Three Essays in Financial Economics

Lily Xiaoli Qiu

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Abstract

This dissertation presents three essays in financial economics. Section 1 presents an empirical study on institutional investor activism. It shows that firms with large public pension fund (PPF) shareholders engage in less mergers and acquisitions activity and in smaller deals, while firms with large insurance or investment company shareholders engage in more M&A activity and in larger deals, after controlling for firm-level governance provisions, firm characteristics, and ownership endogeneity. Although the presence of PPF ownership is not significantly associated with bidder announcement abnormal returns, it is significantly and positively associated with long-term M&A abnormal returns including the announcement month, and with post-M&A improvement in asset turnover rates. The findings in this study suggest that public pension funds are the most likely monitors of corporate governance, whereas investment companies are the least likely monitors.

Section 2 offers a mechanism different from Shleifer and Vishny (1986), by which an external monitor can add value. In this two-period model with uncertainty of managerial quality and noisy but informative private information, limited improvement in investment efficiency is an equilibrium outcome, and the monitor may give up monitoring due to the added cost of uncertainty. The model highlights the limitation of external monitoring, and provides a theoretical explanation for the empirical finding that only the activist institutions can reduce corporate mergers and acquisitions activity. It also offers testable prediction regarding managerial investment behavior and performance. It may offer an

explanation for the fact that there are very little overlapping in block holdings among the activist institutions.

Section 3 presents new evidence that past industry conditions can predict future IPO underpricing, long-term IPO performance, and IPO volume. Moreover, the impact of industry conditions is economically large. After controlling for variables known to predict initial returns, we find that high underpricing industries are those with (1) lower leverage, (2) higher share turnover, (3) lower book to market ratio, and (4) smaller size. Furthermore, we find that IPOs in industries with (1) lower concentration and (2) lower leverage experience superior performance in the three years following their IPO. Industries with higher concentration also experience higher future IPO volume.

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Contents

List of Tables

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1 Which Institutional Investors Monitor? Evidence from Acquisition Activity

Introduction

Institutional investors hold more than half of U.S. publicly traded equity (55.8% in 2001[1]). The fastest growing institutional investors are public pension funds and mutual funds. Their assets grew at compound annual growth rates of 14% and 20% respectively in the 1990s.[2]. As of 2001, U.S. public pension funds held 8.0% of the total U.S. equity market.[3] These funds have become active in submitting shareholder proxy proposals on corporate governance topics.[4] From 1987 to 1994, their members sponsored 284 proxy proposals, about 61% of the total proxy proposals sponsored by institutional investors.[5]

Institutional investor activism has attracted both publicity in the press and substantial interest in academic research. It has come to be regarded as the new corporate governance mechanism[6] (Black (1992), Pound (1992), and Holmstrom and Kaplan (2001)). However, prior studies on the effectiveness of institutional investor activism have found only inconclusive results. Gillan and Starks (2000), Del Guercio and Hawkins (1999), Karpoff, Malatesta, and Walkling (1996), and Wahal (1996) find that shareholder proxy proposals have either insignificant effect or small negative effect on stock returns. On the other hand, Wahal (1996) finds that nonproxy proposal targeting receives signifi-

[1] Institutional Investment Report, The Conference Board, Volume 5, Number 1, March 2003.

[2] Davis and Steil (2001)

[3] The Conference Board.

[4] According to Gordon and Pound (1993), under SEC Rule 14A-8, established in 1942, shareholders may make proposals on corporate governance issues of up to 500 words in length, and management must include these proposals in their proxy materials and give shareholders an opportunity to vote. In 1992 the SEC amended its proxy rule to relax prior restrictions on direct communication among shareholders. This change allowed institutional investors to coordinate their voting activities without public disclosure. It not only reduced the cost of shareholder activism, but also facilitated the formation of shareholder coalitions.

[5] As recorded by the Investor Responsibility Research Center, Gillan and Starks (2000).

[6] Various antitakeover measures adopted by management had rendered the disciplinary takeover market ineffective during the 90s. For example, Bebchuk, Coates IV, and Subramanian (2002) find that "not a single hostile bid won a ballot box victory against an 'effective' staggered board."

cant and positive abnormal announcement returns. Smith (1996) finds that CalPERS (California Public Employees Retirement System) gained an estimated $19 million from its activism at a cost of $3.5 million from 1987 to 1993.

Most of these studies focus on the impact of shareholder proxy proposals targeting governance issues. While this is the most visible governance activity by institutional investors, there are several reasons to suspect that event responses to proxy proposals do not fully represent the impact of shareholder activism. First, proxy proposals are advisory rather than binding (Pound (1988), Gordon and Pound (1993)). Managers are not obliged to adopt these proposals even if they receive a majority vote from shareholders.[7] The data used in event studies which examine announcement stock returns will inevitably include many shareholder proposals that are never implemented.[8] Consequently, it is not surprising that stock price reactions to these events are modest and difficult to detect. Second, proposals will be withdrawn and thus not disclosed if management voluntarily adopts them. The inclusion of the proposal in the proxy materials may reflect management's negative response to shareholder concerns, and may thus be associated with negative stock market reactions (Prevost and Rao (2000)).

There are also other studies examining institutional investor activism other than their proxy proposal targeting activity.[9] Despite the common theoretical argument that external shareholders can monitor, no existing study has documented any economy-wide evidence that any external shareholder can influence firms' real decisions.

This study is the first to document a real effect by any class of shareholders. Taking a different approach, this study examines whether public pension ownership and other types of institutional ownership reduce corporate M&A activity, especially that which

[7]For example, in 1988, USAIR did not adopt CalPERS' anti-poison pill proxy resolution although the proposal received a majority of votes (Del Guercio and Hawkins (1999)).

[8]Wahal (1996) documents that 40 percent of proxy proposals on governance structures changes initiated by public pension funds were adopted by target firms.

[9]Hotchkiss and Strickland (2003) find evidence supporting the idea that the composition of institutional shareholders affects the market response to corporate events. Song and Szewczyk (2003) study the impact of Focus List by the Council of Institutional Investors and find very little evidence of the efficacy of shareholder activism. Parrino, Sias, and Starks (2003) find that changes in institutional owership are negatively related to the likelihood of forced CEO turnover.

leads to value reduction for bidder shareholders. The study finds that public pension funds are the only institutional investors whose presence is associated with reductions in the likelihood that a firm will acquire other firms, and that reduction is greater for potentially harmful M&A activity.

Studies on corporate M&A activity provide inconclusive results on bidder announcement returns. Jensen and Ruback (1983) find positive and significant bidder abnormal returns in successful tender offers, but approximately zero bidder abnormal returns in mergers. In their more recent summary paper, Andrade, Mitchell, and Stafford (2001) find on average insignificant bidder announcement abnormal returns, and negative announcement abnormal returns for bidders that financed the merger with stock. Many studies on acquirers' post-announcement performance reveal either negative abnormal returns or insignificant abnormal returns. For example, Agrawal, Jaffe, and Mandelker (1992), and Loughran and Vijh (1997) find evidence of poor bidder long-term performance. Mitchell and Stafford (2000) find no significant abnormal performance after accounting for the positive correlations among event-firm abnormal returns. Ravenscraft and Scherer (1987) and Healy, Palepu, and Ruback (1992) study post-M&A operating performance and reach different conclusions about whether mergers improve operating profitability.

There are many theories for why mergers occur: capturing synergy gains, creating market power, disciplining incompetent managers of the targets, responding to industry-level shocks (technology shocks or deregulation), and finally agency costs. Insignificant announcement and post-announcement bidder performance may support the argument that some M&A activity is driven by managerial private incentives rather than shareholder value maximization. Morck, Shleifer, and Vishny (1990) suggest that managerial objectives drive value-reducing acquisitions. Shleifer and Vishny (1989)'s model suggests that managers could overpay for acquisitions aimed at managerial-entrenchment. Amihud and Lev (1981), Agrawal and Mandelker (1987), as well as Morck, Shleifer, and Vishny (1990) point out that diversification of personal risk serves as strong incentive for managers to seek out acquisitions. Avery, Chevalier, and Schaefer (1998) find that CEOs who completed acquisitions are more likely to gain outside directorships. Their results support the argument that the prestige associated with acquisitions may encourage M&A activity. Apart from being driven by managerial incentives, M&A activity may also be plagued by managerial overconfidence. Roll (1986) points out that "bidding firms infected by hubris simply pay too much for their targets."

If M&A activity can be motivated by managerial private incentives, and reduce shareholder value for the acquirer, and *if* institutional investors are effective monitors, then the presence of institutional investors should reduce the frequency of M&A, ceteris paribus. If institutional investors have the capacity to judge the quality of individual transactions and effectively intervene, or if their presence signals credible promise of punishing value-reducing actions motivated by managerial incentives, then their presence should reduce the frequency of negative bidder NPV M&A. My analysis thus proceeds in two stages. First, I examine the relationship between institutional ownership and M&A activity in the whole sample. Second, I examine the relationship between institutional ownership and value-reducing/value-creating M&A activity.

In the first-stage analysis on overall M&A activity, I find that firms with higher public pension fund (PPF) ownership are less likely acquirers, while firms with higher insurance and investment company[10] ownership are more likely acquirers. For example, I find that a 1% increase in the top individual PPF ownership from the sample mean of 1.42% is associated with a 0.92% reduction in the estimated likelihood of M&A in the following year, while a 1% increase in the top insurance/investment company holdings from the sample mean of 2.54%/5.53% is associated with a 0.67%/0.57% increase in the estimated likelihood of M&A. PPF ownership is also negatively associated with the frequency of M&A activity in the long-run (in the span of eight years covered by this study).

[10]Mostly mutual funds. I follow the terminology used by Thomson Financial.

A natural concern for this study is the possible existence of endogeneity between institutional ownership and institutions' preference for less/more acquisitive firms. This concern is alleviated by the finding that firms' M&A activity in the previous year has no effect on PPF holdings, a negative effect on individual investment company holdings, and a marginally positive effect on insurance company holdings (the specification controls for firm characteristics and shareholder rights provisions). To address the concern that other endogeneity may exist, the study uses both an IV panel data methodology and a standard panel data methodology in the analysis. Both specifications yield similar and significant results.

Firm characteristics such as firm size, q ratio, and firm prior performance may be correlated with both M&A likelihood and institutional ownership. These variables are included in my specifications as controls. The relations between various types of institutional ownership and firms' M&A activity remain economically and statistically significant.

Another potential concern is the possible presence of confounding omitted variables. Gompers, Ishii, and Metrick (2003) find that firms with stronger shareholder rights make fewer acquisitions. My specifications control for firm-level shareholder rights provisions using their index measure. Institutions (except investment companies in aggregate) do not exhibit a preference for firms with better governance provisions. The observed relation between institutional ownership and M&A likelihood is independent of firm-level shareholder rights provisions.

Moeller, Schlingemann, and Stulz (2003) find in their sample of acquisitions from 1980 to 2001 a positive equal-weighted bidder announcement abnormal return of 1.1%, but a negative value-weighted bidder announcement abnormal return of −1.18%. Similarly, in my sample, I find the equal-weighted bidder announcement abnormal return to be 0.22%,[11] and the value-weighted bidder announcement abnormal return to be

[11] The equal-weighted bidder announcement abnormal return is −0.99% for deals with public targets, and 0.55% for deals with private targets.

-0.28%.[12] Moeller, Schlingemann, and Stulz (2003) also find that small acquirers receive higher announcement returns. Firm size is correlated with deal size. It is possible that smaller deals are ex ante better. In my sample, conditional on deal size greater than zero, a 1% increase of the top individual PPF ownership from the sample mean of 1.42% is associated with a $25.73 million reduction in the size of a deal, while a 1% increase of top individual investment company ownership from its sample mean of 5.53% is associated with a $4.07 million increase in M&A deal size.

My findings from the second stage analysis explore the value-relevance of institutional investor monitoring of M&A activity. M&A stock performance and operating performance provide the grounds to judge whether a particular M&A deal is value-reducing or not. I can not observe the possible performance of the M&A activity reduced by PPF ownership. On the other hand, not all value-reducing M&A activity is driven by managerial private incentives. However, given the hypothesis that an effective monitor prevents the value-reducing managerial-incentive-driven M&A, I would expect a positive relation between PPF ownership and M&A performance in general if PPF monitoring is effective, and the proportion of managerial-incentive-driven M&A is not negligible. M&A stock performance is measured by both the announcement abnormal return during a 3-day window (-1, 1) and long-term abnormal return with a window (-1, 365). Although PPF ownership does not appear to have a significant relation with bidder announcement abnormal return, individual PPF ownership is positively associated with bidder long-term stock abnormal return and post-M&A improvement in asset turnover rate.

Theory also suggests that the presence of institutional ownership should reduce more ex-ante value-reducing M&A if their monitoring is effective. Previous research suggests several scenarios in which bad M&A is more likely. In Jensen (1986), agency costs are the highest for cash rich firms facing fewer positive NPV investment projects.

[12] The value-weighted announcement abnormal return is calculated using bidder market capitalization two days prior to announcement date as the weight.

Harford (1999) reports negative acquirer returns at M&A announcements by firms with excess cash. Blanchard, Lopez-de Silanes, and Shleifer (1994) find that within their small sample of low q firms[13] that received cash windfalls, managers wasted the resources in order to ensure their long-run survival. Thus, the literature suggests that the managers of low q firms with piles of free cash are more likely to waste the cash flow on bad investments. Therefore I divide the whole sample into sub-samples according to firm q ratio and cash richness, and study whether institutional influence varies across sub-samples. Morck, Shleifer, and Vishny (1990) identify "buying-growth" M&A as driven by managerial incentives and value-reducing. I also examine institutional influence on the likelihood of "buying-growth" M&A within the sub-sample of M&A observations. In my sample, cash-rich low q M&A firms do appear to perform worse than low cash low q M&A firms, and "buying-growth" M&A are worse than "non-buying-growth" M&A. Correspondingly, within my sample, the reduction of M&A likelihood associated with PPF ownership is concentrated among cash-rich and low q firms, and PPF ownership is also associated with a reduction in the likelihood of "buying-growth" M&A. Overall evidence, then, supports the argument that PPFs actively monitor their equity holdings and discourage value-reducing M&A.

This study also documents institutional heterogeneity in monitoring activity. In contrast to the findings on public pension fund ownership, investment company ownership is significantly and positively associated with M&A likelihood and deal size[14], and its aggregate level is negatively associated with both bidder announcement abnormal returns and bidder long-term abnormal returns. Investment companies (mostly mutual funds) appear to be the least likely monitors among all types of institutions.

Finally this study offers some findings on control variables of managerial incentives and firm characteristics. Higher insider ownership is significantly associated with reductions in both the size and the likelihood of M&A, although it has no relation with

[13]Low q firms are more likely to be firms with few positive NPV investment opportunities.
[14]Conditional on deal size greater than zero.

post-M&A stock performance. Higher CEO compensation is not significantly associated with M&A activity or deal size, and is negatively associated with post-M&A stock performance. CEO option grants are positively associated with M&A likelihood and negatively associated with deal sizes. Firm leverage is negatively associated with M&A likelihood. There is a substitution effect between capital expenditures and M&A activity. A 1% increase in the capital expenditures ratio is significantly associated with a 0.77% decrease in M&A likelihood.

1.1 Hypotheses

Black (1990) argues that public pension funds are in the forefront of institutional shareholder activism due to their size and independence. Private pension funds, bank trusts and insurance companies remain mostly promanager, fearing a loss of current or prospective business. Several other characteristics of public pension funds also encourage and facilitate their roles as monitors of corporate governance. First, although most institutional investors outsource the management of some of their assets to external money managers, public pension funds appear to retain effective voting control of their assets. In 1993, PPFs retained voting control over 98.9% of the stock they owned, compared to only 66.4% for the average institutional investor (Brancato (1993)). Retention of voting power provides the means of activism. Second, indexation is more popular with public pension funds. It accounts for 54% of public pension funds' domestic equity and only 24% of that of corporate funds (Davis and Steil (2001)). Indexation provides incentives for activism aimed at improving overall market performance.[15] Gillan and Starks (2000) also argue that selling constraints imposed by indexing strategies provide an important motivation for shareholder activism.

On the other hand, public pension funds may suffer their own agency costs. Romano (1993) argues that the political pressure faced by the managers of public pension

[15]Richard Koppes, former chief counsel of CalPERS, remarked, "It makes sense for us to try to raise the ocean in order to lift our boat," in a speech at Stanford University, March 21, 1996.

funds may be in conflict with the goal of profit maximization. Murphy and Van Nuys (1994) find that state pension system officials manage the funds "more conservatively than their corporate counterparts to avoid drawing negative attention to the pension system." Woidtke (2002) finds that firm relative values are negatively related with public pension ownership. She concludes that administrators of public funds may be motivated more by political or social influences than by firm performance.

The principal interest of this study is to differentiate between two hypotheses.

Hypothesis 1a: Public pension funds are effective monitors of corporate M&A activity. Public pension funds reduce value-reducing M&A.

Hypothesis 1b: Public pension funds are not effective monitors of corporate M&A activity, and are not able to reduce value-reducing M&A.

Non-public-pension institutions may not want to be active monitors. Pound (1988) and Brickley, Lease, and Smith (1988) document that institutions such as banks and insurance companies are more likely to side with management in proxy contests. Van Nuys (1993) analyzes the proxy solicitation and restructuring at Honeywell in 1989, and also finds that banks and insurance companies are more supportive of management.[16] On the other hand, there is also anecdotal evidence that these institutions, especially mutual funds, may have become viable monitors. For example, in 1992, Vanguard was involved in the succession and retirement of Chrysler's then-Chairman Lee Iacocca.

This study also intends to differentiate between two hypotheses on non-public-pension institutions.

Hypothesis 2a: Non-public-pension institutions have remained passive in monitoring corporate governance. Their presence has no effect on corporate M&A activities.

[16]However, she concludes that existing business ties did not appear to explain the voting differences.

Hypothesis 2b: Non-public-pension institutions have become active in monitoring corporate governance. Their presence also reduces value-reducing M&A.

1.2 Data and Methodology

The initial sample is drawn from the Execucomp data base. This data base lists each firm in the S&P 1500 (S&P 500, S&P Midcap 400, and S&P SmallCap 600). Corporate financial information is obtained from COMPUSTAT and stock performance data is from CRSP. The sample is limited to securities identified by CRSP as ordinary common shares (with share codes 10, 11 or 12),[17] and excludes utilities, finance and insurance companies, and government agencies (2-digit SIC code 49, from 60 to 69, and above 89). Finally, I drop firms with December market capitalization less than one-hundredth the level of the S&P 500 index.[18]

Mergers and acquisitions information is obtained from the SDC domestic M&A database. To be included in my study, a deal has to be completed, with an acquisition of 100% of the target. The total number of M&A deals increases by 132 when considering deals in which acquirers acquired majorities of the targets. The results of the study do not change materially if the criterion of M&A deal inclusion is majority ownership of targets instead of 100% ownership. Both disclosed value and non-disclosed value deals are included, but disclosed value deals must have a value of at least 1 million. The final M&A data contains both public and private targets (from July 1993 to June 2001). The following table provides a summary. Average deal values (in million dollars) are reported in parentheses.

[17]This excludes American Depository Receipts, closed-end-funds, primes and scores, and Real Estate Investment Trusts.

[18]The robustness check using all firms with COMPUSTAT and CRSP data available (without insider ownership and compensation variables) shows the same results, which are available upon request.

	Target public company		Target non-public	
	disclosed	non-disclosed	disclosed	non-disclosed
Acquirer acquired 100% of the target	487 (2,050.30)	1	1,286 (252.99)	1,859
Acquirer acquired between 50% and 100% of the target	26 (1,247.43)	1	55 (282.98)	50

Due to multiple announcements during the 12-month period, the final M&A sample consists of 2,025 firm-year observations. Out of this total, 874 observations are for disclosed value M&A only, 761 observations are for undisclosed value M&A only, and 390 observations are for both types.

Institutional ownership data is obtained from Thomson Financial. 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.

Thomson Financial classifies institutions into five categories: banks, insurance companies, investment companies (mostly mutual funds),[19] independent investment advisors,[20] and others. The last category includes public and private pension funds, and endowments. Within this last category, I identify public pension funds by their names. In total I find 15 public pension funds: California public employees retirement system, California state teachers retirement system, Colorado public employees retirement association, Florida state board of administration, Kentucky teachers retirement system, Michigan state treasury, Montana board of investment, New Mexico educational retirement board, New York state common retirement fund, New York state teachers retirement system, Ohio public employees retirement system, Ohio school employees retirement system, Ohio state teachers retirement system, Virginia retirement system,

[19]For example, AIM management, Janus, and Liberty Mutual.

[20]For example, Bear Stearns, Fidelity, Goldman Sachs, and Morgan Stanley.

and State of Wisconsin investment board.[21] Not all state and local pension funds holdings are available because either they are too small and do not file 13f forms, or their assets are reported by their outside money managers.

Four different variables are used to measure institutional ownership. (All variables are described in Table 1.)

1. The aggregate holdings by each category.
2. The highest individual holdings within each category.
3. A dummy variable which equals one if there is at least one 5% block holder within a category.
4. The Herfindahl concentration measure normalized by aggregate holdings in each category.

The firm-level shareholder rights variable (the governance index) is obtained from Gompers, Ishii, and Metrick. They constructed this index by examining firm-level provisions of 24 governance rules (mostly takeover related). Gompers, Ishii, and Metrick (2003) provide the details on the construction of this index. A higher index value reflects weaker shareholder rights. This index is available for the full sample of Investor Responsibility Research Center (IRRC) firms for each publication of Corporate Takeover Defenses [Rosenbaum 1990, 1993, 1995, 1998, 2000]. For years (1992, 1994, 1996, 1997, 1999) during which there is no publication to provide up-to-date governance provision information, I use the most adjacent data as a proxy.

