***	-.29***	-.28***	-.29***
	(.02)	(.04)	(.04)	(.05)	(.04)
Initial $\mathrm{holding}_i$	1.25	-1.74	-2.75*	-3.42*	-2.74*
	(.61)	(1.41)	(1.50)	(1.76)	(1.50)
$\mathrm{Abnormal}_i$	.06	.02			
	(.05)	(.12)			
Debt/Total Assets_i		1.43***	1.30***	1.25***	1.30***
		(.22)	(.22)	(.20)	(.23)
Cash/Total Assets_i		-.04	-.37	-.03	-.38
		(.37)	(.44)	(.38)	(.44)
Sales Growth_i		-.69***	-.75***	-.69***	-.74***
		(.25)	(.23)	(.25)	(.23)
Observations	23652	21653	13490	15195	13490
Time Fixed Effects	Yes	Yes	Yes	Yes	Yes
Industry Fixed Effects	No	No	Yes	No	Yes
Institution Fixed Effects	N0	No	No	Yes	No

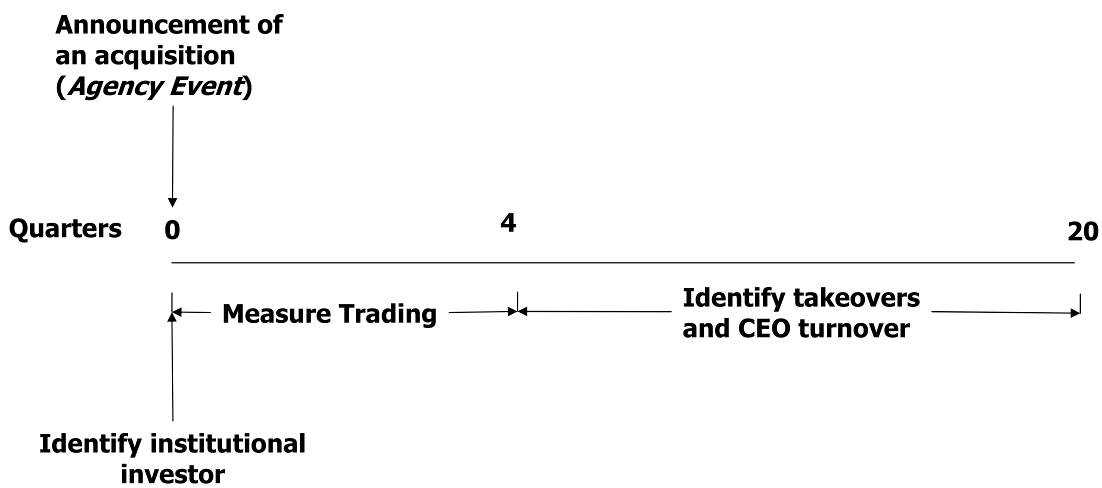

Figure 1: Empirical Timeline

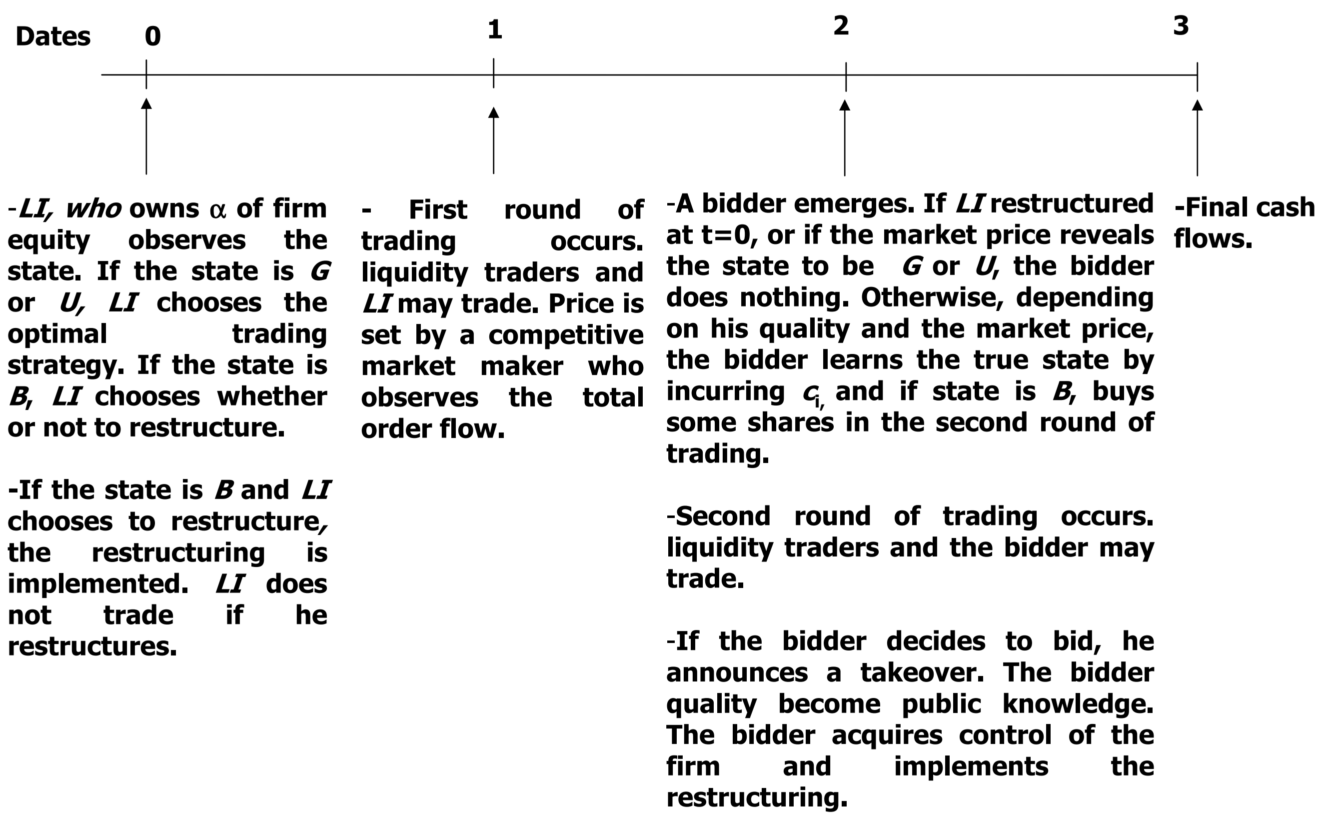

Figure 2: Sequence of Events

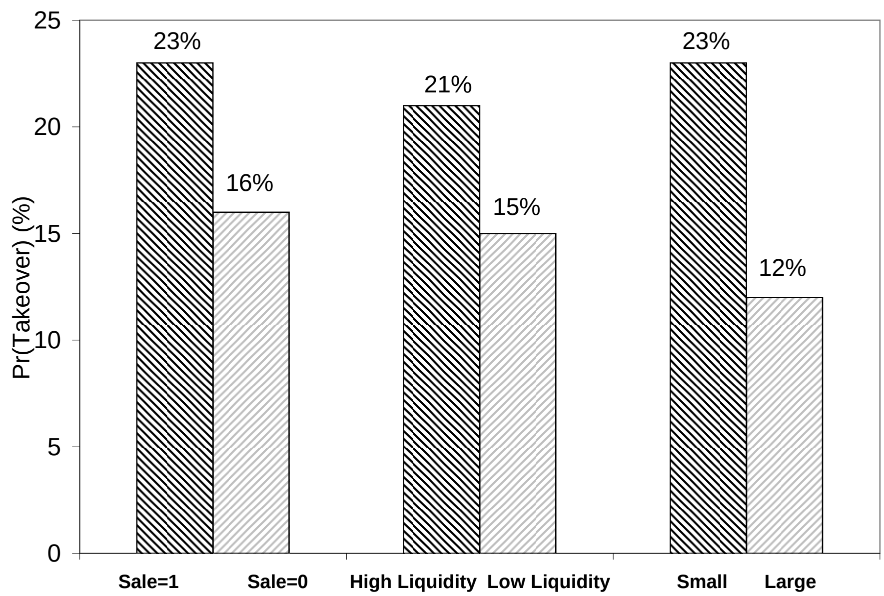

Figure 3: Takeover Probability

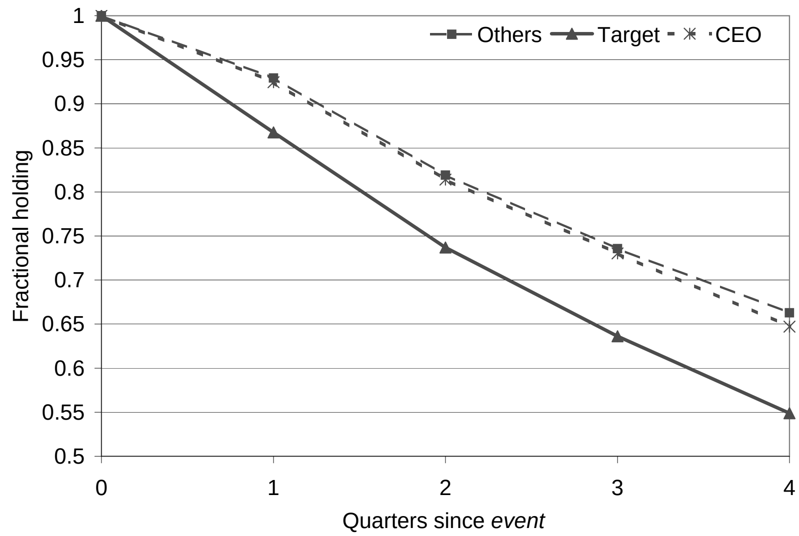