[21] Results do not change materially if I exclude holdings by California Public Employees Retirement System (CalPERS). Although CalPERS is the most visible activist fund, my results are not driven by this fund only.

accounting data insider ownership ‖ ← executive compensation →‖		institutional ownership ‖ ← mergers and acquisitions activity →‖	
Jan. 1st year t	Dec. 31st year t	June 30th year t+1	June 30th year t+2

The figure above demonstrates the timeline of the research design. During the calendar year t, corporate accounting data, insider ownership data, and executive compensation data are recorded. The majority of the firms end their fiscal year in December. At the end of June, year t+1, institutional ownership is recorded. The six-month lag ensures that all relevant information is public when institutional ownership data is considered. If the firm announces at least one merger and/or acquisition deal during the period July, year t+1 to June, year t+2, this firm is considered to be an M&A firm for data year t. That is, the dependent variable (M&A dummy variable) is 1.

Thomson Financial institutional ownership data is available until 2000 at the time of this study. Execucomp data is available from 1992. Thus my final sample represents the overlapping between Execucomp firms (with both accounting data and stock performance data available) and IRRC firms from 1992 to 1999. There are 1,363 firms and a total of 6,693 firm-year observations. Table 2 shows that this sample is biased towards larger firms. In 1992 dollars, the median market capitalization is $1,029.87 million and the median total assets is $922.35 million. Ranked by year-end market capitalization each year, 5,882 observations (87.88%) are above the median market capitalization of NYSE and AMEX firms.[22]

Among my 6,693 firm-year observations, there are in total 2,025 (30.26%) M&A observations. As demonstrated in Table 3, M&A firms are larger, have lower insider ownership, higher governance index, higher cash flow ratios, higher q ratios, lower

[22]The results remain if only the top 50% firms are included. Thus, my conclusions are not driven by the smaller firms in the sample.

capital expenditures ratios, and better prior performances than non-M&A firm-years. Table 4 shows that there are no strong correlations among key variables of this study.

1.2.1 Specification

I use random effects logistic regression in my study. This model allows for firm-level unobserved heterogeneity in mergers and acquisitions decisions, and utilizes both the time-series and the cross-sectional dimensions of the data. Unobserved industry-level heterogeneity is incorporated in this firm-level random effects.[23] Fixed effects logistic regression results are similar and not reported.[24] However, fixed effects logistic regression does not include two types of firms: those with no M&A activity throughout the period and those which pursued M&A activity in every year of the sample, because this analysis is conditional on at least one positive/negative outcome within a group. About one-third of the observations are thereby lost. Table 5 compares the value of key variables among firms with different M&A freqency. Aggregate PPF ownership and aggregate independent advisor ownership in zero M&A firms are not much different from those in the most frequent M&A firms. However, other types of institutions in aggregate hold more shares in frequent M&A firms. In addition, the zero M&A group on average has smaller size, higher leverage ratio, and higher capital expenditures ratio. Excluding the zero M&A group and the all M&A group might cause selection bias in the sample. Therefore random effects logistic regression is a better specification due to its ability to include the full sample in the study.

[23]During the sample period 1992-1999, the telecommunication and broadcasting industry went through major deregulation (1996). A dummy variable capturing this shock is not significantly associated with M&A activity. This dummy variable equals one for firms in telecommunication and broadcasting at year 1996 and later, and equals zero otherwise. Results are available upon request.

[24]Results are available upon request.

The specification of random effects logistic regression is:

$$\begin{aligned} Log(\frac{y_{it}}{1-y_{it}}) &= \beta_0 + \beta_1 PubPension_{it} + \beta_2 PvtPension_{it} + \beta_3 Bank_{it} \\ &+ \beta_4 Insurance_{it} + \beta_5 Investment_{it} + \beta_6 Advisor_{it} \\ &+ \phi X_{it} + \gamma Year_t + u_i + \epsilon_{it}, \end{aligned} \quad (1)$$

where y_{it} is the dummy variable measuring firms' M&A activity, t is a time subscript, i denotes each firm, and u_i is the firm-level random effect. The $Year_t$'s are dummy variables for the years 1992 - 1998. The X_{it} is a vector of control variables including managerial ownership, managerial compensation, the governance index, leverage ratio, cash flow ratio, q ratio, firm size, capital expenditures ratio, firm prior performance, and industrial concentration. The other six variables (PubPension, PvtPension, Bank, Insurance, Investment, Advisor) are the ownership variables for each category of institutions.

1.2.2 M&A performance

This study also intends to find out whether institutions have the ability to differentiate between good and bad M&A, and to discourage the value-reducing ones. Bidder announcement stock abnormal returns, bidder long-term stock abnormal returns, and bidder post-M&A operating performance are examined to judge whether an M&A deal is good or bad. Appendix A provides the details on the methodologies measuring those performances.

My study of long-term M&A bidder stock abnormal returns is not intended to test market efficiency. It differs from the studies by Barber and Lyon (1997a), Mitchell and Stafford (2000) and others as I include the announcement month in the calculation of long-term abnormal returns. These measures are used in my analysis to gauge whether institutional ownership has any effect on acquirers' combined performances at the announcement and post-M&A.[25] In this study I use three methodologies — cumulative abnormal returns, Fama-French 3-factor abnormal returns, and buy-and-hold abnormal returns — to measure long-term M&A abnormal returns.

Abnormal post M&A operating performance is measured by changes after the deal completion dates in industry-adjusted operating cash flow returns, cash flow margins, and asset turnover rates. Barber and Lyon (1996) evaluate different methodologies used to measure accounting-based operating performance, and find the change models to be more desirable than the level models. In this study, I follow methodologies used both in Barber and Lyon (1996) and in Healy, Palepu, and Ruback (1992).

1.3 Endogeneity Concerns

If institutions have preferences for acquisitive or non-acquisitive firms, I would observe a significant relation between firms' prior M&A activity and institutional ownership. Table 6 reports the fixed effects regression results on the determinants of institutional ownership.[26] I use two independent dummy variables to measure firms' prior M&A. The first dummy equals one if a firm announced a deal in the prior year which received positive announcement abnormal return. It equals zero for all others. The second dummy equals one if a firm announced a deal in the prior year which received negative announcement abnormal return, and zero for the rest.

Overall, there is no clear evidence that institutions avoid acquisitive firms.[27] PPF ownership is not affected by firms' M&A activity in the previous year. Individual private pension funds appear to reduce holdings in firms whose prior M&A activity received negative market response. In aggregate, banks hold more shares in firms whose prior M&A activity received positive market response. There is some evidence

[25] Results are similar if I look at post-M&A performances only, and are available upon requests.

[26] This specification is the same as the one used in the first stage of the Wu-Hausman endogeneity test.

[27] In results not reported, I examine the relation between firms' prior M&A activity and PPF ownership up to the four years prior to ownership, and find no significant relation. Results are available upon request.

that insurance companies and independent advisors in aggregate hold more shares in firms whose prior M&A received negative announcement abnormal returns. On the other hand, individual investment company ownership is lower for firms whose prior M&A activity received negative announcement abnormal returns.

In addition, PPFs do not appear to avoid firms with weaker shareholder rights. Banks prefer firms with higher insider ownership, and aggregate bank ownership is higher in firms with weaker shareholder rights. In aggregate, investment companies hold fewer shares of companies with weaker shareholder rights. Individual advisors hold more shares in firms with higher insider ownership. There is again no clear evidence that institutions prefer firms with better governance structure measured by insider ownership or the governance index.

Nevertheless, there may be other endogeneity problems. Wu-Hausman endogeneity tests are performed to determine whether an instrumental variable technique is required.

It is very difficult to find an ideal instrument for institutional ownership. Demsetz and Lehn (1985) find that the instability of firm profit is a determinant of firm ownership. Gompers and Metrick (2001) find that dividend yield, volatility of the stock and the stock turnover ratio are determinants of institutional ownership. Woidtke (2002) uses transactions costs[28] as an instrument. Following their results, I use firm beta from the market model, the standard error of firm beta, dividend yield over the previous year, volatility of monthly returns over the previous two years, turnover ratio and transactions costs as instruments. Unfortunately, these instruments are determined to be weak instruments from the first-stage F tests.[29] Their correlations with institutional ownership are too small to detect possible endogeneity. Using these instruments, I was not able to reject the null of the Wu-Hausman test that a standard panel data regres-

[28]Calculated as 0.687 + 0.239*(Nasdaq dummy) - 0.076*(log of market value of equity) + 9.924*(inverse of price), based on Keim and Madhavan (1997)'s model.

[29]Staiger and Stock (1997) suggest as a rule of thumb that in the case of one endogenous variable, instruments should be deemed weak if the first-stage F is less than ten.

sion is sufficient. My last resort is to use previous ownership as an instrument. If we are willing to accept that this lagged term is contemporaneously independent from the error term, then it can be considered to be predetermined. Thus previous ownership is considered not to be correlated with current M&A activity. I add firm beta as the additional instrument for institutional ownership. Firm beta, or a firm's systematic risk, is not correlated with M&A activity. By adding this additional instrument, I am able to use the overidentification test to verify the validity of this set of instruments. Test statistics are reported in Table 7. The first-stage F statistics are much larger than 10. The overidentification tests conclude that this set of instruments is valid. Although I am concerned with possible correlation between prior ownership level and the error term in equation (1), these test results give me some confidence in the overall set of instruments.

According to the test results, all four measures of public pension fund ownership and the measure of aggregate independent advisor ownership are endogenous. Thus throughout the chapter I report the regression results both from random effects logistic regressions and from instrumented random effects logistic regressions.

1.4 Full Sample Results

It is easier for managers to undertake M&A motivated by their own incentives when there is no effective monitoring. Controlling for firm-level governance provisions and firm characteristics which may affect M&A likelihood, I would expect to observe, ceteris paribus, that firms with no effective institutional monitoring are more likely to engage in M&A activity than firms with effective institutional monitoring. In this section I examine whether institutional ownership reduces the overall M&A frequency and deal sizes.

1.4.1 Likelihood of M&A

Institutional Ownership

As a first pass, I proceed to examine the relation between overall institutional ownership (sum of all types) and firms' future M&A likelihood. Table 8 presents the results from random effects logistic regressions in which the dependent variable is 1 if there is at least one M&A deal announced during the 12-month period after the institutional ownership recording date, and 0 if there is no M&A announcement (during the same period). In the first regression, the institutional ownership variable is the aggregate institutional ownership; in the second, the highest individual institutional ownership of the firm; in the third, 5% block holder dummy; in the fourth, institutional ownership concentration.

The overall institutional ownership is positively and significantly associated with M&A activity in the following 12 months. In the next table, Table 9, I separate the overall institutional ownership into six types as detailed earlier. This table reports results from both random effects logistic regressions and instrumented random effects logistic regressions. Public pension funds appear to be the only institutions whose presence is negatively associated with future M&A likelihood. The positive association between overall institutional ownership and M&A is mainly driven by the positive association between insurance and investment company ownership and M&A.

PPF ownership is significantly and negatively correlated with M&A likelihood in both instrumented and non-instrumented regressions (with stronger results from the instrumented version). In the instrumented regressions reported in Table 9, the coefficients on all four measures of PPF ownership are negative and significant at the 1% level. A 1% increase in the aggregate PPF ownership is correlated with a 3.07% decrease in M&A likelihood; a 1% increase in the top individual PPF ownership is correlated with a 4.87% decrease in M&A likelihood; the presence of a 5% PPF block holder is correlated with a 48.61% decrease in M&A likelihood; and a one unit increase in the PPF Herfindahl concentration measure (normalized) is correlated with a 6.08% decrease in M&A likelihood. These results suggests that concentrated public pension ownership has stronger influence than diffused public pension ownership does.

In contrast, insurance and investment company ownerships are significantly and positively associated with M&A activity. A one unit increase in the insurance company normalized Herfindahl concentration measure is correlated with a 0.5% increase in M&A likelihood (at the significance level of 10%). A one unit increase in the investment company normalized Herfindahl concentration measure is correlated with a 0.6% increase in M&A likelihood (at the significance level of 5%).

The significant negative relation between PPF ownership and future M&A appears to remain in the long-run. Table 10 reports the results from negative binomial regressions on factors predicting M&A frequency in the long-run. Only observations from 1992 are included in the regression for the independent variables. The set of independent variables used in the regression is the same as the one used in table 9. The dependent variable is the number of M&A years during the period of eight years (July 1993 - June 2001) of this study. Negative binomial regression is employed because goodness-of-fit test indicates overdispersion of the Poisson model. PPF ownership is negatively and significantly correlated with M&A frequency in the long run. A 1% increase in top individual PPF ownership is associated with a 4% reduction in the number of M&As in eight years.

The positive association between insurance company ownership and future M&A remains in the long-run only for the aggregate insurance ownership. The relationship between investment company ownership and future M&A disappears in the long-run.

The fact that PPF ownership is significantly and negatively associated with future M&A activity, and insignificantly associated with firms' past M&A activity, strongly supports the argument that the presence of PPF ownership does reduce firms' M&A activity.

The positive and significant correlation between investment company ownership and the likelihood of M&A in the near future can be explained by two stories. Table 6 reports a significant and positive relation between a firm's prior stock performance and current investment company ownership. Managers of mutual funds may herd towards companies with better prior performance. These companies are subsequently more likely to acquire, as reported in Table 9. This positive correlation between investment company ownership and likelihood of M&A is also consistent with the theory that investment companies suffer conflict-of-interest problems, and that company managers have more freedom to pursue their self-interest, including managerial-incentive-driven and value-reducing M&A, when investment company ownership is higher.

Controls

Table 9 also reports results on relevant controls. Gompers, Ishii, and Metrick (2003) find that firms with stronger shareholder rights made fewer corporate acquisitions. Their finding is confirmed within my sample. An increase of one unit on their governance index, which reflects weaker shareholder rights, is correlated with an increase of about 0.60% in M&A likelihood. The statistical significance of this variable is not very strong because this measure does not vary much over time for individual firms.

In Jensen and Meckling (1976), larger managerial equity ownership aligns managerial incentives with those of outside shareholders. Consistent with their theory, I find that insider ownership is significantly and negatively correlated with M&A likelihood. However, its economic significance is not strong. One standard deviation difference (8.72%) in insider ownership is associated with only a 2% difference in M&A likelihood.

CEO compensation does not appear to be significantly associated with M&A activity. Options granted to the CEO have a marginal economic effect: a 1% increase in options granted as a fraction of total compensation is correlated with a 0.08% increase in M&A likelihood, at the 1% significance level.

Firm characteristics

Firm characteristics have definitive effects on a firm's M&A decisions. My specification (random effects logistic regression in equation 1) also includes several firm characteristic variables as necessary controls. Table 9 reports the results.

Jensen (1986) points out that debt commits management to pay out a steady stream of cash in the future and thereby reduces the free cash flow available for discretionary spending. The requirements of debt service also provide incentives to motivate managers. Myers and Majluf (1984)'s pecking order theory predicts that investment projects will be financed by internal cash whenever it is available. Investment projects financed by external debt or stock issuance require higher rates of returns. In this theory, a high leverage ratio correlates with less internal free cash, which causes a higher threshold of profitable investment returns. Both theories predict that a higher leverage ratio should correlate with less M&A activity. Berger, Ofek, and Yermack (1997) find that managerial entrenchment is higher for less leveraged firms. The agency conflict associated with managerial entrenchment is positively correlated with agency-driven M&A. It is possible that a higher leverage ratio is associated with less managerial entrenchment and thus less M&A activity.

In this study, the leverage ratio is calculated as the sum of current debt and long-term debt divided by non-cash total assets. Firm leverage does exhibit a negative and significant correlation with M&A activity as predicted by theories. However, its economic effect is not large: a 1% increase in the ratio is correlated with only a 0.10% decrease in M&A likelihood on average. Given one standard deviation difference (24.34%) in firm leverage ratios within my sample, the change in M&A likelihood is approximately 2.43%. My calculation of the leverage ratio does not differentiate between bank debt and public debt. It is possible that a measure using only bank debt would yield stronger results.

Tobin's q ratio has been used widely by researchers as a measure of growth opportunities. As found in many previous studies, a higher q ratio is correlated with more investment opportunities, and hence higher M&A frequency. Table 9 reports that within my sample, an increase of 1 in the q ratio is associated with a 2% increase in M&A likelihood on average, significant at the 1% level.

The firm size measured by its total assets is positively correlated with M&A. A one unit increase in the log of total assets[30] of the firm (a 272% increase in the level) is associated with a 3% increase in M&A likelihood on average, significant at the 1% level.

There is a substitution effect between capital expenditures and M&A activity within my sample of firms. A 1% increase in the capital expenditures ratio is correlated with about a 0.80% decrease in M&A likelihood on average, significant at the 1% level.

Finally, M&A activity is also motivated by a firm's prior performance. I use four measures for prior performance: one-year sales growth rate, cumulative abnormal returns using the benchmark method, cumulative abnormal returns using the Fama-French 3-factor model, and buy-and-hold abnormal returns. A 1% increase in the benchmarked CAR (over the 12-month period prior to the institutional ownership recording date) is associated with a 0.07% increase in M&A likelihood on average, significant at the 1% level. This suggests that firms either extrapolate their prior performances when making investment decisions or take advantage of their relatively high valuations. A difference in prior CAR of one standard deviation is associated with a 2% difference in M&A likelihood. A 1% increase in prior sales growth rate, prior 3-factor CAR, and prior buy-and-hold abnormal return are associated with a 0.03%, a 0.07%, and a 0.08% increase of M&A likelihood respectively.[31]

[30] Adjusted by CPI, CPI base year 1992.

[31] I report the rest of my results using benchmarked CAR throughout this chapter. Results using other measures are similar both in economic and statistical significance, and are available upon request.

Investment horizon

It is possible that an institution with a shorter investment horizon may have less incentive to engage in active monitoring.[32] However, there is no reason for an institution not to stop a bad M&A, even if it intends to sell its holdings soon.

As a robustness check, I examine the relation between institution's investment horizon and M&A likelihood. For each type of institution, I calculate the average annual turnover ratio by averaging an individual institution's annual "churn rate" on the sample stocks over the period 1992-1999. The "churn rate" of institution i at time t is defined as

$$CR_{i,t} = \frac{\sum_{k=1}^{S} |N_{k,i,t}P_{k,t} - N_{k,i,t-1}P_{k,t-1} - N_{k,i,t-1}\Delta P_{k,t-1}|}{\sum_{k=1}^{S} \frac{N_{k,i,t}P_{k,t} + N_{k,i,t-1}P_{k,t-1}}{2}},$$

where $P_{k,t}$ is the price of stock k at time t, $N_{k,i,t}$ is the holding of institution i of stock k at time t. This ratio is calculated for each institution at each quarter. The annual turnover ratio for an individual institution is the average of this quarterly "churn rate" over four quarters. Then I calculate the representative turnover ratio for each type of institution as the average of the individual annual turnover ratios over the sample period. The following table provides a summary.

[32]Gaspar, Massa, and Matos (2003) find that firms with short-term investors are more likely to be bidders. Their paper also looks at the effect of activism on the likelihood of being a bidder, and they find a positive and significant relation.

Average Annual Turnover Ratio within the Sample					
	Mean	Median	Std Dev	Min	Max
Public pension funds	0.17	0.16	0.10	0.03	0.57
Private pension funds	0.24	0.18	0.23	0.00	1.90
Banks	0.20	0.17	0.16	0.00	1.92
Insurance company	0.28	0.23	0.21	0.00	1.30
Investment company	0.32	0.27	0.22	0.00	1.91
Independent advisor	0.36	0.28	0.27	0.00	1.96

The average turnover ratio is smaller for public pension funds, while there are a lot of variations among other types of institutions.

The annual turnover ratio of each type of institutions for an individual firm is calculated as the weighted average of the institutions within a type. In regressions not reported, this turnover measure has no significant relation with a firm's M&A likelihood.[33] The following table provides a summary on this measure.

Weighted Average Annual Turnover Ratio for Individual Firms					
	Mean	Median	Std Dev	Min	Max
Public pension funds	0.16	0.16	0.05	0.06	0.57
Private pension funds	0.22	0.20	0.09	0.01	1.00
Banks	0.18	0.18	0.04	0.07	0.92
Insurance company	0.22	0.22	0.08	0.01	1.03
Investment company	0.28	0.28	0.06	0.08	0.90
Independent advisor	0.29	0.29	0.07	0.05	0.76

[33]In these regressions, I also include six dummy variables for zero holdings of each type of institution. If a firm has no institutional holdings for a particular type, then the turnover ratio of this type of institutions for this particular firm is zero, and the dummy for this type of institutions equals one. Otherwise the dummy equals zero. Results are available upon request.

1.4.2 Size of disclosed value M&A

Table 11 presents the marginal effects from truncated regressions analyzing factors affecting the size of M&A deals, conditional on deal sizes greater than zero. This study is restricted to the subset of disclosed-value M&A observations. Any firm-year observation with announcements of undisclosed-value deals is dropped.

At the 5% significance level, a 1% increase in the aggregate PPF ownership reduces the deal size by 14 million; a 1% increase of the top individual PPF ownership reduces the deal size by 26 million; and a one unit increase in PPF ownership concentration reduces the deal size by 33 million, all conditional on deal sizes greater than zero.

Banks and independent advisors both appear to have a negative effect on deal size, while investment companies appear to have a positive effect on deal size.

The governance index is negatively associated with deal size. This result is different from the finding in Gompers, Ishii, and Metrick (2003). Within my sample, the correlation between prior sales growth and the governance index is -0.20 for firms that announced disclosed value deals, -0.11 between prior buy-and-hold abnormal return and the governance index, and -0.11 between cash flow ratio and the governance index. It seems that within this subsample of firms that announced disclosed value deals, those with inferior shareholder rights tend to perform worse. It is possible that in comparison those firms are less able to engage in bigger deals due to their relatively poor prior performance.

While the leverage ratio has no impact on the deal size, insider ownership and CEO options are negatively associated with deal sizes. Deals are of smaller size if a bigger percentage is financed by cash. Firm size and q ratio are positively associated with deal sizes. Money spent on capital expenditures are again substitutes for money spent on M&A. Higher industrial concentration reduces deal size. This may be because the U.S. government is more likely to block a larger M&A transaction in a concentrated industry.

Moeller, Schlingemann, and Stulz (2003) find systematic bidder shareholder wealth loss associated with acquisition, except for small firms. Firm size is correlated with deal size. As reported in Table 11, a one unit decrease in the log of total assets of the firm is associated with a reduction of 93 million to 109 million dollars in the deal size. It is possible that smaller deals are ex ante better. PPF may improve bidder shareholder values by restricting the deal size. It is also possible that the presence of PPF ownership (and the presence of bank and independent advisor ownership as well) reduces the likelihood of overbidding. Further research is needed to draw a conclusion.

1.5 Institutional Ownership and Performance of M&A

1.5.1 Market reactions

In this section, I examine whether the market reacts differently to M&A events given different institutional ownerships. Table 12 and Table 13 report the short-run and long-run findings respectively. Whether fixed effects or random effects regressions are employed for the specification depends on the outcomes of Hausman specification tests. Travlos (1987) finds that the form of payment is significantly correlated with announcement abnormal returns. I include the method of payment variable (measuring the percentage of the deal financed by cash) in the regressions for announcement abnormal returns. The sample size is thus restricted to disclosed value deals only. For long-term abnormal return regressions, this method of payment variable is not significantly related with any abnormal return measures. I choose to report the regression results from the bigger sample without the inclusion of this variable.

Table 12 reports the results on announcement abnormal returns. Private pension fund ownership and aggregate investment company ownership are significantly and negatively associated with abnormal returns. The use of cash is significantly and positively related with announcement abnormal returns. However, the market does not appear to perceive that higher PPF ownership can improve shareholder value in

M&A. There can be several explanations to this observation. First, the measure of announcement abnormal returns may be noisy. Second, there are other factors that affect the profitability of a deal, such as managerial ability. The market may not be responsive to PPF ownership variable, given other factors.

Table 13 reports the results on long-term abnormal returns over 12 months, including the announcement month. PPF ownership is positively associated with long-run abnormal returns measured by all three methodologies. A one unit increase in PPF ownership concentration is correlated with a 0.55% increase in benchmarked CAR (at the 5% significance level), with a 4.52% increase in 3-factor CAR (at the 5% significance level), and with a 3.31% increase in buy-and-hold abnormal return (at the 10% significance level). It appears that M&A firms with higher PPF ownership perform better than expected in the long-run. In contrast, aggregate investment company ownership and the level of CEO cash compensation is negatively correlated with long-run abnormal returns.

1.5.2 Operating performance

Table 14 reports the summary statistics of sample M&A firms' pre- and post-M&A operating performance measures and their abnormal post-M&A operating performances. The M&A firms within my sample, on average, perform better than their industry median both pre- and post-M&A. This holds when measured by both operating cash flow returns and cash flow margin on sales. Furthermore, their performances as measured by these two benchmarks improve after their acquisitions. Post-M&A industry-adjusted cash flow returns on average increase by 1.53% compared to their pre-M&A levels; post-M&A industry-adjusted cash flow margins on average increase by 5.38% comparing to pre-M&A levels. Both improvements are statistically different from zero at the 1% significance level. However, on average they performed worse than the industry median both before and after M&A when we look at their asset turnover rates. Also their asset turnover rates appear to deteriorate after the acquisitions' completion. The decline is not statistically significant except for the subgroup of M&As with publicly traded targets.

Consistent with findings in Healy, Palepu, and Ruback (1992), on average post-acquisition operating performances improve for my sample of M&A deals. This improvement comes mostly from increased cash flow margins on sales.

PPF ownership is not significantly correlated with either post-M&A abnormal cash flow returns or abnormal cash flow margins. Interestingly, PPF ownership has a significant and positive correlation with post-M&A improvement in asset turnover rate.

Table 15 reports the regression results on post-M&A operating performance measured by abnormal asset turnover rates. PPF ownership is positively associated with improvements in asset turnover rates. The presence of a PPF 5% block holder is correlated with an increase of 18 cents per dollar in the change of industry-adjusted asset turnover rate, at the significance level of 1%. Keeping in mind that Table 13 reports a positive association between PPF ownership and long-run stock abnormal returns within a year of M&A announcements, this positive association between PPF ownership and abnormal asset turnover rate is less likely to be driven by a relatively low market valuation of firm assets.

1.6 Subsample Results

Mergers and acquisitions can create value for the acquirers. It is important to know if PPF has the ability to differentiate between good and bad M&A ex ante, and thus to discourage bad deals.

Jensen's free cash flow theory predicts that low q firms with more free cash tend to waste more of it. Cash-rich and low q firms suffer higher agency costs. Lang, Stulz, and Walkling (1991) indeed find that bidder returns are significantly lower for low q bidders with high cash flows than low q bidders with low cash flows. Morck, Shleifer, and Vishny (1990) find that "buying growth" acquisitions reduce the returns to the bidders. Managers are likely to overpay fast-growing targets because they want to create opportunities for insiders and to assure the long-run survival of the firm.

Table 16 reports the sub-sample M&A performances. High q firms have lower announcement abnormal returns than low q firms. Low q firms have significantly positive equal-weighted announcement abnormal return, but small negative value-weighted announcement abnormal return. Among the low q firms, cash rich ones have lower announcement abnormal returns than low cash ones. The value-weighted announcement abnormal return is negative for cash-rich and low q firms, and positive for low-cash and low q firms. "Buying-growth" M&A receives significantly negative announcement abnormal returns, while "non-buying-growth" M&A announcement abnormal return is insignificant.

If PPF monitoring is effective, I would expect PPF ownership to: 1) have a more pronounced effect in the high q group than the low q group; 2) have a more pronounced effect in the cash-rich group than the low-cash group, among the low q firms; 3) reduce the likelihood of "buying-growth" M&A among successful M&A deals.

In results not reported, PPF ownership has a stronger economic effect among the high q firms than among the low q firms. However, all PPF ownership variables are statistically insignificant for the high q group in the standard random effects logistic regressions. They are both statistically and economically significant in the instrumented random effects logistic regressions. Table 17 presents the results on PPF impact among low q firms. The specifications are again the random effects logistic regression (equation 1) and its instrumented version. Low q firms and cash rich firms are classified independently. Each year, firms with q ratios less than the sample median are classified as low q firms.[34] Cash richness is defined as the ratio of non-current-debt cash and cash equivalent to non-cash total assets. Each year, firms with above industry (by 4-digit SIC code) median cash holdings are classified as cash-rich firms.

[34]Annual median q ratios vary from 1.31 to 1.60.

Thus half of the original observations are classified as low q observations. This subsample is further split into cash-rich and low-cash groups. In Table 17, PPFs appear to focus their monitoring efforts on the cash-rich low q group. From the standard random effects logistic regression, the presence of a PPF block holder in this group reduces M&A likelihood by 11.78%, much greater than the effect of 7.27% for the whole sample reported in Table 9. On the other hand, PPF ownership has neither economically nor statistically significant effect on M&A likelihood among low-cash low q firms.

The coefficients on the firm-level governance index are significantly positive for the cash-rich and low q group, and not significant at all for low-cash and low q group. The coefficient's economic significance is also greater in the cash-rich group, and larger than its average effect in the whole sample. Cash-rich and low q firms may indeed have higher agency costs.

Insider ownership is significantly associated with reductions in M&A among the cash-rich group only. This evidence is consistent with the argument that higher insider ownership helps to align managerial incentives with those of shareholders.

The occurrences of M&A among cash-rich low q and low-cash low q groups are about the same, with 25.16% for the former and 26.14% for the latter. The fact that the reduction in M&A likelihood associated with PPF ownership is significant only in the cash-rich group, and that the magnitude of the reduction is greater than the average effect in the whole sample, suggests PPFs' ability to differentiate between ex ante good and bad M&A. I also examine whether PPF ownership is correlated with M&A stock performance within the cash-rich low q group. There I am unable to find a significant association.

Table 18 looks at PPF impact on the likelihood of "buying growth" M&A. Due to limited accounting data availability for the targets, I have only 310 observations with target sales growth rate available. Target growth rate is defined to be the 3-year sales growth rate prior to the takeover. The median growth rate of this sample is used as the benchmark. Deals with target sales growth above the median are considered to be "buying growth." I use the logistic regression specification for analysis because I no longer have a panel. PPF also reduces the likelihood of "buying growth" M&A. A 1% increase in top PPF ownership reduces the probability of buying a fast-growing target by 5.98%.[35]

1.7 Conclusions

My study has shown that PPF ownership is associated with significantly lower mergers and acquisitions activity and smaller deal size (for successful deals), after controlling for firm-level governance provisions, firm characteristics, and ownership endogeneity. The reduction in M&A activity is greater in cases with higher potential agency conflict, i.e., for firms with low q ratios but high free cash flows, and for firms seeking to buy fast-growing targets (compared to "non-buying-growth" M&A). PPF ownership is also positively correlated with long-run M&A abnormal returns. Overall, I believe that there is enough evidence to support Hypothesis 1a, that public pension funds are effective monitors of corporate M&A activity.

Concentrated bank and independent advisor ownership is not significantly correlated with M&A likelihood in the future 12 months, and somewhat positively correlated with long-term M&A abnormal returns. Both bank ownership and advisor ownership are negatively correlated with deal size (conditional on successful deals). There seems to be some monitoring effect by individual banks and independent advisors. Despite this, the positive association between aggregate bank ownership and M&A likelihood, and some evidence of a negative correlation between aggregate bank/independent advisor ownership and the long-term M&A abnormal returns, suggest possible free-riding incentives among these institutions.

[35]The coefficient on public pension block dummy is not significant. This may be caused by limited observations — there are only 10 (2.58%) observations with PPF block holders.

Ownership by investment companies is significantly and positively associated with M&A likelihood and deal sizes, and its aggregate ownership is negatively associated with both announcement abnormal returns and long-run M&A abnormal returns. Given these findings, investment companies appear to be the least likely monitors among all types of institutions. The fact that aggregate investment company ownership is negatively correlated with M&A stock performance is not explained by the "herding" story, and may be more consistent with the story that their presence encourages value-reducing activity by firm management. However, Shleifer and Vishny (2003) demonstrate in their model that a rational manager may undertake an acquisition when the stock is overvalued by an irrational market. In this scenario M&A is not value-reducing for bidder shareholders at all even though the stock price goes down post-event as the true valuation is revealed.

Higher insider ownership is negatively and significantly correlated with M&A likelihood and deal sizes, but not significantly correlated with M&A performance. The level of CEO cash compensation is not significantly correlated with M&A likelihood, and is negatively and significantly correlated with M&A performance. Core, Holthausen, and Larcker (1999) find that CEO compensation level is higher when governance structures are less effective. Therefore greater CEO compensation could be correlated with greater agency problems and higher agency costs in M&A activity. CEO stock options are significantly and positively correlated with M&A likelihood, but not significantly correlated with M&A performance. I find no support within my sample for the argument that more option grants encourage better performance, and thus encourage good M&A. Yermack (1995) finds little evidence that agency or financial contracting theories explain the patterns of CEO stock option awards. CEO option grants having no effect on encouraging good M&A is consistent with his findings.

These variables on managerial incentives are primarily control variables in this study. It would be interesting to pursue further the significance of managerial incentives in affecting managers' M&A decisions. It is very possible that factors such as agency costs, which affect firms' M&A activity, also affect firm-level managerial incentives. This endogeneity problem needs to be addressed in further studies.

1.8 Appendix A: Measuring Performance

M&A bidder stock performance is measured by both the announcement abnormal return and the long-run abnormal return. For announcement abnormal returns, I follow standard event study methodology to calculate CARs for the three-day window (-1,1) around the announcement date supplied by SDC. The abnormal returns are estimated using a modified market model:

$$AR_i = r_i - r_m,$$

where r_i is the return on firm i and r_m is the value-weighted market index return. If there are multiple announcements during the 12-month period, I take the average abnormal announcement return of all announcements during the period.

Measuring long-term abnormal performance is difficult. Barber and Lyon (1997a) advocate the use of buy-and-hold abnormal returns over cumulative abnormal returns. They document that cumulative abnormal returns are most affected by new listing bias, and are generally positively biased, while buy-and-hold abnormal returns are generally negatively biased. Kothari and Warner (1997) caution that long-horizon abnormal returns are severely misspecified. Fama (1998a) argues that formal inferences about long-term abnormal returns should be based on averages or sums of short-term abnormal returns. Mitchell and Stafford (2000) show that the conventional methodology of calculating multi-year buy-and-hold abnormal returns and conducting inferences via a bootstrapping procedure is flawed because the abnormal returns for event firms are not independent. They find no abnormal performance in their sample of mergers, seasoned equity offerings, and share repurchases, after accounting for the positive cross-correlations of event firm abnormal returns. Brav (2000) uses a Bayesian approach in estimating long-term abnormal returns and finds the three-factor model to be inconsistent with the long-term performance of IPOs.

Since no one measure appears to be perfect, I examine all three measures of long-term abnormal returns: cumulative abnormal returns using the benchmark method, buy-and-hold abnormal returns, and cumulative abnormal returns using Fama-French 3-factor model.

Each month, NYSE/AMEX ordinary common stocks with prior book-to-market values are sorted into 10 size portfolios according to their market capitalizations at the beginning of the month. Within each size portfolio, these stocks are further sorted into 5 groups according to their book-to-market values. The breaking points for these 50 portfolios are used to place all ordinary common stocks with CRSP and COMPUSTAT coverages and prior book-to-market values (to mitigate the new listing bias) into 50 benchmark portfolios.

Cumulative abnormal returns (CAR, benchmarked) are calculated over 12 months for individual event firms, including the announcement month. When there are multiple announcements during a year, CAR is calculated starting from the announcement month of the first announcement.

$$CAR_i = \sum_{t=1}^{12}(R_{it} - R_{bt}),$$

where R_{it} is the simple monthly return on the common stock of firm i. R_{bt} is the equal-weighted average monthly return of its benchmark portfolio.

Buy-and-hold abnormal returns (BHAR) are calculated over 12 months, including the announcement month.

$$BHAR_i = \prod_{t=1}^{12}(1 + R_{it}) - \prod_{t=1}^{12}(1 + R_{bt})$$

Fama-French 3-factor monthly abnormal return is the α_i from the time-series regression of the model:

$$R_{it} - R_{ft} = \alpha_i + \beta_i(R_{mt} - R_{ft}) + s_i SMB_t + h_i HML_t + \epsilon_{it},$$

where R_{ft} is the return on three-month Treasury bills, R_{mt} is the return on the value-weighted market index, SMB_t is the difference between the return on a portfolio of small stocks and the return on a portfolio of large stocks, HML_t is the difference between the return on a portfolio of high book-to-market stocks and the return on a portfolio of low book-to-market stocks. Cumulative abnormal returns (CAR, 3-factor) are then calculated as $12 * \alpha_i$ for individual event firms.

Firm-level operating performance is adjusted by the industry median before M&A and after M&A. The changes in industry-adjusted performances are the measure of M&A abnormal operating performances.

I follow Healy, Palepu, and Ruback (1992) to calculate three measures of operating performance.

- Operating cash flow return,

$$CF = \frac{\text{Operating Income[13]+Depreciation[14]+Goodwill[204]}}{\text{Total Asset[6]-Book Value Of Equity[60]+Market Value Of Equity Beginning Of Year}}$$

- Cash flow margin on sales,

$$CFM = \frac{\text{Operating Income[13]+Depreciation[14]+Goodwill[204]}}{\text{Sales[12]}}$$

- Asset turnover rate,

$$AT = \frac{\text{Sales[12]}}{\text{Total Asset[6]-Book Value Of Equity[60]+Market Value Of Equity Beginning Of Year}}$$

These operating performance measures are not affected by depreciation and goodwill. Thus they are comparable cross-sectionally for firms used purchase accounting and firms used pooling-of-interests accounting methods. These measures are also not affected by the methods of financing used in mergers because the interest expense is not deducted.

These measures are then adjusted by subtracting industry medians. Industry-adjusted operating cash flow return(IACF), industry-adjusted cash flow margin on sales(IACFM), and industry-adjusted asset turnover rate(IAAT) are calculated for the 3 years before M&A completion year and the 3 years after M&A completion year.

The majority of my M&A sample acquired private targets. For the small number of M&As with publicly traded targets, pre-M&A operating performance is calculated as the weighted average between the bidder and the target. The weights are the bidder and the target's market capitalizations at the beginning of the year prior to the M&A completion year.

The median value of operating performance from the 3 years pre-M&A($IACF_{pre,i}$, $IACFM_{pre,i}$, $IAAT_{pre,i}$) and the median value of operating performance from the 3 years post-M&A($IACF_{post,i}$, $IACFM_{post,i}$, $IAAT_{post,i}$) are used to calculate abnormal operating performance.

I use two methods of calculation. The first one follows Barber and Lyon (1996). It is the difference between post-M&A industry-adjusted performance and pre-M&A industry-adjusted performance,

$$\begin{aligned} AIACF_i &= IACF_{post,i} - IACF_{pre,i} \\ AIACFM_i &= IACFM_{post,i} - IACFM_{pre,i} \\ AIAAT_i &= IAAT_{post,i} - IAAT_{pre,i} \end{aligned}$$

The second method follows Healy, Palepu, and Ruback (1992). Taking into consideration that pre-M&A operating performance may predict the post-M&A operating performance,

$$
\begin{aligned}
IACF_{post,i} &= a1 + b1 * IACF_{pre,i} + \epsilon_{i1} \\
IACFM_{post,i} &= a2 + b2 * IACFM_{pre,i} + \epsilon_{i2} \\
IAAT_{post,i} &= a3 + b3 * IAAT_{pre,i} + \epsilon_{i3}
\end{aligned}
$$

These regressions are run on the whole sample of M&A observations to get estimates of the coefficients. The abnormal operating performance of the individual acquirer is thus calculated as,

$$
\begin{aligned}
AIACF_i &= IACF_{post,i} - (a1 + b1 * IACF_{pre,i}) \\
AIACFM_i &= IACFM_{post,i} - (a2 + b2 * IACF_{pre,i}) \\
AIAAT_i &= IAAT_{post,i} - (a3 + b3 * IAAT_{pre,i})
\end{aligned}
$$

Table 1: Data Sources and Definitions

Aggregate institutional holdings	Thomson Financial	aggregate institutional ownership by each category, in percent, at the end of June, year t+1
Top individual institutional holdings	Thomson Financial	highest individual institutional ownership within each category, in percent, at the end of June, year t+1
5% institutional block holder dummy	Thomson Financial	1=at least one individual institution with at least 5% ownership; 0=no individual institution with at least 5% ownership, within each category, at the end of June, year t+1
Institutional ownership concentration	Thomson Financial	Herfindahl-index measure of concentration (sum of the squares of individual ownership) / aggregate ownership, by each category
Mergers and acquisitions dummy	SDC	1=there is at least one M&A announcement during the 12-month period: July t+1 – June t+2; 0=no M&A announcement during the same 12-month period
Governance index	Gompers, Ishii, &Metrick	measures shareholder rights, smaller number indicates better governance provisions, "Corporate Governance and Equity Prices," *The Quarterly Journal of Economics*, Feb. 2003
Insider ownership	Execucomp	aggregate insider ownership of top 5 executives, in percent, during year t
CEO salary and bonus	EXECUCOMP	annual salary and bonus, in millions of dollars
CEO options (% of compensation)	EXECUCOMP	option granted as the percentage of CEO total compensation. Total compensation is comprised of the following: salary, bonus, other annual compensation, total value of restricted stock granted, total value of stock options granted, long-term incentive payouts, and all others.
CPI, base year 1992	U.S. Department of Labor	Consumer Price Index - all urban consumers, U.S. all items series, index=1 for year 1992
Total assets	COMPUSTAT	total book assets[6] / CPI, base year 1992
Size	COMPUSTAT	ln(total assets[6] / CPI, base year 1992)
Market capitalization	CRSP	market capitalization at the end of calendar year / CPI, base year 1992
Cash flow ratio	COMPUSTAT	(ebitda[13] - interest[15] - tax[16-Δ35] - common dividends[21] - preferred dividends[19]) / (total assets[6] - cash and cash equivalents[1])
Capital expenditures ratio	COMPUSTAT	capital expenditures[128] / (total assets[6] - cash and cash equivalents[1]), averaged over three years (t, t+1 and t+2)
Leverage ratio	COMPUSTAT	(current debt[34] + long-term debt[9])/(total assets[6] - cash and cash equivalents[1])
Q ratio	COMPUSTAT	(market capitalization + long-term debt[9] + current debt[34] + preferred stock value[130]) / total assets[6]
Beta		firm beta based on the market model 5 years prior to July year t+1, if less than 2 years of stock return data available, use the earliest 2-year data as proxy.
Cash richness	COMPUSTAT	(cash and cash equivalents[1] - current debt[34]) / (total assets[6] - cash and cash equivalents[1])
Industrial concentration	COMPUSTAT	Herfindahl-index calculated using sales data[12], based on 4-digit SIC code
Sales growth	COMPUSTAT	1-year sales growth rate
Target sales growth	COMPUSTAT	3-year sales growth rate of the target prior to M&A

Table 2: Descriptive Statistics

The sample (6,693 observations) are all Execucomp firms (1992 – 1999) issuing ordinary common shares, with Governance index available, and excluding utilities, finance and insurance companies and government agencies. Further restrictions are the availability of accounting data and stock return data, and year end market capitalization exceeding one-hundredth of the S&P 500 index level.