Figure 4: Mean Fractional Holding in the Four Quarters Following *Event*

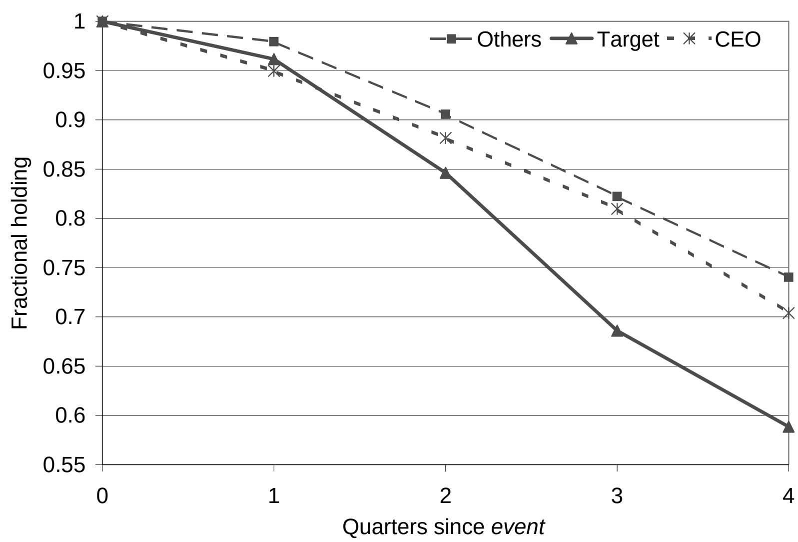

Figure 5: Median Fractional Holding in the Four Quarters Following *Event*

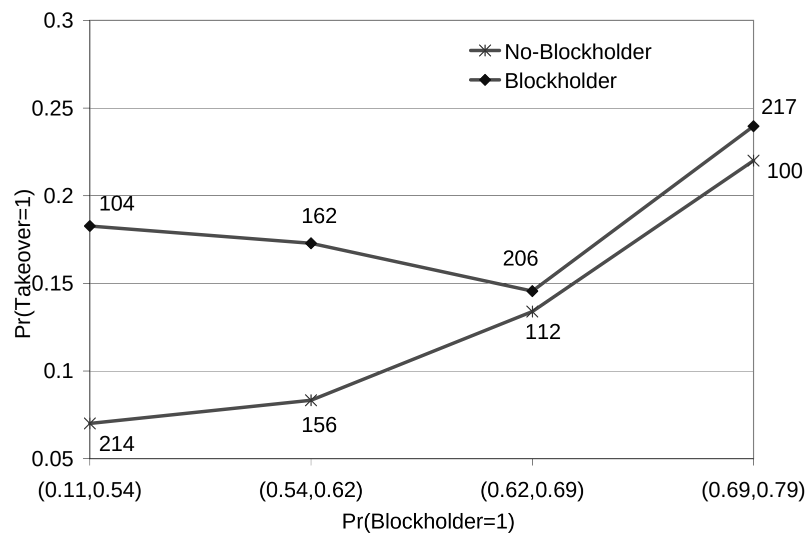

Figure 6: Block holders and Takeovers - Propensity Score Matched Plot

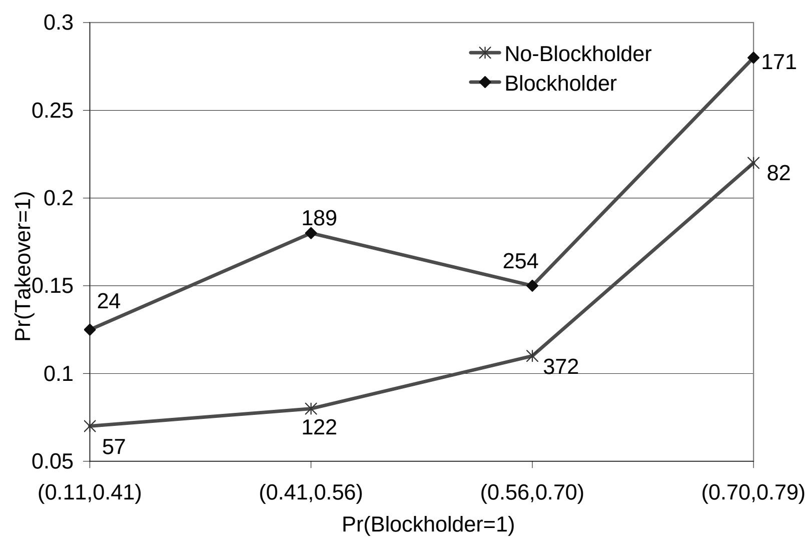

Figure 7: Block holders and Takeovers - Propensity Score Matched Plot