Variable	Mean	Median	Std Dev	Min	Max
Ownership Data					
Aggregate public pension fund holdings (%)	3.07	2.44	2.49	0.00	19.78
Aggregate private pension fund holdings (%)	1.03	0.48	2.10	0.00	66.55
Aggregate bank holdings (%)	10.19	9.15	6.40	0.00	53.76
Aggregate insurance company holdings (%)	5.05	4.15	3.86	0.00	47.38
Aggregate investment company holdings (%)	12.56	10.79	9.19	0.00	59.64
Aggregate independent advisor holdings (%)	24.85	24.27	10.85	0.00	78.78
Top individual public pension fund holdings (%)	1.42	0.80	1.82	0.00	18.38
Top individual private pension fund holdings (%)	0.67	0.20	1.93	0.00	66.38
Top individual bank holdings (%)	3.36	2.17	3.88	0.00	47.58
Top individual insurance company holdings (%)	2.54	1.63	2.91	0.00	47.05
Top individual investment company holdings (%)	5.53	4.59	4.05	0.00	50.17
Top individual independent advisor holdings (%)	5.71	4.79	3.91	0.00	57.10
5% public pension fund block holder dummy	0.05	0.00	0.21	0.00	1.00
5% private pension fund block holder dummy	0.02	0.00	0.14	0.00	1.00
5% bank block holder dummy	0.16	0.00	0.37	0.00	1.00
5% insurance company block holder dummy	0.12	0.00	0.32	0.00	1.00
5% investment company block holder dummy	0.47	0.00	0.50	0.00	1.00
5% independent advisor block holder dummy	0.47	0.00	0.50	0.00	1.00
Public pension ownership concentration	1.05	0.55	1.54	0.00	17.12
Private pension ownership concentration	0.55	0.14	1.84	0.00	66.21
Bank ownership concentration	2.01	1.16	2.94	0.00	43.77
Insurance company ownership concentration	1.81	1.07	2.47	0.00	46.72
Investment company ownership concentration	3.76	3.02	2.94	0.00	42.50
Independent advisor ownership concentration	2.93	2.32	2.50	0.00	46.52
Insider ownership (%)	4.38	0.86	8.72	0.00	82.47
Firm and Industry Characteristics					
Governance index	9.26	9.00	2.78	2	16
Total assets (millions, CPI-adjusted)	2,999.14	922.35	7,026.08	10.09	142,663.00
Market capitalization (millions, CPI-adjusted)	4,590.66	1,029.87	15,976.99	13.17	507,331.00
Q-ratio	1.88	1.33	2.08	0.27	46.11
Cash flow ratio (%)	10.00	9.92	17.03	−500.69	100.19
Capital expenditures ratio (%)	7.90	6.44	5.76	0.00	58.40
Leverage ratio (%)	25.79	24.34	24.44	0.00	966.61
Sales growth (%)	13.50	8.51	27.08	−40.80	225.50
Beta	1.10	1.04	0.53	−0.07	3.24
CEO cash compensation (millions, CPI-adjusted)	0.96	0.74	0.86	0.00	15.71
CEO options (% of total compensation)	29.99	25.99	27.78	0.00	100
Ln(industrial concentration)	8.00	8.12	0.87	5.29	9.21
Stock Return Data (%)					
Pre-M&A					
CAR benchmarked, July t – June t+1	0.99	−0.78	41.48	−224.20	774.26
CAR 3-factor, July t – June t+1	2.64	1.21	41.53	−76.71	105.31
Buy-and-hold return, July t – June t+1	1.60	−5.85	53.40	−125.66	958.21
M&A performance (number of observations — 2,025)					
Announcement abnormal return	0.22	0.21	5.42	−51.57	30.59
Long-term CAR, benchmarked	0.06	−0.11	10.03	−59.20	60.02
Long-term CAR, 3-factor	4.37	2.36	49.60	−134.82	162.00
Long-term BHAR	1.47	−3.25	47.54	−138.45	378.52

Table 3: Comparison between M&A Firm-years and Non-M&A Firm-years

This table reports the mean values of variables for M&A firm-year observations and non-M&A firm-year observations. P-values from ranksum tests on the means are reported in parentheses. There are 2,025 M&A firm-years, and 4,668 non-M&A firm-years.

	mean values		P-value
	M&A	non-M&A	
Aggregate public pension ownership (%)	2.98	3.10	(0.030)
Aggregate private pension ownership (%)	1.16	0.97	(0.000)
Aggregate bank ownership (%)	11.04	9.82	(0.000)
Aggregate insurance co. ownership (%)	5.57	4.82	(0.000)
Aggregate investment co. ownership (%)	14.01	11.93	(0.000)
Aggregate indep. advisor ownership (%)	25.29	24.65	(0.023)
5% public pension block holder	0.03	0.06	(0.000)
5% private pension block holder	0.02	0.02	(0.259)
5% bank block holder	0.16	0.16	(0.356)
5% insurance co. block holder	0.12	0.11	(0.303)
5% investment co. block holder	0.51	0.47	(0.001)
5% indep. advisor block holder	0.43	0.48	(0.001)
Governance index	9.49	9.16	(0.000)
Insider ownership (%)	3.44	4.79	(0.000)
Total assets (millions, CPI-adjusted)	3,698.11	2,695.93	(0.000)
Market capitalization (millions, CPI-adjusted)	6,903.50	3,587.34	(0.000)
Cash flow ratio (%)	11.31	9.42	(0.000)
Q ratio	2.16	1.76	(0.000)
Leverage ratio (%)	24.72	26.26	(0.063)
Capital expenditures ratio (%)	7.27	8.17	(0.000)
Sales growth(%)	16.02	12.40	(0.000)
CAR, benchmarked (June, year t - July, year t+1)	5.77	−1.09	(0.000)
CAR, 3-factor (June, year t - July, year t+1)	7.17	0.67	(0.000)
BHAR (June, year t - July, year t+1)	8.08	−1.21	(0.000)
# of obs	2,025	4,668	

Table 4: Correlations Among Key Variables

Aggregate institutional ownership within each category

	Public pension	Private pension	Banks	Insu. Co.	Invt. Co.	Indep. advisors	Gover. index	Future M&A	Prior good M&A	Prior bad M&A	Ln(Mkt Cap)
Public pension	1.00										
Private pension	0.06	1.00									
Banks	0.14	0.13	1.00								
Insurance Co.	0.04	0.03	0.11	1.00							
Investment Co.	−0.11	−0.04	−0.05	0.15	1.00						
Indep. advisors	0.08	−0.02	0.02	0.14	0.14	1.00					
Governance index	0.08	0.07	0.19	0.07	−0.02	0.06	1.00				
Future M&A	−0.02	0.04	0.09	0.09	0.10	0.03	0.06	1.00			
Prior good M&A	−0.03	−0.01	0.03	0.04	0.06	0.03	0.02	0.22	1.00		
Prior bad M&A	−0.02	0.04	0.05	0.04	0.06	0.01	0.04	0.17	−0.18	1.00	
Ln(Market Cap)	−0.02	0.16	0.35	0.16	0.24	−0.14	0.11	0.19	0.10	0.11	1.00

5% block holder within each category

	Public pension	Private pension	Banks	Insu. Co.	Invt. Co.	Indep. advisors	Gover. index	Future M&A	Prior good M&A	Prior bad M&A	Ln(Mkt Cap)
Public pension	1.0000										
Private pension	0.01	1.00									
Banks	−0.05	0.02	1.00								
Insurance Co.	−0.01	−0.02	0.00	1.00							
Investment Co.	−0.04	−0.04	−0.05	0.02	1.00						
Indep. advisors	0.05	0.01	−0.00	0.03	0.09	1.00					
Governance index	−0.03	0.01	0.06	−0.01	−0.00	−0.00	1.00				
Future M&A	−0.06	−0.01	−0.01	0.01	0.04	−0.04	0.06	1.00			
Prior good M&A	−0.03	−0.03	−0.01	−0.00	0.02	−0.00	0.02	0.22	1.00		
Prior bad M&A	−0.02	0.00	−0.02	−0.00	0.00	−0.04	0.04	0.17	−0.18	1.00	
Ln(Market Cap)	−0.19	0.02	−0.02	−0.02	0.00	−0.34	0.11	0.19	0.10	0.11	1.00

Table 5: Comparison between Frequent and Non-frequent M&A Firms

This table reports the mean values of variables of interest for sample firms with different M&A frequencies. P-values from ranksum tests comparing the means between the 0 M&A group and the all M&A group are reported.

	0 M&A year	1-2 M&A years	3-4 M&A years	5-6 M&A years	7 M&A years	all M&A years	P-value
Aggregate public pension ownership (%)	3.16	2.99	2.94	3.30	3.11	3.18	(0.136)
Aggregate private pension ownership (%)	0.82	1.07	1.07	1.19	1.74	2.34	(0.000)
Aggregate bank ownership (%)	8.75	9.70	11.64	12.35	14.90	16.08	(0.000)
Aggregate insurance co. ownership (%)	4.57	5.00	5.37	5.86	5.53	5.90	(0.000)
Aggregate investment ownership (%)	11.62	12.90	12.82	13.53	12.16	13.14	(0.060)
Aggregate indep. advisor ownership (%)	24.30	24.93	25.74	24.78	23.84	25.10	(0.477)
5% public pension block holder	0.08	0.05	0.02	0.03	0.00	0.00	(0.070)
5% private pension block holder	0.02	0.03	0.01	0.01	0.05	0.00	(0.401)
5% bank block holder	0.15	0.16	0.18	0.14	0.29	0.15	(0.992)
5% insurance co. block holder	0.11	0.13	0.10	0.11	0.05	0.00	(0.024)
5% investment co. block holder	0.46	0.50	0.48	0.47	0.29	0.48	(0.858)
5% indep. advisor block holder	0.50	0.48	0.42	0.39	0.31	0.23	(0.001)
Insider ownership (%)	6.02	4.27	3.69	2.20	1.02	0.97	(0.003)
Governance index	8.61	9.16	9.78	10.38	10.57	7.73	(0.031)
Total assets (millions, CPI-adjusted)	2,429.63	2,076.92	3,925.55	5,060.68	9,213.02	6,719.37	(0.000)
Market capitalization (millions, CPI-adjusted)	2,861.35	3,139.11	6,863.32	8,071.56	17,978.04	13,711.42	(0.000)
Cash flow ratio (%)	9.02	9.75	11.25	10.97	12.37	13.05	(0.007)
Q ratio	1.80	1.93	1.84	1.84	2.77	2.17	(0.000)
Leverage ratio (%)	26.04	26.17	25.24	25.47	24.95	14.07	(0.000)
Capital expenditures ratio (%)	8.41	8.28	6.90	7.29	5.27	5.31	(0.002)
Sales growth (%)	12.24	14.64	11.92	14.89	15.53	16.16	(0.001)
CAR, benchmarked (July, year t - June, year t+1)	−1.31	2.25	0.04	3.35	4.33	7.60	(0.001)
CAR, 3-factor (July, year t - June, year t+1)	0.47	3.47	1.43	5.77	11.32	7.52	(0.132)
BHAR (July, year t - June, year t+1)	−2.16	4.02	−0.17	4.87	6.78	7.25	(0.003)
# of firms	534	530	178	101	15	5	
# of firm-year observations	2,014	2,590	1,162	771	116	40	

Table 6: Determinants of Institutional Ownership

This table reports the coefficients and standard errors from fixed effects regressions on determinants of institutional ownership. P-values from Hausman tests are reported. In some cases, random effects estimator degenerates to pooled OLS and the Wald test may not be appropriate.

	Dependent var - PPF ownership				Dependent var - Private Pension ownership				Dependent var - Banks			
	Aggre	Top Indi	5% block	Concen	Aggre	Top Indi	5% block	Concen	Aggre	Top Indi	5% block	Concen
Prior ownership	0.368***	0.341***	0.260***	0.333***	0.483***	0.482***	0.439***	0.472***	0.316***	0.330***	0.181***	0.334***
	(0.011)	(0.012)	(0.012)	(0.012)	(0.012)	(0.012)	(0.013)	(0.012)	(0.012)	(0.013)	(0.013)	(0.013)
Prior M&A +ve announcement CAR	0.081	0.054	0.004	0.036	−0.039	−0.047	−0.006	−0.047	0.223*	0.015	−0.000	−0.011
	(0.059)	(0.044)	(0.006)	(0.036)	(0.050)	(0.047)	(0.004)	(0.046)	(0.132)	(0.089)	(0.011)	(0.068)
Prior M&A -ve announcement CAR	0.009	−0.030	0.009	−0.031	−0.051	−0.089*	−0.005	−0.095**	0.126	−0.035	−0.019	−0.031
	(0.062)	(0.046)	(0.006)	(0.038)	(0.050)	(0.050)	(0.004)	(0.048)	(0.138)	(0.094)	(0.012)	(0.071)
beta	0.118*	0.123***	0.005	0.115***	0.091*	0.093*	−0.003	0.090*	−0.136	−0.025	−0.001	−0.032
	(0.063)	(0.046)	(0.006)	(0.038)	(0.053)	(0.050)	(0.004)	(0.049)	(0.140)	(0.095)	(0.012)	(0.072)
Governance index	0.057*	0.022	0.001	0.012	0.022	0.017	0.002	0.014	0.140**	0.072	0.002	0.057
	(0.032)	(0.023)	(0.003)	(0.019)	(0.027)	(0.025)	(0.002)	(0.025)	(0.071)	(0.048)	(0.006)	(0.036)
Insider ownership	−0.002	0.002	−0.000	0.002	0.002	0.001	0.000	0.001	0.031**	0.033***	0.001	0.028***
	(0.006)	(0.005)	(0.001)	(0.004)	(0.005)	(0.005)	(0.000)	(0.005)	(0.014)	(0.009)	(0.001)	(0.007)
CEO cash compensation	−0.005	−0.012	−0.002	−0.006	0.064*	0.039	0.002	0.031	0.149	−0.036	−0.005	−0.044
	(0.041)	(0.030)	(0.004)	(0.025)	(0.035)	(0.033)	(0.003)	(0.032)	(0.091)	(0.062)	(0.008)	(0.047)
CEO options (% of total compensation)	0.001	0.001	0.000	0.000	0.001	0.000	−0.000	0.000	0.002	0.001	0.000	0.001
	(0.001)	(0.001)	(0.000)	(0.001)	(0.001)	(0.001)	(0.000)	(0.001)	(0.002)	(0.001)	(0.000)	(0.001)
Cash flow ratio	−0.003	−0.004***	−0.001***	−0.004***	0.002	0.001	0.000	0.001	0.006	0.001	−0.000	0.000
	(0.002)	(0.002)	(0.000)	(0.001)	(0.002)	(0.002)	(0.000)	(0.002)	(0.005)	(0.003)	(0.000)	(0.003)
Size	0.377***	0.111*	0.011	0.048	0.054	0.048	−0.002	0.044	0.652***	0.008	−0.011	−0.037
	(0.079)	(0.058)	(0.008)	(0.048)	(0.066)	(0.063)	(0.005)	(0.061)	(0.175)	(0.118)	(0.015)	(0.090)
Q ratio	−0.012	−0.025*	−0.001	−0.023*	−0.020	−0.021	−0.000	−0.022	0.185***	0.003	0.001	−0.009
	(0.020)	(0.014)	(0.002)	(0.012)	(0.017)	(0.016)	(0.001)	(0.015)	(0.044)	(0.030)	(0.004)	(0.023)
Leverage ratio	−0.003*	−0.001	−0.000	−0.001	0.001	0.000	0.000*	0.000	−0.007**	−0.002	−0.000	−0.000
	(0.002)	(0.001)	(0.000)	(0.001)	(0.001)	(0.001)	(0.000)	(0.001)	(0.004)	(0.002)	(0.000)	(0.002)
Capital expenditures ratio	0.002	-0.002	0.001	-0.003	0.003	-0.000	0.000	-0.000	0.025	0.003	-0.001	-0.002
	(0.007)	(0.005)	(0.001)	(0.004)	(0.006)	(0.006)	(0.000)	(0.006)	(0.016)	(0.011)	(0.001)	(0.008)
Prior performance CAR, benchmarked	−0.004***	−0.004***	−0.000***	−0.003***	−0.000	−0.000	−0.000	−0.000	0.003***	−0.001	−0.000**	−0.001
	(0.001)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.001)	(0.001)	(0.000)	(0.001)
Ln(industrial concentration)	−0.098	−0.050	0.000	−0.045	0.004	0.009	0.003	0.007	−0.218	−0.244**	−0.006	−0.182**
	(0.073)	(0.054)	(0.007)	(0.045)	(0.062)	(0.059)	(0.005)	(0.057)	(0.163)	(0.110)	(0.014)	(0.084)
Year Dummies	Yes				Yes				Yes			
Observations	6,693				6,693				6,693			
Number of firms	1,363				1,363				1,363			
R-squared, within	0.319	0.231	0.104	0.209	0.254	0.241	0.174	0.230	0.221	0.144	0.043	0.135
R-squared, between	0.522	0.604	0.630	0.652	0.816	0.824	0.695	0.824	0.696	0.752	0.598	0.747
R-squared, overall	0.457	0.469	0.388	0.495	0.602	0.582	0.495	0.563	0.592	0.572	0.324	0.572
Hausman Test P-value	0.000	0.000	0.000	0.000	NA	NA	0.000	NA	0.000	NA	NA	NA

* significant at 10 %; ** significant at 5%; *** significant at 1%

Table 6: Determinants of Institutional Ownership: cont'd

This table reports the coefficients and standard errors from fixed effects regressions on determinants of institutional ownership. P-values from Hausman tests are reported. In some cases, random effects estimator degenerates to pooled OLS and the Wald test may not be appropriate.

	Dep var - Insurance Co. Ownership				Dep var - Investment Co. Ownership				Dep var - Indep. Advisor Ownership			
	Aggre	Top Indi	5% block	Concen	Aggre	Top Indi	5% block	Concen	Aggre	Top Indi	5% block	Concen
Prior ownership	0.258***	0.264***	0.109***	0.280***	0.334***	0.229***	0.132***	0.212***	0.285***	0.326***	0.130***	0.350***
	(0.013)	(0.013)	(0.013)	(0.013)	(0.012)	(0.013)	(0.014)	(0.013)	(0.012)	(0.013)	(0.014)	(0.013)
Prior M&A +ve announcement CAR	−0.020	−0.070	−0.006	−0.091	0.263	−0.194	−0.007	−0.195**	0.407	0.044	0.010	-0.030
	(0.094)	(0.068)	(0.009)	(0.057)	(0.219)	(0.121)	(0.016)	(0.092)	(0.268)	(0.108)	(0.016)	(0.066)
Prior M&A -ve announcement CAR	0.174*	0.061	0.018*	0.031	0.159	-0.221*	-0.039**	-0.206**	0.474*	-0.036	-0.013	-0.061
	(0.099)	(0.071)	(0.010)	(0.059)	(0.229)	(0.127)	(0.017)	(0.096)	(0.281)	(0.113)	(0.017)	(0.069)
beta	-0.177*	-0.134*	-0.019*	-0.120**	0.013	0.012	-0.011	0.004	-0.275	0.022	0.006	-0.009
	(0.100)	(0.072)	(0.010)	(0.060)	(0.232)	(0.128)	(0.017)	(0.097)	(0.284)	(0.114)	(0.017)	(0.070)
Governance index	0.005	0.005	0.004	0.004	-0.248**	-0.096	-0.008	-0.048	0.130	-0.032	0.002	-0.010
	(0.050)	(0.036)	(0.005)	(0.030)	(0.117)	(0.065)	(0.009)	(0.049)	(0.143)	(0.058)	(0.009)	(0.035)
Insider ownership	-0.002	-0.003	-0.001	-0.001	0.008	-0.006	-0.001	-0.008	0.014	0.023**	0.003**	0.016**
	(0.010)	(0.007)	(0.001)	(0.006)	(0.023)	(0.013)	(0.002)	(0.010)	(0.028)	(0.011)	(0.002)	(0.007)
CEO cash compensation	0.170***	0.093**	0.009	0.057	0.184	-0.047	-0.010	-0.070	-0.242	-0.084	-0.020*	-0.070
	(0.065)	(0.047)	(0.006)	(0.039)	(0.152)	(0.084)	(0.011)	(0.064)	(0.186)	(0.075)	(0.011)	(0.046)
CEO options (% of total compensation)	0.003*	0.001	0.000	0.001	0.008**	0.002	0.000	0.001	-0.007*	-0.003**	-0.001**	-0.002**
	(0.001)	(0.001)	(0.000)	(0.001)	(0.003)	(0.002)	(0.000)	(0.001)	(0.004)	(0.002)	(0.000)	(0.001)
Cash flow ratio	0.006*	0.003	0.000	0.003	0.011	0.004	0.001	0.000	0.003	-0.006	-0.001*	-0.005*
	(0.004)	(0.003)	(0.000)	(0.002)	(0.008)	(0.005)	(0.001)	(0.003)	(0.010)	(0.004)	(0.001)	(0.002)
Size	0.244**	0.092	0.005	0.042	-0.345	-0.621***	-0.040*	-0.443***	-3.625***	-0.977***	-0.145***	-0.598***
	(0.125)	(0.090)	(0.012)	(0.075)	(0.290)	(0.160)	(0.022)	(0.122)	(0.357)	(0.143)	(0.022)	(0.088)
Q ratio	0.141***	0.048**	-0.001	0.027	0.196***	-0.045	-0.004	-0.049	-0.262***	-0.076**	-0.019***	-0.062***
	(0.031)	(0.023)	(0.003)	(0.019)	(0.073)	(0.040)	(0.005)	(0.031)	(0.089)	(0.036)	(0.005)	(0.022)
Leverage ratio	0.001	0.004**	0.001***	0.004***	-0.000	0.001	-0.000	0.000	0.010	0.007**	0.000	0.006***
	(0.003)	(0.002)	(0.000)	(0.002)	(0.006)	(0.003)	(0.000)	(0.002)	(0.007)	(0.003)	(0.000)	(0.002)
Capital expenditures ratio	0.027**	0.012	0.002*	0.008	0.080***	0.028*	0.004*	0.007	0.034	-0.023*	-0.004**	-0.021***
	(0.011)	(0.008)	(0.001)	(0.007)	(0.026)	(0.015)	(0.002)	(0.011)	(0.032)	(0.013)	(0.002)	(0.008)
Prior performance CAR, benchmarked	0.001	-0.001*	-0.000	-0.001**	0.025***	0.007***	0.001***	0.002***	0.028***	-0.005***	-0.000***	-0.005***
	(0.001)	(0.001)	(0.000)	(0.001)	(0.002)	(0.001)	(0.000)	(0.001)	(0.002)	(0.001)	(0.000)	(0.001)
Ln(industrial concentration)	-0.178	-0.158*	-0.003	-0.139**	-0.489*	-0.101	-0.011	-0.036	-0.557*	-0.195	0.005	-0.088
	(0.116)	(0.084)	(0.011)	(0.070)	(0.270)	(0.150)	(0.020)	(0.114)	(0.331)	(0.133)	(0.020)	(0.082)
Year Dummies		Yes				Yes				Yes		
Observations		6,693				6,693				6,693		
Number of firms		1,363				1,363				1,363		
R-squared, within	0.128	0.091	0.021	0.093	0.343	0.104	0.060	0.068	0.197	0.134	0.045	0.166
R-squared, between	0.596	0.715	0.325	0.759	0.517	0.228	0.195	0.243	0.195	0.371	0.213	0.472
R-squared, overall	0.435	0.488	0.194	0.521	0.467	0.189	0.139	0.180	0.208	0.290	0.147	0.359
Hausman Test P-value	0.000	0.000	NA	0.000	0.000	0.000	NA	0.000	0.000	0.000	0.000	0.000

* significant at 10 %; ** significant at 5%; *** significant at 1%

Table 7: Endogeneity test

This table reports the Wu-Hausman endogeneity test results for various ownership measures of different types of institutions. Each type of institutional ownership is tested individually. For example, to test for the PPF ownership, in the first-stage of the Wu-Hausman test, where Z_{it} is the set of instruments,

$$PubPension_{it} = \alpha_0 + \sigma Z_{it} + \delta X_{it} + \eta Year_t + u_{1i} + \epsilon_{1it}$$

In the second-stage, a significant λ indicates that instrumented variable technique is required,

$$Log(\frac{y_{it}}{1-y_{it}}) = \beta_0 + \lambda(u_{1i} + \epsilon_{1it}) + \beta_1 PubPension_{it} + \phi X_{it} + \gamma Year_t + u_i + \epsilon_{it}$$

The first column reports the λ and the corresponding t-stat from the second-stage regression. F-test stats from the first stage and the P-value from the overidentification tests are also reported.

	Coefficients (λ)	t-stats (λ)	F from first stage demeaned OLS regression	P-value from overidentification test
Aggregate PPF	0.18***	(3.33)	445.92	0.831
Aggregate private pension	−0.06	(-1.09)	716.27	0.672
Aggregate bank	0.04	(1.41)	297.03	0.669
Aggregate insurance co.	0.03	(0.67)	170.97	0.696
Aggregate investment co.	0.01	(0.56)	290.51	0.697
Aggregate indep. advisor	0.03*	(1.71)	255.28	0.616
Top indiv. PPF	0.26***	(3.10)	359.01	0.872
Top indiv. private pension	−0.08	(−1.44)	694.19	0.661
Top indiv. bank	0.04	(0.91)	288.60	0.684
Top indiv. insurance co.	0.04	(0.67)	177.45	0.722
Top indiv. investment co.	−0.01	(−0.31)	128.70	0.702
Top indiv. indep. advisor	0.01	(0.17)	275.18	0.690
5% PPF block	2.44***	(2.97)	194.33	0.798
5% private pension block	−1.04	(−1.31)	460.40	0.704
5% bank block	0.12	(0.19)	75.79	0.691
5% insurance co. block	−0.91	(−0.79)	29.30	0.825
5% investment co. block	−0.27	(−0.45)	38.66	0.743
5% indep. advisor block	0.66	(1.08)	37.72	0.724
PPF concentration	0.32***	(3.06)	338.73	0.883
Private pension concentration	−0.09	(−1.47)	655.70	0.657
Bank concentration	0.05	(0.99)	291.53	0.668
Insurance co. concentration	0.06	(0.72)	199.57	0.724
Investment co. concentration	−0.02	(−0.32)	111.73	0.702
Indep. advisor concentration	0.00	(0.05)	322.36	0.698

* significant at 10 %; ** significant at 5%; *** significant at 1%

Table 8: Likelihood of M&A and Overall Institutional Ownership

This table reports the marginal effects and P-values from random effects logistic regressions. The institutional ownership variable in this table is for the overall level. Marginal effects at means are obtained by assuming the random effect u=0 and are reported as percentages. For a dummy variable, marginal effect reflects the change in probability when the value of the variable increases from 0 to 1. The intercepts are not reported in this table.

	Dependent variable — 1=M&A; 0=no M&A 1=M&A, # of obs: 2025 (30.26%)			
	Aggre	Top Indi	5% block	Concen
Institutional ownership	0.20***	0.25*	4.10***	0.13
	(0.000)	(0.056)	(0.010)	(0.624)
Shareholder Rights				
Governance Index	0.45	0.52*	0.50*	0.52*
	(0.102)	(0.057)	(0.066)	(0.057)
Managerial Incentives				
Insider ownership	−0.14	−0.23***	−0.22***	−0.23***
	(0.129)	(0.014)	(0.018)	(0.012)
CEO cash compensation	0.82	0.97	0.97	0.98
	(0.356)	(0.275)	(0.274)	(0.270)
CEO options (% of	0.07***	0.08***	0.08***	0.08***
total compensation)	(0.003)	(0.001)	(0.001)	(0.001)
Firm Characteristics				
Prior M&A +ve	20.34***	20.90***	20.72***	20.90***
announcement CAR	(0.000)	(0.000)	(0.000)	(0.000)
Prior M&A -ve	17.92***	18.46***	18.36***	18.50***
announcement CAR	(0.000)	(0.000)	(0.000)	(0.000)
Leverage ratio	−0.07**	−0.08**	−0.08**	−0.08**
	(0.039)	(0.033)	(0.030)	(0.037)
Cash flow ratio	0.06	0.09*	0.09*	0.10*
	(0.198)	(0.068)	(0.071)	(0.063)
Size	2.72***	3.04***	3.20***	2.96***
	(0.000)	(0.000)	(0.000)	(0.000)
Q ratio	1.56***	1.57***	1.61***	1.53***
	(0.000)	(0.000)	(0.000)	(0.000)
Capital expenditures ratio	−0.63***	−0.62***	−0.62***	−0.62***
	(0.000)	(0.000)	(0.000)	(0.000)
Prior Performance				
CAR, benchmark	0.07***	0.08***	0.08***	0.08***
	(0.000)	(0.000)	(0.000)	(0.000)
Industry Characteristics				
Ln(industrial concentration)	−0.19	−0.18	−0.22	−0.18
	(0.822)	(0.835)	(0.795)	(0.836)
Year Dummies			Yes	
Observations			6,693	
Number of firms			1,363	

* significant at 10 %; ** significant at 5%; *** significant at 1%

Table 9: Likelihood of M&A and Different Types of Institutional Ownership

This table reports the marginal effects and P-values from random effects logistic regressions. Marginal effects at means are obtained by assuming the random effect u=0 and are reported as percentages. For a dummy variable, marginal effect reflects the change in probability when the value of the variable increases from 0 to 1. The intercepts are not reported in this table. If the log of market capitalization is used as the measurement of firm size, regression results are similar. The log of total assets is used as the measure for firm size because the Q ratio is strongly correlated with market capitalization.

	Dependent variable — 1=M&A; 0=no M&A 1=M&A, # of obs: 2025 (30.26%)							
	random effects logit				Instrumented random effects logit			
Institutional Ownership	aggre	Top indi.	5% block	concen.	aggre	Top indi.	5% block	concen.
PPFH	−0.51*	−0.90**	−7.27**	−1.15**	−2.53***	−4.26***	−43.77***	−5.33***
	(0.089)	(0.033)	(0.020)	(0.024)	(0.001)	(0.000)	(0.000)	(0.000)
Private pension	0.52*	0.52*	−4.39	0.48	0.52*	0.51	−4.33	0.46
	(0.082)	(0.099)	(0.324)	(0.149)	(0.085)	(0.108)	(0.331)	(0.162)
Banks	0.27**	−0.03	−0.24	−0.15	0.28**	−0.02	−0.24	−0.15
	(0.022)	(0.890)	(0.894)	(0.530)	(0.018)	(0.901)	(0.892)	(0.540)
Insurance Co.	0.63***	0.53**	3.27	0.52*	0.65***	0.53**	3.28	0.51*
	(0.000)	(0.020)	(0.117)	(0.053)	(0.000)	(0.020)	(0.116)	(0.054)
Investment Co.	0.33***	0.56***	3.32**	0.55**	0.34***	0.58***	3.42***	0.57***
	(0.000)	(0.001)	(0.011)	(0.012)	(0.000)	(0.000)	(0.009)	(0.009)
Indep. advisors	0.05	0.11	0.25	0.06	−0.11	0.11	0.26	0.04
	(0.419)	(0.525)	(0.851)	(0.826)	(0.620)	(0.538)	(0.848)	(0.864)
Shareholder Rights								
Governance index	0.48*	0.53*	0.51*	0.54**	0.67**	0.63**	0.54*	0.59**
	(0.081)	(0.051)	(0.062)	(0.049)	(0.018)	(0.023)	(0.051)	(0.032)
Managerial Incentives								
Insider ownership	−0.13	−0.20**	−0.21**	−0.21**	-0.16*	−0.19**	−0.22**	−0.20**
	(0.153)	(0.034)	(0.023)	(0.022)	(0.095)	(0.035)	(0.018)	(0.026)
CEO cash compensation	0.75	0.89	0.97	0.94	0.67	0.80	0.86	0.88
	(0.396)	(0.316)	(0.275)	(0.288)	(0.454)	(0.370)	(0.334)	(0.323)
CEO options (% of total compensation)	0.07***	0.08***	0.08***	0.08***	0.07***	0.08***	0.08***	0.08***
	(0.003)	(0.001)	(0.001)	(0.001)	(0.002)	(0.001)	(0.001)	(0.001)
Firm Characteristics								
Prior M&A +ve announcement CAR	20.40***	20.74***	20.70***	20.82***	20.49***	20.72***	20.68***	20.77***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Prior M&A -ve announcement CAR	17.80***	18.25***	18.44***	18.33***	17.78***	17.94***	18.66***	17.96***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Leverage ratio	−0.07**	−0.08**	−0.08**	−0.08**	−0.08**	−0.09**	−0.09**	−0.08**
	(0.045)	(0.029)	(0.034)	(0.030)	(0.026)	(0.018)	(0.017)	(0.020)
Cash flow ratio	0.06	0.08	0.08	0.08	0.05	0.05	0.04	0.05
	(0.247)	(0.139)	(0.117)	(0.117)	(0.322)	(0.326)	(0.397)	(0.326)
Size	2.15***	2.81***	2.85***	2.82***	2.63**	3.17***	3.23***	2.93***
	(0.002)	(0.000)	(0.000)	(0.000)	(0.026)	(0.000)	(0.000)	(0.000)
Q ratio	1.37***	1.55***	1.52***	1.53***	1.24***	1.40***	1.45***	1.38***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.001)	(0.000)	(0.000)	(0.000)
Capital expenditures ratio	−0.67***	−0.66***	−0.64***	−0.65***	−0.67***	−0.67***	−0.62***	−0.67***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Prior Performance								
CAR, benchmarked	0.07***	0.07***	0.07***	0.07***	0.06***	0.06***	0.07***	0.06***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Industry Characteristics								
Ln(industrial concentration)	−0.23	−0.18	−0.18	−0.20	−0.57	−0.47	−0.24	−0.51
	(0.795)	(0.834)	(0.832)	(0.814)	(0.514)	(0.586)	(0.784)	(0.556)
Year Dummies	Yes				Yes			
Observations	6,693				6,693			
Number of firms	1,363				1,363			

* significant at 10 %; ** significant at 5%; *** significant at 1%

Table 10: Predicting M&A Frequency in the Long-run

This table reports the percent changes in Incident Rate Ratios (IRR) and P-values from negative binomial regressions on observations from year 1992. The dependent variables are the number of M&A years during the eight years of the sample (July 1993 - June 2001). Negative binomial regression is used because the goodness-of-fit test indicates overdispersion of Poisson model. IRR ($e^{\text{coefficient}}$) represents the factor change in the expected count for unit increase in the independent variable. Percent change in IRR = (IRR-1) * 100. Other controls include the governance index, leverage ratio, insider ownership, CEO cash compensation, Q ratio, prior CAR, and industrial concentration. Their coefficients are not significant.

	Dependent var — # of M&A years during the period of study			
Institutional Ownership	Aggregate	Top indiv.	5% block	Concentration
PPFH	−1.68	−4.08*	−22.71	−4.92*
	(0.255)	(0.059)	(0.110)	(0.060)
Private Pension	2.32	2.28	19.21	2.11
	(0.101)	(0.147)	(0.445)	(0.228)
Banks	1.16**	0.11	−4.16	−0.23
	(0.031)	(0.891)	(0.653)	(0.834)
Insurance Co.	2.46**	1.58	17.6	1.28
	(0.010)	(0.210)	(0.203)	(0.390)
Investment Co.	0.09	−0.37	−6.78	−0.37
	(0.908)	(0.769)	(0.446)	(0.819)
Indep. Advisor	−0.10	0.99	4.37	1.05
	(0.794)	(0.398)	(0.590)	(0.658)
CEO options (% of total compensation)	0.33**	0.31*	0.33**	0.31*
	(0.044)	(0.061)	(0.047)	(0.055)
Prior M&A +ve announcement CAR	85.33***	88.35***	91.23***	88.57***
	(0.000)	(0.000)	(0.000)	(0.000)
Prior M&A -ve announcement CAR	64.84***	66.4***	67.96***	67.71***
	(0.000)	(0.000)	(0.000)	(0.000)
Cash flow ratio	1.07*	1.14**	1.1*	1.16**
	(0.064)	(0.043)	(0.051)	(0.039)
Size	9.68**	11.95***	11.92***	11.63***
	(0.014)	(0.002)	(0.002)	(0.004)
Capital expenditures ratio	−2.73***	−2.72***	−2.79***	−2.73***
	(0.002)	(0.002)	(0.002)	(0.002)
Prior CAR, benchmarked	0.31**	0.29**	0.31**	0.28**
	(0.022)	(0.031)	(0.017)	(0.032)
Other controls		Yes		
# of Observations		566		
Pseudo R-squared	0.05	0.05	0.05	0.05
Overdispersion P-value	0.00	0.00	0.00	0.00

* significant at 10 %; ** significant at 5%; *** significant at 1%

Table 11: Size of Disclosed Deals

This table reports the marginal effects and P-values from truncated regressions. Any firm that announced one or more undisclosed value deal is dropped. For firms that announced multiple disclosed value deals, the size is the sum of all such deals. Ownership levels are the actual values instead of instrumented values, because there is no evidence of the existence of endogeneity for this specification.

	Dependent variable — size of M&A (millions)			
Institutional Ownership	Aggregate level	Top individual	5% block holder	Concentration
PPFH	−14.03** (0.018)	−25.73** (0.024)	−100.44 (0.341)	−33.03** (0.030)
Private pension funds	−0.56 (0.895)	−5.25 (0.303)	102.96*** (0.005)	−2.06 (0.716)
Banks	−6.49*** (0.000)	−6.54*** (0.007)	−86.18*** (0.000)	−2.66 (0.437)
Insurance companies	−4.15 (0.122)	−3.93 (0.300)	25.74 (0.254)	−6.00 (0.241)
Investment companies	3.95*** (0.000)	4.07** (0.023)	52.47*** (0.000)	3.15 (0.307)
Independent advisors	−4.80*** (0.000)	−13.73*** (0.000)	−33.18* (0.051)	−19.27*** (0.001)
Shareholder Rights				
Governance Index	−4.28* (0.054)	−6.28*** (0.005)	−7.71*** (0.000)	−8.95*** (0.000)
Managerial Incentives				
Insider ownership	−7.57*** (0.000)	−5.87*** (0.001)	−5.30*** (0.002)	−5.98*** (0.001)
CEO cash compensation	4.56 (0.359)	5.89 (0.249)	4.07 (0.394)	10.01* (0.069)
CEO options (% of total compensation)	−1.23*** (0.000)	−1.23*** (0.000)	−1.17*** (0.000)	−1.41*** (0.000)
Deal Characteristics				
Cash payment (% of total deal value)	−2.29*** (0.000)	−2.26*** (0.000)	−2.33*** (0.000)	−2.29*** (0.000)
Firm Characteristics				
Leverage ratio	0.56 (0.211)	0.68 (0.134)	0.63 (0.200)	0.47 (0.318)
Cash flow ratio	−0.31 (0.547)	−0.56 (0.268)	−0.71 (0.229)	−0.86* (0.098)
Size	97.66*** (0.000)	93.07*** (0.000)	108.97*** (0.000)	94.49*** (0.000)
Q-ratio	7.81*** (0.000)	7.86*** (0.000)	9.42*** (0.000)	8.40*** (0.000)
Capital expenditures ratio	−8.42*** (0.000)	−5.72*** (0.000)	−2.33* (0.095)	−2.69* (0.090)
Prior Performance				
CAR, benchmarked	0.01 (0.942)	0.00 (0.984)	−0.09 (0.664)	−0.13 (0.531)
Industry Characteristics				
Ln(industrial concentration)	−20.07** (0.025)	−28.75*** (0.001)	−23.44*** (0.005)	−34.79*** (0.000)
Year Dummies	yes	yes	yes	yes
Observations	874	874	874	874

* significant at 10 %; ** significant at 5%; *** significant at 1%

Table 12: Announcement Abnormal Returns

This table reports the coefficients and standard errors from random effects regressions on factors affecting announcement abnormal returns.

	Dependent variable - announcement abnormal returns			
	Aggre	Top Indi	5% block	Concen
PPFH	−0.068	−0.100	−1.525	−0.075
	(0.115)	(0.156)	(1.275)	(0.187)
Private pension funds	−0.275*	−0.310**	−1.124	−0.296*
	(0.142)	(0.155)	(1.275)	(0.167)
Banks	−0.040	−0.039	−0.544	−0.050
	(0.043)	(0.075)	(0.668)	(0.105)
Insurance companies	0.059	0.055	−0.089	0.072
	(0.061)	(0.079)	(0.661)	(0.097)
Investment companies	−0.068**	−0.118**	−0.271	−0.110
	(0.028)	(0.059)	(0.467)	(0.082)
Independent advisors	0.014	−0.006	−0.043	−0.009
	(0.024)	(0.058)	(0.473)	(0.085)
Governance index	−0.124	−0.124	−0.126	−0.122
	(0.094)	(0.094)	(0.094)	(0.094)
Insider ownership	−0.044	−0.042	−0.038	−0.040
	(0.039)	(0.039)	(0.039)	(0.039)
CEO cash compensation	−0.370	−0.553*	−0.576*	−0.564*
	(0.324)	(0.323)	(0.325)	(0.326)
CEO options (% of total compensation)	−0.006	−0.007	−0.007	−0.008
	(0.008)	(0.008)	(0.008)	(0.008)
Cash (% of total deal value)	0.021***	0.021***	0.022***	0.021***
	(0.005)	(0.005)	(0.005)	(0.005)
Year Dummies			Yes	
Observations			873	
Number of firms			572	
R-squared within	0.083	0.074	0.062	0.073
R-squared between	0.041	0.040	0.035	0.035
R-squared overall	0.046	0.045	0.041	0.042
Hausman Test P-value	0.909	0.806	0.695	0.795

* significant at 10 %; ** significant at 5%; *** significant at 1%

Table 13: Long-term Abnormal Returns

This table reports the coefficients and standard errors from fixed effects and random effects regressions examining the relation between institutional ownerships and long-term M&A performances. P-values from the Hausman test are reported. An insignificant test result indicates that random effects regression is appropriate.

	Dependent variable - abnormal returns 12 months including announcement month											
	CAR, benchmarked				CAR, 3-factor				BHAR			
	Aggre	Top Indi	5% block	Concen	Aggre	Top Indi	5% block	Concen	Aggre	Top Indi	5% block	Concen
PPFH	0.122	0.385**	3.258**	0.546**	0.794	2.749*	13.715	4.520**	0.402	1.896	23.066**	3.307*
	(0.128)	(0.183)	(1.449)	(0.223)	(0.978)	(1.462)	(10.562)	(1.832)	(0.991)	(1.481)	(10.674)	(1.860)
Private pension funds	0.114	0.176	1.583	0.213*	−0.555	0.080	14.848	0.262	0.328	1.896	10.500	0.969
	(0.114)	(0.120)	(1.905)	(0.125)	(1.002)	(1.057)	(14.291)	(1.087)	(1.015)	(1.071)	(14.442)	(1.104)
Banks	−0.066	0.062	0.011	0.120	−0.292	1.277*	0.541	2.317**	−0.725*	0.114	−0.097	0.988
	(0.049)	(0.083)	(0.694)	(0.116)	(0.430)	(0.709)	(4.920)	(1.018)	(0.436)	(0.718)	(4.972)	(1.033)
Insurance companies	−0.019	−0.019	0.655	−0.027	−0.277	0.307	4.976	0.338	−0.140	0.219	4.119	0.139
	(0.072)	(0.097)	(0.779)	(0.120)	(0.585)	(0.863)	(5.774)	(1.095)	(0.595)	(0.874)	(5.834)	(1.111)
Investment companies	−0.070**	−0.030	0.381	−0.013	−0.922***	0.096	3.296	0.497	−1.238***	−0.770*	−0.225	−0.685
	(0.032)	(0.063)	(0.493)	(0.087)	(0.254)	(0.454)	(3.303)	(0.622)	(0.258)	(0.460)	(3.337)	(0.631)
Independent advisors	−0.022	0.007	0.282	0.053	−0.830***	0.095	2.668	0.957	−0.367	0.866	9.664***	2.184**
	(0.027)	(0.067)	(0.499)	(0.105)	(0.223)	(0.525)	(3.371)	(0.921)	(0.226)	(0.532)	(3.413)	(0.935)
Governance index	−0.013	−0.011	0.017	−0.006	−1.975	−1.274	−0.864	−1.011	−1.192	−0.697	−0.122	−0.536
	(0.111)	(0.110)	(0.111)	(0.110)	(1.874)	(1.883)	(1.881)	(1.875)	(1.902)	(1.911)	(1.903)	(1.905)
Insider ownership	−0.033	−0.019	−0.012	−0.021	−0.427	−0.719	−0.665	−0.744	−0.242	−0.488	−0.466	−0.497
	(0.042)	(0.041)	(0.041)	(0.041)	(0.478)	(0.481)	(0.481)	(0.479)	(0.485)	(0.487)	(0.486)	(0.486)
CEO cash compensation	0.100	0.081	0.129	0.124	−5.567**	−5.179**	−4.773**	−4.827**	−9.247***	−9.366***	−8.653***	−9.190***
	(0.300)	(0.298)	(0.299)	(0.299)	(2.386)	(2.391)	(2.395)	(2.382)	(2.419)	(2.422)	(2.421)	(2.418)
CEO options (% of total compensation)	0.003	0.002	0.001	0.002	−0.011	−0.010	0.003	−0.014	−0.035	−0.036	−0.025	−0.036
	(0.009)	(0.009)	(0.009)	(0.009)	(0.058)	(0.059)	(0.059)	(0.059)	(0.059)	(0.060)	(0.059)	(0.060)
Year Dummies	Yes				Yes				Yes			
Observations	2,013				2,015				2,013			
Number of firms	825				826				825			
R-squared within	0.011	0.012	0.016	0.014	0.043	0.028	0.026	0.033	0.043	0.029	0.032	0.031
R-squared between	0.015	0.011	0.004	0.011	0.005	0.003	0.004	0.001	0.001	0.000	0.000	0.000
R-squared overall	0.013	0.011	0.010	0.012	0.012	0.007	0.012	0.004	0.007	0.004	0.005	0.003
Hausman Test P-value	0.963	0.670	0.236	0.667	0.002	0.019	0.034	0.002	0.000	0.001	0.000	0.000

* significant at 10%; ** significant at 5%; *** significant at 1%

Table 14: Post-M&A Operating Performance

Panel A reports the median operating cash flow return on market value of assets, median cashflow margin, and median asset turnover rate for the M&A firms in years surrounding the M&A completion year.
Panel B reports the summary statistics on abnormal operating performances. The first method looks at the changes of industry-adjusted measures(operating cash flow return, cash flow margin on sales, and asset turnover rate). The second method is regression-based. The median values of firm-level industry-adjusted operating performance measures from the 3 years post-M&A are regressed on the median value from the 3 years pre-M&A. Standard errors are reported in parentheses.

Panel A

	Operating cash flow returns			Cash flow margin on sales			Asset turnover ratio		
Year relative to M&A	Firm median	Industry adjusted median	# of obs	Firm median	Industry adjusted median	# of obs	Firm median median	Industry adjusted	# of obs
			all M&A firm-years						
-3	14.66%	2.72%	1,963	23.21%	6.71%	1,970	68.76(c/$)	−3.86(c/$)	1,965
-2	14.61	2.83	1,991	23.81	7.24	1,995	65.08	−3.79	1,992
-1	14.83	3.13	2,002	24.76	8.02	2,005	62.92	−4.72	2,002
1	15.72	3.84	1,746	26.57	9.39	1,746	61.22	−4.66	1,749
2	16.07	3.99	1,404	26.14	9.24	1,404	60.94	−4.94	1,408
3	15.85	3.86	1,028	25.67	9.21	1,028	61.56	−5.76	1,031
			public targets only						
-3	13.86%	2.47%	295	25.06%	7.65%	296	58.36(c/$)	−8.12(c/$)	297
-2	13.76	1.99	335	26.79	8.97	335	55.64	−5.13	338
-1	13.84	2.37	311	26.85	8.37	311	50.07	−7.74	315
1	13.71	2.73	276	29.32	13.95	279	46.47	−8.98	279
2	12.55	3.44	216	27.69	11.33	219	49.92	−9.72	219
3	12.75	3.91	145	27.91	10.65	147	51.75	−7.89	148

Panel B

Abnormal industry-adjusted post-M&A operating performance - method 1

	all M&A firm-years			public targets only		
	mean	median	# of obs	mean	median	# of obs
$IACF_{post,i} - IACF_{pre,i}$	1.53***	0.64	1,741	1.94***	0.88	322
$IACFM_{post,i} - IACFM_{pre,i}$	5.38***	2.01	1,743	16.41***	3.59	321
$IAAT_{post,i} - IAAT_{pre,i}$	−1.00	0.06	1,743	−2.30	0.74	323

Abnormal industry-adjusted post-M&A operating performance - method 2

				all M&A firm-years			
$IACF_{post,i}$	=	2.586***	+	0.767***	$IACF_{pre,i}$	R^2=0.41	N=1,741
		(0.219)		(0.022)			
$IACFM_{post,i}$	=	8.357***	+	0.714***	$IACFM_{pre,i}$	R^2=0.24	N=1,743
		(0.775)		(0.031)			
$IAAT_{post,i}$	=	−0.358	+	0.850***	$IAAT_{pre,i}$	R^2=0.71	N=1,743
		(0.719)		(0.013)			
				public targets only			
$IACF_{post,i}$	=	2.146***	+	0.949***	$IACF_{pre,i}$	R^2=0.52	N=322
		(0.460)		(0.051)			
$IACFM_{post,i}$	=	22.834***	+	0.007	$IACFM_{pre,i}$	R^2=0.00	N=321
		(3.304)		(0.037)			
$IAAT_{post,i}$	=	−2.468*	+	0.857***	$IAAT_{pre,i}$	R^2=0.74	N=323
		(1.422)		(0.029)			

* significant at 10%; ** significant at 5%; *** significant at 1%

Table 15: Asset Turnover and Institutional Ownership

This table reports the coefficients and standard errors from random effects regressions. The dependent variable is the abnormal post-M&A operating performance measured by industry-adjusted asset turnover rate. Fixed-effect or random-effect regressions are used according to Hausman-test results.

	Dependent variable - abnormal asset turnover							
	$IAAT_{post,i}$ - $(-0.358 + 0.850IAAT_{pre,i})$				$IAAT_{post,i}$ - $IAAT_{pre,i}$			
	Aggre	Top Indi	5% block	Concen	Aggre	Top Indi	5% block	Concen
PPFH	1.627***	2.851***	14.376**	3.534***	1.756***	2.809***	18.310***	3.471***
	(0.503)	(0.532)	(5.609)	(0.655)	(0.547)	(0.560)	(4.503)	(0.688)
Private pension	−0.075	−0.241	1.873	−0.162	−0.039	−0.168	0.855	−0.104
	(0.463)	(0.347)	(6.952)	(0.358)	(0.503)	(0.363)	(5.680)	(0.375)
Banks	−0.273	−0.236	−0.657	−0.337	−0.254	−0.305	−0.804	−0.468
	(0.211)	(0.245)	(2.394)	(0.345)	(0.229)	(0.257)	(2.055)	(0.361)
Insurance Co.	−0.712**	−0.562*	−0.926	−0.618	−0.807**	−0.579*	−0.001	−0.651*
	(0.292)	(0.292)	(2.761)	(0.364)	(0.317)	(0.305)	(2.306)	(0.380)
Investment Co.	0.090	0.239	3.821**	0.520**	0.090	0.172	2.306	0.384
	(0.130)	(0.181)	(1.616)	(0.249)	(0.141)	(0.192)	(1.452)	(0.264)
Independent advisors	−0.400***	−0.205	−3.101*	−0.045	−0.443***	−0.330	−2.275	−0.197
	(0.115)	(0.194)	(1.635)	(0.313)	(0.125)	(0.205)	(1.463)	(0.329)
Governance index	1.168	−0.006	1.236	0.021	1.352	−0.168	−0.158	−0.145
	(0.945)	(0.368)	(0.949)	(0.367)	(1.027)	(0.376)	(0.377)	(0.375)
Insider ownership	0.203	0.031	0.131	0.034	0.205	0.055	0.072	0.059
	(0.236)	(0.131)	(0.237)	(0.131)	(0.256)	(0.135)	(0.136)	(0.135)
CEO cash compensation	−0.459	−2.019**	−0.153	−1.852**	−0.379	−2.070**	−2.103**	−1.909**
	(1.175)	(0.908)	(1.185)	(0.910)	(1.277)	(0.956)	(0.963)	(0.958)
CEO options (% of compensation)	0.034	0.017	0.039	0.016	0.038	0.029	0.029	0.029
	(0.029)	(0.025)	(0.030)	(0.025)	(0.032)	(0.026)	(0.027)	(0.026)
Constant	−1.928	3.124	−14.202	1.049	−3.718	4.987	3.257	2.848
	(11.276)	(5.051)	(10.358)	(4.896)	(12.249)	(5.240)	(4.966)	(5.079)
Year Dummies	Yes							
Observations	1,743							
Number of firms	734							
R-squared within	0.051	0.030	0.033	0.029	0.052	0.030	0.026	0.028
R-squared between	0.007	0.058	0.007	0.063	0.006	0.055	0.048	0.058
R-squared overall	0.012	0.042	0.008	0.045	0.010	0.038	0.032	0.038
Hausman-test P-value	0.005	0.104	0.072	0.131	0.012	0.187	0.157	0.223

* significant at 10%; ** significant at 5%; *** significant at 1%

Table 16: Performance of Low Q and High Q Firms, and "Buying-growth" M&A

This table reports the means and medians for different performance measures among subgroups of observations. P-values from non-parametric median tests are reported in parentheses. Each year, firms with q ratios less than the sample median are defined to be low q firms. Cash richness is defined as the ratio of non-current-debt cash and cash equivalent to non-cash total assets. Each year, firms with above industry (by 4-digit SIC code) median cash richness are defined to be cash rich firms, otherwise they are low cash firms. In the subsample of M&A observation for which target pre-M&A three-year sales growth rates are available, deals with target sales growth rates above the median are defined to be "buying-growth," otherwise "non-buying-growth."

	cash rich, low q		low cash, low q		
# of obs	482		476		
	mean	median	mean	median	median test
Announcement abnormal return	9.02	5.94	22.38***	15.46	(0.288)
Announcement value-weighted AR	−7.73		6.73		
Long-term CAR, benchmarked	0.54	0.01	0.64	0.25	(0.561)
Long-term CAR, 3-factor	−0.28	−1.82	4.45**	2.90	(0.061)
Long-term BHAR	−0.34	−5.54	0.67	−2.76	(0.272)
Abnormal IA cash flow	3.41***	2.13	3.19***	1.55	(0.444)
Abnormal IA cash margin	5.73***	2.94	6.69***	2.65	(0.321)
Abnormal IA asset turnover	1.67	0.48	2.44*	0.49	(0.857)
	high q firms		low q firms		
# of obs	1,050		961		
Announcement abnormal return	−2.85	3.61	15.68***	11.34	(0.094)
Announcement value-weighted AR	−8.47		−0.10		
Long-term CAR, benchmarked	−0.41	−0.58	0.59*	0.18	(0.124)
Long-term CAR, 3-factor	6.46***	4.21	2.07	0.34	(0.078)
Long-term BHAR	2.67*	−2.60	0.16	−3.78	(0.434)
Abnormal IA cash flow	1.94***	1.12	3.30***	1.70	(0.119)
Abnormal IA cash margin	10.31***	5.02	6.21***	2.71	(0.000)
Abnormal IA asset turnover	−2.59***	−0.68	2.06*	0.49	(0.187)
	"buying-growth" M&A		"non-buying-growth" M&A		
# of obs	156		154		
Announcement abnormal return	−32.38***	−8.86	−13.97	3.54	(0.496)
Announcement value-weighted AR	−25.39		−46.48		
Long-term CAR, benchmarked	−1.30	−1.62	0.55	−0.03	(0.112)
Long-term CAR, 3-factor	3.62	6.41	10.05**	5.37	(0.820)
Long-term BHAR	−4.04	−5.39	2.40	−6.37	(0.820)
Abnormal IA cash flow	3.18***	1.68	2.24***	1.39	(0.589)
Abnormal IA cash margin	12.88***	9.46	9.14***	4.26	(0.048)
Abnormal IA asset turnover	−3.40	−1.37	−6.79***	−4.17	(0.208)

* significantly different from zero at 10%; ** significantly different from zero at 5%; *** significantly different from zero at 1%

Table 17: Low Q Firms

This table reports the marginal effects and P-values from random effects logistic regressions on the subsample of low q firms with different cash holding levels. Each year, firms with q ratio less than the sample median are defined to be low q firms. Cash richness is defined as the ratio of non-current-debt cash and cash equivalent over non-cash total asset. Each year, firms with above industry (by 4-digit SIC code) median cash richness are defined to be cash rich firms, otherwise low cash firms. Results for regressions in which the institutional ownership is measured by the highest individual ownership within each category are not reported due to limited space. They are available upon request.

	random effects logit						instrumented random effects logit					
	Dependent variable — 1=M&A; 0=no M&A						Dependent variable — 1=M&A; 0=no M&A					
	Cash rich, low q 1=M&A (25.16%)			Low Cash, low q 1=M&A (26.14%)			Cash rich, low q 1=M&A (25.16%)			Low Cash, low q 1=M&A (26.14%)		
	Aggre	5% block	Concen	Aggre	5% block	Concen	Aggre	5% block	Concen	Aggre	5% block	Concen
Instl. Ownership												
PPF	−1.29**	−11.78**	−2.15**	−0.06	0.49	0.08	−2.80**	−33.55*	−4.09**	−1.60	−10.19	−1.15
	(0.011)	(0.015)	(0.016)	(0.888)	(0.917)	(0.913)	(0.018)	(0.077)	(0.050)	(0.158)	(0.601)	(0.558)
Private pension	0.33	−7.84	0.28	−0.11	−1.47	−0.35	0.31	−8.24	0.28	−0.08	−1.45	−0.36
	(0.393)	(0.307)	(0.485)	(0.885)	(0.860)	(0.714)	(0.426)	(0.279)	(0.491)	(0.921)	(0.862)	(0.706)
Banks	0.29	−1.92	−0.02	−0.35*	−2.67	−0.67	0.27	−1.73	0.01	−0.33	−2.79	−0.68
	(0.133)	(0.510)	(0.953)	(0.099)	(0.346)	(0.128)	(0.149)	(0.554)	(0.984)	(0.113)	(0.323)	(0.121)
Insurance Co.	0.39	0.61	0.24	0.90***	9.63***	0.88**	0.42	0.50	0.24	0.89***	9.60***	0.87**
	(0.139)	(0.858)	(0.527)	(0.001)	(0.006)	(0.035)	(0.114)	(0.884)	(0.542)	(0.001)	(0.006)	(0.037)
Investment Co.	0.40**	4.85**	0.89**	0.26*	2.22	0.42	0.42***	5.04**	0.92**	0.27*	2.25	0.42
	(0.011)	(0.040)	(0.013)	(0.073)	(0.309)	(0.249)	(0.008)	(0.033)	(0.011)	(0.060)	(0.303)	(0.250)
Indep. Advisors	0.06	−1.11	0.07	0.15	2.52	0.24	−0.36	−1.15	0.05	0.59	2.52	0.22
	(0.601)	(0.636)	(0.885)	(0.168)	(0.270)	(0.541)	(0.441)	(0.624)	(0.918)	(0.102)	(0.270)	(0.566)
Shareholder Rights												
Governance index	1.18***	1.14***	1.16***	0.55	0.54	0.58	1.93***	1.26***	1.30***	0.69	0.51	0.55
	(0.007)	(0.010)	(0.008)	(0.202)	(0.206)	(0.176)	(0.000)	(0.005)	(0.004)	(0.112)	(0.243)	(0.199)
Managerial Incentives												
Insider Ownership	−0.26	−0.34**	−0.32**	−0.12	−0.20	−0.19	−0.30*	−0.25	−0.29*	−0.13	−0.20	−0.19
	(0.113)	(0.035)	(0.043)	(0.468)	(0.227)	(0.256)	(0.096)	(0.127)	(0.068)	(0.429)	(0.233)	(0.269)
CEO cash compensation	−0.17	−0.03	0.01	0.73	1.04	0.99	−0.28	−0.19	−0.05	0.56	0.99	1.05
	(0.925)	(0.988)	(0.994)	(0.653)	(0.523)	(0.542)	(0.878)	(0.916)	(0.979)	(0.734)	(0.545)	(0.520)
CEO options (% of total compensation)	0.10**	0.10**	0.10**	0.01	0.02	0.02	0.10**	0.10**	0.10**	0.02	0.02	0.02
	(0.031)	(0.026)	(0.022)	(0.803)	(0.654)	(0.617)	(0.035)	(0.030)	(0.025)	(0.653)	(0.665)	(0.599)
Firm Characteristics												
Prior M&A +ve announcement CAR	21.75***	20.95***	22.04***	24.95***	25.71***	25.33***	22.61***	20.98***	22.35***	24.55***	25.67***	25.41***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Prior M&A -ve announcement CAR	19.27***	19.24***	20.01***	19.64***	19.92***	19.86***	20.51***	19.89***	20.43***	19.66***	20.18***	19.78***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Leverage ratio	−0.19**	−0.17**	−0.17**	−0.17**	−0.17**	−0.16**	−0.24***	−0.23***	−0.21***	−0.20**	−0.18**	−0.16**
	(0.013)	(0.027)	(0.023)	(0.039)	(0.045)	(0.048)	(0.007)	(0.006)	(0.007)	(0.019)	(0.040)	(0.049)
Cash flow ratio	0.16	0.21	0.20	0.41*	0.50**	0.49**	0.15	0.15	0.14	0.35	0.47**	0.47**
	(0.395)	(0.247)	(0.265)	(0.073)	(0.031)	(0.035)	(0.438)	(0.405)	(0.454)	(0.139)	(0.047)	(0.044)
Size	1.30	1.70	1.80	2.38**	2.66**	2.54**	2.03	1.76	2.44**	4.57***	3.07**	2.83**
	(0.310)	(0.165)	(0.143)	(0.037)	(0.015)	(0.021)	(0.311)	(0.155)	(0.048)	(0.010)	(0.024)	(0.019)
Q ratio	10.73**	11.60**	11.91**	11.61**	12.23***	11.99**	9.17*	9.95**	11.20**	13.99***	12.47***	11.89**
	(0.025)	(0.015)	(0.013)	(0.016)	(0.011)	(0.012)	(0.065)	(0.045)	(0.021)	(0.006)	(0.010)	(0.013)
Capital expenditures ratio	−0.66***	−0.63***	−0.66***	−0.54**	−0.50**	−0.51**	−0.60**	−0.57**	−0.64***	−0.48**	−0.49**	−0.50**
	(0.007)	(0.009)	(0.006)	(0.027)	(0.043)	(0.038)	(0.016)	(0.021)	(0.008)	(0.049)	(0.046)	(0.045)
Prior Performance												
CAR, benchmarked	0.04	0.05*	0.05*	0.07**	0.08***	0.07***	0.05	0.05	0.04	0.06**	0.08***	0.07***
	(0.167)	(0.079)	(0.097)	(0.012)	(0.005)	(0.007)	(0.166)	(0.115)	(0.164)	(0.039)	(0.006)	(0.009)
Industry Characteristics												
Ln(industrial concentration)	−1.36	−0.83	−1.02	0.67	0.44	0.46	−1.70	0.44	−0.89	−0.22	0.40	0.10
	(0.415)	(0.620)	(0.536)	(0.667)	(0.774)	(0.767)	(0.313)	(0.806)	(0.593)	(0.891)	(0.796)	(0.950)
Year Dummies		Yes			Yes			Yes			Yes	
Observations		1,554			1,844			1,554			1,844	
Number of firms		643			692			643			692	

* significant at 10%; ** significant at 5%; *** significant at 1%

Table 18: "Buying Growth" M&A

This table reports the marginal effects and P-values from logistic regressions on the subsample with target sales growth rates available. Target sales growth rate is the three-year growth rate prior to takeover. The median growth rate of the sample is used as the benchmark.

Dependent variable — 1=target sales growth rate above median; 0=target sales growth rate below median				
	Aggregate	Top individual	5% block	Concentration
Institutional Ownership				
PPFH	−2.69	−5.98*	−33.48	−9.40**
	(0.111)	(0.055)	(0.155)	(0.041)
Private pension funds	−0.09	−0.97	−15.85	−1.57
	(0.959)	(0.600)	(0.449)	(0.445)
Banks	0.52	0.41	−9.88	0.49
	(0.320)	(0.635)	(0.259)	(0.697)
Insurance companies	0.90	0.05	−6.33	−0.08
	(0.290)	(0.954)	(0.526)	(0.968)
Investment companies	0.49	1.02	9.72	1.26
	(0.191)	(0.213)	(0.121)	(0.296)
Independent advisors	0.69**	0.91	8.19	−0.26
	(0.045)	(0.414)	(0.219)	(0.905)
Shareholder Rights				
Governance index	0.20	0.02	0.16	0.01
	(0.858)	(0.994)	(0.897)	(0.998)
Managerial Incentives				
Insider Ownership	0.58	0.30	0.20	0.28
	(0.326)	(0.602)	(0.710)	(0.621)
CEO cash compensation	3.45	2.47	2.94	1.73
	(0.154)	(0.304)	(0.216)	(0.465)
CEO options (% of total compensation)	0.04	0.05	0.07	0.06
	(0.744)	(0.657)	(0.500)	(0.615)
Firm Characteristics				
Q-ratio	2.27	1.92	2.40*	1.50
	(0.125)	(0.187)	(0.095)	(0.284)
Sales growth	0.14	0.16	0.15	0.17
	(0.200)	(0.138)	(0.158)	(0.112)
Leverage ratio	−0.12	−0.16	−0.10	−0.15
	(0.536)	(0.389)	(0.571)	(0.414)
Ln(industry concentration)	−6.96*	−6.16	−5.60	−6.30*
	(0.072)	(0.101)	(0.135)	(0.093)
Observations	310	310	310	310
Pseudo R-square	0.07	0.07	0.07	0.07

* significant at 10%; ** significant at 5%; *** significant at 1%

2 Managerial Reputation Concerns, Outside Monitoring, and Investment Efficiency

Introduction

A central question of corporate finance is how information asymmetry and agency problems affect corporate investment efficiency. Incentive-based compensation policy and active monitoring by both the board and shareholders are popular corporate governance measures to alleviate agency problems. It is already recognized in the theoretical literature that the presence of an outside large shareholder can improve firm value. But, many papers have simply assumed a positive value impact of a monitor, only Shleifer and Vishny (1986) have offered a precise mechanism by which an outside large shareholder can bring about value improvement. This chapter offers an alternative, in which an external monitor has the power to pressure the board to remove the manager, but not the desire to take over the control.

Incentive-based compensation policy may not be effective in inducing efficient investment outcome when the manager derives private benefit from investing.[36] The role of monitors becomes crucial in promoting shareholder's interest in cases like these. Many theoretical models assume that the market does not know the true ability of the manager initially. Similarly, very often the market does not know whether the manager intends to build his empire or intends to maximize shareholder wealth. Oftentimes, the manager can blame a failed investment on unfavorable market conditions or wrong information he received, which can not be verified by an outside investor. In this world of uncertainty and asymmetric information, when will the outside shareholder decide to monitor and which shareholder will monitor?

This model assumes, similar to Maug (1998), that the outside large shareholder has sufficient power to replace the manager when the manager is found to be "empire

[36] Hennessy and Levy (2002) provide strong support for the empire-building model of investment.

building". At the beginning of this two-period model, the monitor is uncertain about the manager and needs to decide on how much to invest in monitoring technology. The private information regarding investment profitability received by the manager is noisy. Managers come in two types. "Empire-building" managers derive private benefits from their investments, and can blame bad investment outcomes on the noise in the information that they receive. This model shows that the "empire-building" manager's reputation concern - the fear of being discovered and subsequently removed - will discipline him from value-reducing activity in the early stage of his tenure.

This model highlights the limitation of outside monitoring in the presence of uncertainty. In equilibrium, the amount of investment in monitoring technology increases with the manager's initial reputation. When the monitor access a high likelihood of the manager being the good type, his expected gain will no longer cover the cost of monitoring and no monitoring will occur in equilibrium. Without the uncertainty about the type of the manager, the outside shareholder only needs to invest in monitoring technology to be able to punish and remove "empire-building" managers. Monitoring occurs as long as this monitoring cost exceeds the gain in improved investment efficiency. In a sense, the uncertainty about the type of the manager adds another layer in the cost of monitoring and thus leads to less monitoring committed by the outside shareholder. Furthermore, in equilibrium limited improvement in investment efficiency can be an outcome, and it is due to the equilibrium mixed-strategy adopted by the bad manager. Thus contrary to what is usually assumed in the literature, an outside monitor might have limited capability to improve efficiency.

Public pension funds are the most active institutions in monitoring corporate governance despite the argument that managers of those funds could be politically motivated. This study may offer an explanation for such phenomenon. When active monitoring is viewed by the public pension fund manager as a means of establishing political capital, he would want to monitor even if the expected return to the fund is negative. Given this type of agency conflict within the institution of the monitor, we may be able to avoid the equilibrium in which the outside shareholder gives up monitoring ex ante.

The model predicts that only shareholders which already have invested in monitoring can influence companies' investment decisions. Several activist institutions are identified as such shareholders. An empirical analysis shows that their blockholdings reduce the likelihood of a company acquiring other companies, while other institutions do not have this influence.

When we have two outside monitors in the model, there are many equilibria in which the two monitors share the cost of monitoring. This prediction raises the question of coordination. One implication is that one monitor may want to buy out the shareholdings of the other to eliminate coordination problems. This might be able to explain the little overlapping of block holdings among the activist institutions.

In this model, the outside shareholder's monitoring effort is facilitated by managers' own reputational concerns. Thus when the "empire-building" manager no longer has reputational concerns in the last period of the game, the presence of an monitor can no longer improve efficiency. The model predicts a pattern of investment through out some manager's career: fewer but successful investment projects in earlier career, more and failed investment projects towards the end of the tenure. This predictions remains to be tested.

A policy implication of the model is that outside monitoring can be more limited than what existing theories usually predict, and that it cannot substitute for internal monitoring by the board. Thus, it is especially important to ensure effective board monitoring.

The rest of the chapter is organized as the following. Section I reviews the related literature. Section II introduces the model. Section III describes the equilibrium outcome. Section IV discusses the comparative statics. Section V tests empirically some of the predictions. And section VI concludes.

2.1 Related Literature

In Admati, Pfleiderer, and Zechner (1994), it is assumed that a large investor can affect a securitie's expected payoff through monitoring. Maug (1998) models the positive effect market liquidity has on monitoring. Kahn and Winton (1998) study a large shareholder's choice between trading and monitoring. Noe (2002) characterizes an equilibrium in which monitoring is stochastic. In those models, it is assumed that interventions by the outside monitor will improve share prices. Although this may not be an unreasonable assumption, it is interesting to explore how indeed an monitor can improve firm values. It is the manager who makes the operating decisions that immediately affect the firm value. Although an outside monitor can intervine via private negotiations or a proxy fight, it is not clear that these activities will have an definitive impact on firm values. For example, studies by Gillan and Starks (2000), Del Guercio and Hawkins (1999), Karpoff, Malatesta, and Walkling (1996), and Wahal (1996) have found that shareholder proxy proposals had either insignificant effect or small negative effect on stock returns.

Shleifer and Vishny (1986) present a model in which the presence of a large shareholder increases the likelihood of a takeover and hence increases the share price. They regard informal negotiations with the management as less effective in improving the firm's operating strategy, compared to a takeover. In my model, an outside monitor is able to discover the true type of the manager and is able to terminate an "empire-building" manager once he is discovered. Del Guercio and Hawkins (1999) document a higher top management turnover rate for firms targeted by activist institutions. Thus the assumption that an outside monitor has the ability to pressure the board to remove an "empire-building" manager is quite realistic.

Jensen (1986) discusses how managerial "empire-building" behavior leads to inefficient investment decisions. Jensen's free cash flow theory predicts that managers tend to waste the cash when they face fewer positive NPV projects. Stulz (1990) and

Hart and Moore (1995) explore how an optimal financing policy/debt-equity ratio can reduce this cost of managerial discretion. This chapter does not model the effect of capital structure on investment. Its main interest is on how an outside monitor can reduce inefficient investment when empire-building managers want to overinvest. Thus my model implicitly assumes that there is enough internal funding for the investment. This simplification may be justified by the fact that the problem of overinvestment is more prevalent when there is enough cash on hand.

Holmstrom (1999) points out that younger managers concerning for future careers will overwork, when managerial ability is unknown initially and managerial effort is unobservable. Scharfstein and Stein (1990) show that managers mimic the decisions of other managers in their investment decisions due to their reputation concerns. Gibbons and Murphy (1992) show empirically that the implicit incentives from career concerns are much larger for younger managers. In my model, the uncertainty about a manager is not about his effort level or his ability. The negotiation process of the contract between the manager and the firm is not modeled and is assumed to be exgenous. My model assumes that the manager is risk-neutral, hence the optimal contract will guarantee that the manager will exert the maximum possible effort. It is also assumed in this study that both types of managers observe the same noisy signal. This is equivalent to the assumption that both types of managers are equally capable. The only difference between the two types lies in whether they derive private benefits from investments. In my model, the manager is not worried about what the market thinks of his ability, but is worried about whether he will be terminated.

Removal of bad management can also be done by the board. The model setup thus is also applicable to monitoring by the board. Weisbach (1988) documents a stronger association between prior performance and CEO resignation for companies with outsider-dominated boards. Byrd and Hickman (1992) find that bidding companies with outside directors holding majority seats on the board have higher announcement abnormal returns during a tender offer bid. In contrast, Yermack (1996) finds no association between the percentage of outside directors and firm performance, and an inverse relation between board size and firm value. Shivdasani and Yermack (1999) find evidence that CEO involvement in the selection of new board members leads to fewer independent outside directors. The existing literature on board monitoring is mixed. When board monitoring is ineffective, outside monitoring may be important and can improve firm value. Monitoring by the board is not explored in this chapter as I am mainly interested in when an outside monitor is effective, and consequently can substitute for board monitoring.

Sobel (1985) presents a model in which it pays for an agent to build a reputation and cash in later. Benabou and Laroque (1992) show that noisy private information allows insiders to manipulate prices repeatedly. Similar to their setup, the "empire-building" manager in my model can hide behind the noisy private information he receives. It is not uncommon in reality that an outside shareholder is uncertain about the manager, and that the firm-relavent information received by the manager is noisy. This study explores the conditions under which an outside monitor can be effective under these circumstances.

2.2 The Model

This is a two-period model with two players - a manager and an outside monitor. At the beginning of each period, the manager observes a private, noisy, but informative signal about the profitability of an investment opportunity, then makes investment decisions. The good type of manager will invest only if the expected return is positive. The "empire-building" type, however, due to his "empire-building" ambition or other private benefits derived from the growing size of the company, will always prefer to invest regardless of its expected returns. The return of the investment is split between the manager and the monitor. For simplicity, it is assumed that the monitor's gain from the investment is proportional to his holdings in the firm, and the manager takes the rest. At the beginning of the game, there is uncertainty about the manager's type. As a result, the "empire-building" manager can blame the negative investment returns on the noise of his signal. The outside monitor, who is also an investor of the company, can choose to invest in a monitoring technology at the beginning of the game, which enables him to discover the manager's type with a non-zero probability whenever the investment turns out to be unprofitable and punish the manager. The "empire-building" manager is terminated from the game if he is discovered. There is a very small variable cost ϵ to monitor. However, the punishment the outside monitor can inflict on the manager when the type is uncertain is limited. That is, this punishment is not severe enough to deter the "empire-building" type from investing after receiving a bad signal. The monitor's objective is to maximize his expected returns.

Under certain circumstances, there exists a mixed-strategy equilibrium, in which the monitor invests positive amount in monitoring technology, and the "empire-building" type of manager invests with a probability between zero and one (exclusive) if he receives a bad signal. This model illustrates that the manager's career concerns can serve as an incentive to reduce value-decreasing investment activities, when an outside monitor has a limited ability to exert punishment under uncertainty.

An Outside Monitor

A risk-neutral outside monitor (e.g., an institutional investor holding the biggest block in a company) holds a fraction, ω, of the company. Due to various constraints, such as following an indexing strategy, or illiquidity encountered in selling block holdings, he suffers a cost to sell off his shares — he is better off holding the shares. His utility is an increasing function of the returns on investment projects the manager chooses. He can choose to invest x in a monitoring technology at the very beginning of the game, which enables him to discover the true type of the manager with a probability $f(x) \in (0, 1)$ when the investment is not profitable, and punish the manager for bad returns. The punishment is higher if he believes that the manager is more likely to be the "empire-building" type. After the initial investment in infrastructure, he can monitor with a very small variable cost ϵ.

Two Types of Managers

A risk-neutral manager of a company makes investment decisions. At the beginning of each period, the manager receives an investment opportunity. The size of the investment project is normalized to 1. If the investment is profitable, it returns R = a, if not, returns R = -a.

There are two types of managers. The objective of the good type is shareholder value maximization. The "empire-building" manager derives private benefits as a fraction of the return, B = ka ($k \geq 1$), due to his "empire-building" ambition or perks derived from the investment.

The Information Structure

The outside monitor does not know the exact type of the manager at the beginning of the game. Let $\lambda_0 \in (0,1)$ denote the monitor's estimate of the probability that the manager is good at the beginning of the first period. This is the manager's *initial reputation.* λ_0 is drawn from some cumulative distribution function $G(\lambda)$. This cumulative distribution function is assumed to be smooth and increasing, and satisfies the property that $G(0) = 0$. The manager is assumed to be aware of his initial reputation.[37]

At the beginning of each period, the manager observes a private, noisy, but informative signal $\in$ {-1,1} indicating the profitability of the investment opportunity. The signals are accurate with probability $\gamma \in (1/2, 1)$. Each signal (1 or -1) occurs with probability 1/2. The signals are the manager's private information. The accuracy of the signal is common knowledge. The monitor can only observe the manager's action $\in$ {I,N} (I — invest; N — no investment), and the outcome of the investment $\in$ {-a, a} if the manager chooses to invest. The monitor prefers the manager to invest only if

[37] For example, the initial reputation may be formed according to some commonly observable signals.

he receives a good signal.

When the investment has positive returns, the monitor's monitoring effort uncovers no new information about the manager. When the investment has negative returns, his monitoring can uncover the type of the manager with probability $f(x) \in (0, 1)$. If the manager is found to be the "empire-building" type, he will be terminated from the game. The monitor can also punish the manager for negative investment returns. This punishment is a decreasing function of λ_t.

The Game and the Definition of Equilibrium

This two-period model defines a game between the monitor and the manager. At the beginning of the game, nature chooses the type of the manager ($i \in \{b,g\}$). The shareholdings of the monitor, ω, is given exogeneously. The monitor forms a prior, λ_0, on the type of the manager and then decides whether to invest in monitoring technology and how much to invest, $x \in (0, \infty)$. Then the first period begins. The manager faces an investment project which requires investment $\tilde{S} = 1$. He observes his private noisy signal and decides whether to invest. At the end of the first period, outcome of the investment is observed. The monitor updates his assessment of the manager type and decides whether to incur the ϵ variable cost of monitoring.[38] When the investment is not profitable, he uncovers the manager type with probability $f(x)$ (after invest in the variable cost). The manager will be terminated from the second period of the game once he is discovered to be the "empire-building" type. Whether the type is discovered or not, the monitor will punish the manager for the bad outcome. The punishment, $G(\lambda_t)$, is a decreasing function of his accessment of the manager λ_t.

At the beginning of the second period, the manager again faces an investment opportunity of size 1, and observes his noisy private signal. The manager makes his investment decision. At the end of the second period, the investment outcome is

[38]This is a realistic assumption. On the other hand, this assumption helps to break the tie in the second period and simplifies the algebra considerably.

observed. Again the monitor decides whether to incur the small variable cost of monitoring. If he does, he can discover the true type of the manager with probability $f(x)$ when the investment outcome is bad, and can punish the manager in such an event. Then the game ends.

I make the following key assumptions concerning the punishment, $G(\lambda_t)$, that the outside monitor can inflict on the manager.

ASSUMPTION 1.

a) $\gamma(1 - f(x))U_b(-(1 - \omega)a, ka, G(\lambda_t)) + \gamma f(x)U_b(-(1 - \omega)a, ka, G(0))$
$+ (1 - \gamma)U_b((1 - \omega)a, ka, 0) > 0,$

b) $\gamma U_g((1 - \omega)a, 0) + (1 - \gamma)(1 - f(x))U_g(-(1 - \omega)a, G(\lambda_t))$
$+ (1 - \gamma)f(x)U_g(-(1 - \omega)a, 0) > 0.$

$U_b((1 - \omega)A, B, C)$ is the utility for the "empire-building" type of manager, when the investment returns A, he gets private benefit B, and expects to receive punishment C.

$U_g((1 - \omega)A, C)$ is the utility for the good type of manager, when the investment returns A and he expects to receive punishment C.

Assumption (a) says that when considering single period utility, the "empire-building" manager (undiscovered) always has an incentive to invest even if he receives a bad signal.

Assumption (b) says that the good manager will always invest after receiving a good signal although there is a chance that the signal may be wrong and he may be punished for a bad outcome when his type is not discovered.

A strategy for the monitor is simply a rule that specifies how much investment in monitoring technology/precision he should make at the very beginning of the game, given his prior accessment of manager type, the noise of the manager's signal, and his shareholdings.

A strategy for the manager has two components. The first is a rule that specifies his investment decision given his private signal in the first period for each type the manager might be. The second is a rule that specifies his investment decision given his private signal in the second period should his type have not been discovered.

In addition to a strategy for the monitor, I need to also specify the monitor's beliefs about the type of the manager, which will depend on the manager's initial reputation and the manager's first-period record.

A perfect Bayesian equilibrium of this game consists of a strategy for the manager, a strategy and beliefs for the monitor that satisfy three properties. First, the monitor's beliefs are consistent with the manager's strategy in the sense that they are generated by Bayes updating whenever possible. Second, the monitor's strategy is optimal given his beliefs and the strategy of the manager. Third, the manager's strategy is optimal given the monitor's beliefs and strategy.

2.3 Equilibrium and Improvement in Investment Efficiency

This section solves for the equilibrium of the game by backward induction and analyzes the manager's equilibrium investment choices.

Second-Period Behavior of the Manager

The good manager will invest only if the expected return is positive. The noisy signal is informative — it is accurate with a probability larger than 1/2. Given assumption 1.b, the good manager will invest only if he receives a good signal. His expected utility is,

$$E[V_{g,t2}] = (1/2)((2\gamma - 1)(1-\omega)a - (1-\gamma)(1-f(x))G(\lambda_t)).$$

The strategy of the "empire-building" manager is different. When he is not discovered, by assumption 1.a, his current utility is positive if he invests with a bad signal. There are no more future periods. So the "empire-building" manager has no concern for termination at this last period, and will invest regardless of his signal. His expected utility, given his reputation entering this period λ_1, if the monitor decides to punish bad outcomes,

$$E[V_{b,\lambda_1,t2}] = \frac{1}{2}[(1-f(x))U_b(-(1-\omega)a, ka, G(\lambda_2)) + f(x)U_b(-(1-\omega)a, ka, G(0)) + U_b((1-\omega)a, ka, 0)],$$

and if the monitor gives up punishing,

$$E[V_{b,\lambda_1,t2}] = \frac{1}{2}(U_b(-(1-\omega)a, ka, 0) + U_b((1-\omega)a, ka, 0)).$$

If the "empire-building" type was discovered during the previous period, he is terminated from the game. His expected utility will be zero in the second period.

Behavior of the monitor

The monitor's strategy is to determine how much to invest in monitoring at the beginning of the game. Larger investment in monitoring technology increases the likelihood of discovering the manager type in the event of bad returns. A sufficient probability of being discovered will discourage the "empire-building" manager from investing with the bad signal. The gain from his monitoring is the improved investment efficiency from the "empire-building" type of the manager.

Entering the second period, the monitor is fully aware of the "empire-building" type's strategy. The threat of termination is no longer real because this is the last period of the game. The threat of punishment will not improve the expected returns for the monitor, while the monitoring effort will cost him ϵ. Thus, the monitor will choose not to monitor and punish in the second period.

During the first period, whether the monitor is willing to spend the ϵ variable cost depends on whether he can expect to gain from monitoring. At the beginning of the game, if the monitor invests in monitoring technology, his gain is the expected improvement of investment efficiency in the first period from the "empire-building" type, and his cost is the cost of the technology plus the first-period variable cost. How much to spend on monitoring technology is determined through his utility maximization function,

$$\underset{x}{\mathcal{MAX}} \ \tfrac{1}{2}\omega a(\lambda_0(1+\delta)(2\gamma-1)+(1-\lambda_0)(2\gamma-1)(1-p))-\epsilon-x,$$

with the participation constraint,

$$\tfrac{1}{2}\omega a(1-\lambda_0)(2\gamma-1)(1-p)-\epsilon-x\geq 0,$$

where δ is the discount rate, λ_0 is the monitor's initial accessment of the manager, p is the probability of the "empire-building" type investing with a bad signal in the first period, and x is the cost of monitoring technology.

The first order condition is,

$$\frac{1}{2}\omega a(1-\lambda_0)(2\gamma-1)\frac{dp}{dx}+1=0. \tag{2}$$

The Manager's First-Period Behavior and the Monitor's Beliefs

Again, the good manager will invest only if he receives a good signal. Our attention is focused on the "empire-building" manager. We want to know when there will be improvement in investment efficiency, i.e., when the "empire-building" type will not invest if he receives a bad signal.

When the "empire-building" manager receives a bad signal at the beginning of the first period, his expected total payoff from investing will be,

$$\begin{aligned} E[V_b(-1, I, \lambda_0)] &= \gamma(1 - f(x))U_b(-(1 - \omega)a, ka, G(\lambda_1)) \\ &\quad + \gamma f(x)U_b(-(1 - \omega)a, ka, G(0)) \\ &\quad + (1 - \gamma)U_b((1 - \omega)a, ka, 0) + \delta(1 - \gamma f(x))E[V_{b,\lambda_1,t2}], \end{aligned}$$

and his expected payoff from not investing will be,

$$E[V_b(-1, N, \lambda_0)] = 0 + \delta E[V_{b,\lambda_1,t2}].$$

If

$$E[V_b(-1, I, \lambda_0) > E[V_b(-1, N, \lambda_0)],$$

then the "empire-building" manager will always invest when receiving a bad signal; and if

$$E[V_b(-1, I, \lambda_0) < E[V_b(-1, N, \lambda_0)],$$

then the "empire-building" manager will never invest when receiving a bad signal; and if

$$E[V_b(-1, I, \lambda_0) = E[V_b(-1, N, \lambda_0)], \tag{3}$$

then the "empire-building" manager can play a mixed strategy — he will invest with probability p ∈ (0, 1) when receiving a bad signal.

Given that the "empire-building" manager follows a mixed-strategy in the first period if he receives a bad signal — he invests with probability $p > 0$, the monitor observes the first period outcome and updates his belief.

The monitor can not observe the signal. He only observes whether the manager invests, and the investment outcome. His belief evolves according to Bayes's rule.

$\lambda_1(\lambda_0, I, -a) = \frac{\lambda_0}{\lambda_0+(1-\lambda_0)(p\frac{\gamma}{1-\gamma}+1)}$,

$\lambda_1(\lambda_0, I, a) = \frac{\lambda_0}{\lambda_0+(1-\lambda_0)(p\frac{1-\gamma}{\gamma}+1)}$,

$\lambda_1(\lambda_0, N) = \frac{\lambda_0}{\lambda_0+(1-\lambda_0)(1-p)}$.

Note that the manager's reputation improves only if there is no investment. It deteriorates less when the investment is profitable.

The possible equilibria are:

- the monitor does not invest in monitoring technology and the "empire-building" type invests regardless of his signals;
- the monitor invests positive amount in monitoring technology, and the "empire-building" manager plays a mixed strategy — invests with a probability less than one if receiving a negative signal in the first period.
- the monitor invests positive amount in monitoring technology, and the "empire-building" manager invests only if he receives a good signal.

The second and the third equilibria are the ones of interest. The second one predicts limited improvement of investment efficiency given noisy signals and uncertainty of the type of the manager.

Linear Utilities

To analyze equilibrium properties, it is necessary to assume functional forms for U_b, $f(x)$, and $G(\lambda_t)$, which satisfied assumption 1. The manager is assumed to be risk neutral, his utility is linear in its three components,

$U_b((1-\omega)a, ka, 0) = (1-\omega)a + ka$, and

$U_b(-(1-\omega)a, ka, G(x)) = -(1-\omega)a + ka - G(x)$.

f(x) is a concave function in x, which reflects diminishing returns,

$f(x) = \frac{bx}{1+bx}$,

where b is the monitoring efficiency of the monitor. Higher b means that the monitor is more efficient at its monitoring effort.

$G(\lambda_t)$ is decreasing in λ,

$G(\lambda_t) = \frac{(1-\lambda_t)(k+(1-\omega)(1-2\gamma))a}{\gamma}$.

Proposition 1: Under the assumption of risk-neutral manager with linear utility, the mixed-strategy equilibrium is,

$$x = \frac{\sqrt{a\omega\lambda(k-(1-\omega)(2\gamma-1))(1-\gamma)(2\gamma-1)}}{\gamma\sqrt{2bk\delta}},$$

$$p = \frac{\sqrt{2\lambda(1-\gamma)(k-(1-\omega)(2\gamma-1))}}{\gamma(1-\lambda)\sqrt{abk\omega\delta(2\gamma-1)}} - \frac{1-\gamma}{\gamma(1-\lambda)},$$

where $p \in (0,1)$, and the monitor's participation constraint is satisfied,

$$\frac{1}{2}\omega a(2\gamma-1)(1-\lambda_0)(1-p) - \epsilon - \frac{\sqrt{a\omega\lambda(k-(1-\omega)(2\gamma-1))(1-\gamma)(2\gamma-1)}}{\gamma\sqrt{2bk\delta}} \geq 0.$$

Proof in Appendix B.

To obtain the pure-strategy equilibrium in which p = 0, the monitor only needs to choose the minimum level of x that deters the "empire-building" type from investing with bad signals, and that satisfies his participation constraint,

$$x = \frac{\lambda(k-(1-\omega)(2\gamma-1))}{bk\gamma\delta}.$$

In the other pure-strategy equilibrium where p = 1, monitor does not invest in monitoring. This occurs when the "empire-building" type's expected return is always higher from investing when he receives a bad signal. It also occurs when the monitor's participation constraint is not satisfied.

2.4 Comparative Statics

In this section, we look at how the changes in the following parameters affect the equilibrium outcome,

1. λ — the manager's initial reputation;
2. γ — the accuracy of the manager's private signal;
3. δ — the discount rate;
4. k — the private benefit ratio for the "empire-building" manager;
5. a — the rate of return on the investment;
6. b — monitoring efficiency, which is monitor-specific;
7. ω — the monitor's share of the investment.

2.4.1 Manager's initial reputation

Proposition 2:

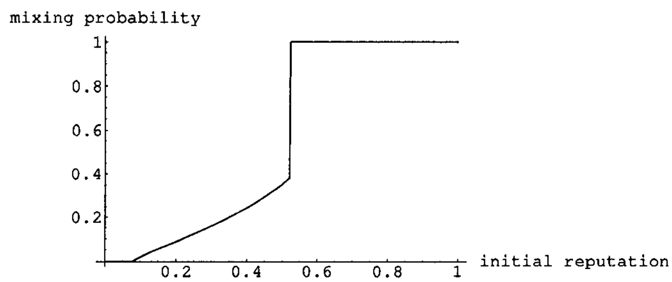
$$\frac{dx}{d\lambda} = \frac{\sqrt{a\omega(k-(1-\omega)(2\gamma-1))(1-\gamma)(2\gamma-1)}}{2\gamma\sqrt{2bk\delta\lambda}} > 0,$$

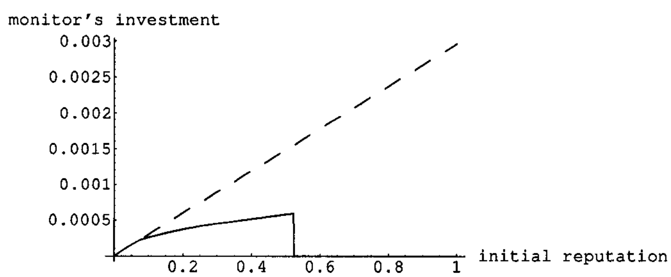
$$\frac{dp}{d\lambda} = \frac{(1+\lambda)\sqrt{(k-(1-\omega)(2\gamma-1))(1-\gamma)}}{\gamma(1-\lambda)^2\sqrt{2abk\omega\delta\lambda(2\gamma-1)}} - \frac{1-\gamma}{\gamma(1-\lambda)^2} > 0.$$

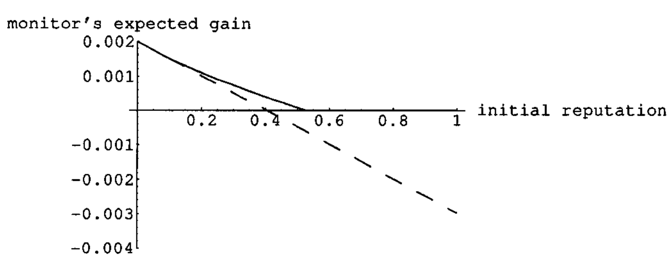
Proof in Appendix B.

As the manager's initial reputation rises, the expected punishment for the "empire-building" manager if he invests in the first period after receiving a bad signal decreases. He has more incentive to invest, hence the probability of investing increases with his initial reputation. The monitor expects the "empire-building" type's strategy. In equilibrium, his investment in monitoring technology also increases with the initial reputation. A higher rate of discovery is required to deter the "empire-building" type from investing for sure when his initial reputation is higher.

The following figures present the "empire-building" manager and the monitor's strategies, and the monitor's expected net profit from monitoring, given $\gamma = 0.9$, k=1, $\delta = 0.9$, a=0.1, b=100, $\omega = 0.05$, and $\epsilon = 0.000001$





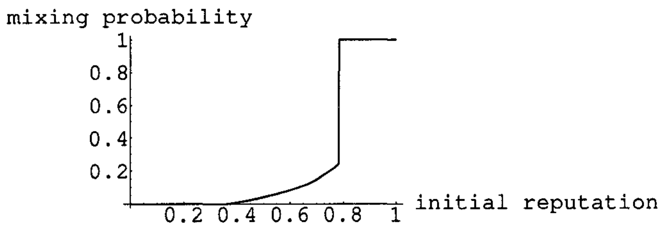


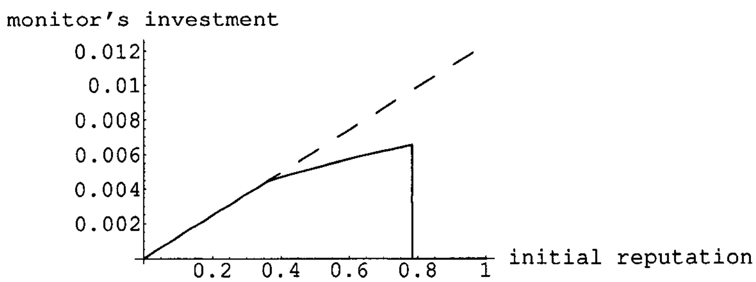
The dashed line in the second figure represents the investment required to deter the "empire-building" manager from investing with a bad signal at all, and in the third one represents the corresponding expected gain. The required investment in monitoring increases as the initial reputation of the manager improves. When the monitor assesses a high enough probability for the manager to be the good type, he will actually give up monitoring as his expected gain is no longer greater than the cost of monitoring. When the monitor does not invest in monitoring technology, the "empire-building" type of manager knows that there is no monitoring and he will invest all the time regardless of his signals. Thus when the "empire-building" type is well disguised, we will have the worst case senario.

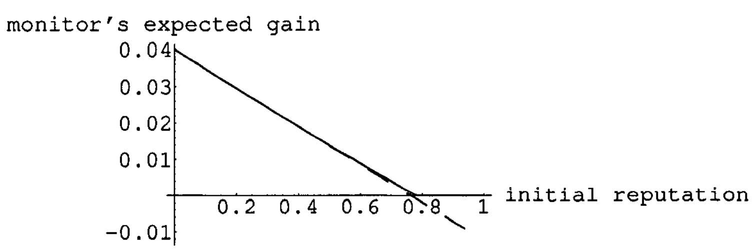
As the initial reputation of the manager improves, the expected gain from monitoring, which equals $\frac{1}{2}\omega a(1-\lambda_0)(2\gamma-1)(1-p)$, decreases as both λ_0 and p increase. This can be interpreted as the additional cost due to uncertainty. Both the actual monitoring cost and the "uncertainty" cost grow with the increase in λ_0.

When his initial reputation is too low, the "empire-building" manager will give up investing when receiving a bad signal, because the expected punishment from a bad outcome is too severe. As his reputation improves, he starts to invest with a larger and larger probability. In this case, when his initial reputation reaches the level λ=0.5235, the monitor actually gives up monitoring, as the expected return from doing so is no longer positive. So we observe the jump of the "empire-building" type's strategy from p=0.3829 to p=1.

When the monitor's share rises, it is still possible for him to give up monitoring when his estimate of the manager is good enough. For parameter values: $\gamma = 0.9$, k=1, $\delta = 0.9$, a=0.1, b=100, $\omega = 1$, and $\epsilon = 0.000001$, the following figures present the "empire-building" manager and the monitor's strategies, and the monitor's expected net profit from monitoring.







Romano (1993) and others have argued that the managers for public pension funds can be politically motivated. In the setting of this model, this political motivation can be good. If the fund manager prefers to monitor in order to establish his political capital, as monitoring activity improves his image, he may do so even if the net profit for the fund is non-positive. Thus we are able to avoid the equilibria in which the monitor gives up monitoring ex ante when the manager's initial reputation is good enough. Although the monitor may lose as his net profit from monitoring is negative, the overall welfare can be improved as the ex ante bad investments can be reduced.

2.4.2 Accuracy of the signal

As the accuracy of the signal changes,

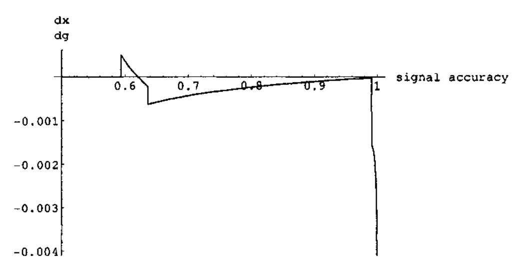
$$\frac{dx}{d\gamma} = -\frac{(k(3\gamma-2)-(2-5\gamma+4\gamma^3)(1-\omega))\sqrt{a\lambda\omega}}{2\gamma^2\sqrt{2bk\delta(k-(1-\omega)(2\gamma-1))(1-\gamma)(2\gamma-1)}},$$

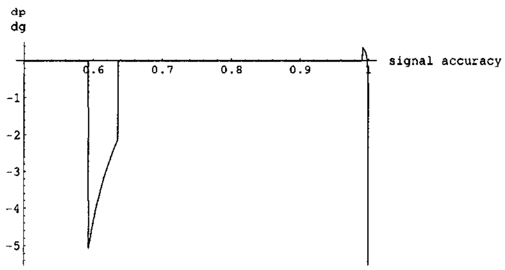
$$\frac{dp}{d\gamma} = \frac{1}{\gamma^2(1-\lambda)} + \frac{(k(2-7\gamma+4\gamma^2)+(2\gamma-1)^2(2-\gamma)(1-\omega))\sqrt{\lambda(1-\gamma)}}{\gamma^2(1-\lambda)(1-\gamma)\sqrt{(2\gamma-1)^3}\sqrt{2abk\omega\delta(k-(1-\omega)(2\gamma-1))}}.$$

Proposition 3: When the participation constraint is satisfied, x increases with γ initially when the signal is noisy, then decreases with γ once the signal is accurate enough. p changes with γ non-linearly.

Proof in appendix.

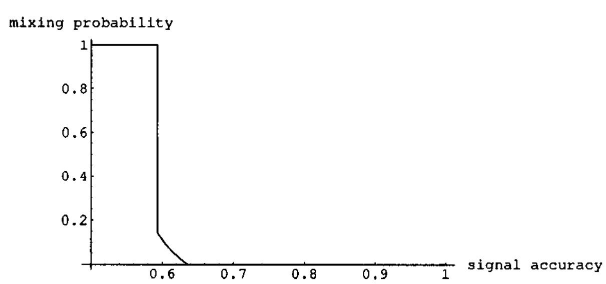
Choosing reasonable values for relevant parameters, $\lambda = 0.03$, k=1, $\delta = 0.9$, a=0.1, b=100, $\omega = 0.05$, and $\epsilon = 0.000001$, we find the relation between the two derivatives and γ in equilibria as such,

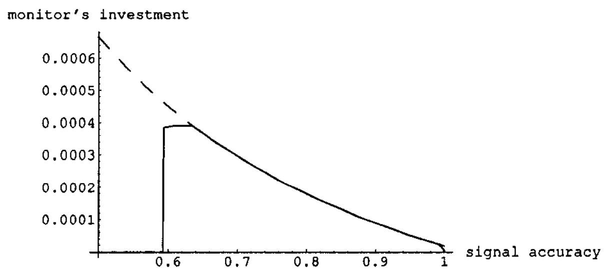


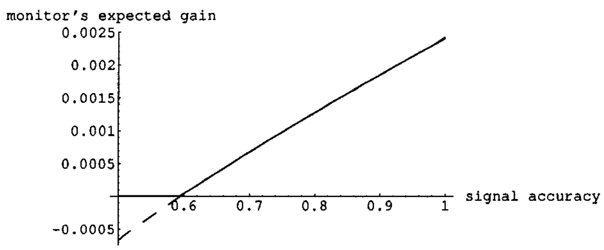


When the initial reputation of the manager is very low, monitor's investment in monitoring technology first rises as signal quality improves, then decreases as the signal quality improves further. The "empire-building" manager's mixing probability decreases with the improvement of signal quality. As the signal becomes more accurate, the "empire-building" type finds it more difficult to blame bad investment outcomes on the error in his signals. On the other hand, more accurate signal means lower level of monitoring coming from the monitor. When the signal becomes accurate enough, the level of monitoring is so low that the "empire-building" type finds it to be optimal to increase the probability of investing with a bad signal.

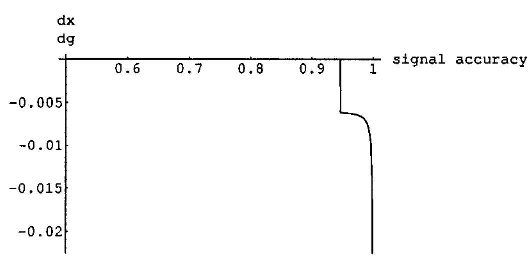
The following figures present the "empire-building" manager and the monitor's strategies, and the monitor's expected net profit from monitoring, given the parameter values: $\lambda = 0.03$, k=1, $\delta = 0.9$, a=0.1, b=100, $\omega = 0.05$, and $\epsilon = 0.000001$.

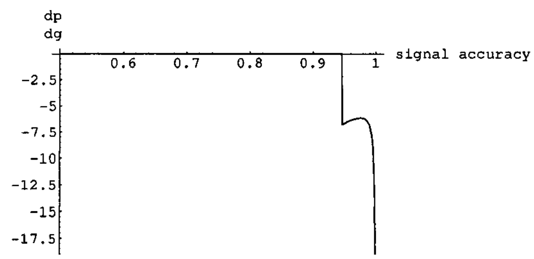




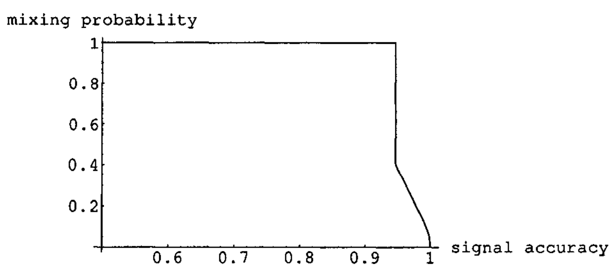


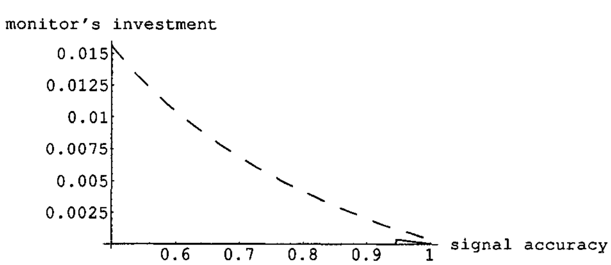
The story is a little different when the manager's initial reputation is higher. For example, for parameter values such as, $\lambda = 0.07$, k=1, $\delta = 0.9$, a=0.1, b=100, $\omega = 0.05$, and $\epsilon = 0.000001$, we find the relation between the two derivatives and γ in equilibria as such,

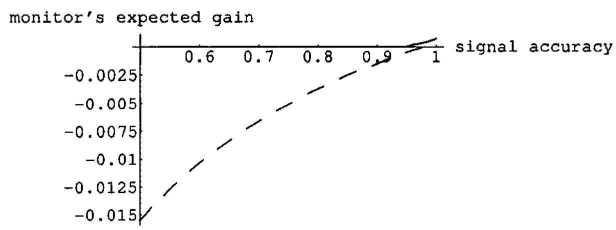




The monitor will not invest in fixed monitoring cost unless the signal is sufficiently accurate. As the signal becomes more accurate, the continuation into the second period becomes more valuable to the "empire-building" type. Thus he has an incentive to avoid being caught in the first period. In this region, the monitor is able to reduce his investment in monitoring in equilibrium, capitalizing on the "empire-building" type's own incentive.







Again the dashed line represents the amount of investment required to prevent the "empire-building" type from investing in first period with a negative signal, and its corresponding expected gain for the monitor.

2.4.3 Discount rate

Proposition 4:

$$\frac{dx}{d\delta} = -\frac{\sqrt{a\omega\lambda(k-(1-\omega)(2\gamma-1))(1-\gamma)(2\gamma-1)}}{2\gamma\sqrt[3]{\delta}\sqrt{2bk}} < 0,$$

$$\frac{dp}{d\delta} = -\frac{\sqrt{\lambda(1-\gamma)(k-(1-\omega)(2\gamma-1))}}{\gamma(1-\lambda)\sqrt[3]{\delta}\sqrt{2abk\omega(2\gamma-1)}} < 0.$$

Both derivatives are negative. The intuition is straightforward. As the discount rate increases, the second period becomes more and more valuable. Thus the "empire-building" type has more incentive to invest with a smaller probability during the first period when the signal is bad, so the chance that he would be caught and terminated from the second period is smaller. Since the expected gain from the second period increases, the amount of monitor investment, which is required by the equilibrium to make the "empire-building" type indifferent between investing and not investing with a bad signal in the first period, is also reduced. Thus the "empire-building" type's own incentive prevents him from more frequent investment and reduces the burden on the monitor.

2.4.4 Private benefit from investment for the "empire-building" manager

Proposition 5:

$$\frac{dx}{dk} = \frac{(1-\omega)\sqrt[3]{2\gamma-1}\sqrt{a\lambda\omega(1-\gamma)}}{2\gamma\sqrt[3]{k}\sqrt{2b\delta(k-(1-\omega)(2\gamma-1))}} > 0,$$

$$\frac{dp}{dk} = \frac{(1-\omega)\sqrt{\lambda(2\gamma-1)(1-\gamma)}}{\gamma(1-\lambda)\sqrt[3]{k}\sqrt{2ab\omega\delta(k-(1-\omega)(2\gamma-1))}} > 0.$$

Both derivatives are positive. In equilibrium, when the private benefit increases, the "empire-building" manager has more incentive to invest during the first period, thus the amount of investment in monitoring technology also increases. For the "empire-building" manager, the higher probability of being caught counter-balances the higher gain from investing with a bad signal.

2.4.5 Return on investment

Proposition 6:

$$\frac{dx}{da} = \frac{\sqrt{\omega\lambda(k-(1-\omega)(2\gamma-1))(2\gamma-1)(1-\gamma)}}{2\gamma\sqrt{2abk\delta}} > 0,$$

$$\frac{dp}{da} = -\frac{\sqrt{\lambda(1-\gamma)(k-(1-\omega)(2\gamma-1)}}{\gamma(1-\lambda)\sqrt[3]{a}\sqrt{2bk\omega\delta(2\gamma-1)}} < 0.$$

When the investment return increases, it becomes more profitable to monitor. It is optimal for the monitor to invest more in technology. The investment return also affects the "empire-building" type's utility. The expected gain from the second period increases while the gain from investing with a bad signal in the first period decreases as the likelihood of being caught goes up. The "empire-building" type has less incentive to invest with a bad signal, hence the probability of investment decreases with the investment return.

2.4.6 Monitoring efficiency

Proposition 7:

$$\frac{dx}{db} = -\frac{\sqrt{a\omega\lambda(k-(1-\omega)(2\gamma-1))(2\gamma-1)(1-\gamma)}}{2\gamma\sqrt[3]{b}\sqrt{2k\delta}} < 0,$$

$$\frac{dp}{db} = -\frac{\lambda(1-\gamma)(k-(1-\omega)(2\gamma-1))}{\gamma(1-\lambda)\sqrt[3]{b}\sqrt{2ak\omega\delta(2\gamma-1)}} < 0.$$

When the monitor can monitor/screen more efficiently, he can invest less to achieve the same rate of discovery. On the other hand, a bigger threat of being discovered reduces the "empire-building" type's investment probability when he receives a bad signal.

2.4.7 Monitor shareholdings

Proposition 8:

$$\frac{dx}{d\omega} = \frac{\sqrt{a\lambda(k-(1-\omega)(2\gamma-1))(2\gamma-1)(1-\gamma)}}{2\gamma\sqrt{2bk\omega\delta}} > 0,$$

$$\frac{dp}{d\omega} = -\frac{\sqrt{\lambda(1-\gamma)}(1+k-2\gamma)}{\gamma(1-\lambda)\sqrt[3]{\omega}\sqrt{2abk\delta(2\gamma-1)(k-(1-\omega)(2\gamma-1))}} < 0.$$

When the monitor has a bigger stake in the investment, his return from monitoring increases. It is optimal for him to invest more in monitoring technology. The "empire-building" type has to reduce his probability of investment due to a higher rate of discovery.

2.5 Two Monitors

An extension to the model is the case with multiple monitors. We consider the two-monitor symmetric case, i.e., two outside shareholders with the same amount of shareholdings and monitoring technology. We also assume that both monitors make decisions simultaneously, and the discovery of the true type of the manager is based on the joined effort of the two monitors. If monitor A invests x_a in monitoring technology and monitor B invests x_b in monitoring technology, then the true type of the manager is revealed by the probability $f(x_a, x_b) = \frac{b(x_a+x_b)}{1+b(x_a+x_b)}$ when the investment is unprofitable.

Proposition 9: The two monitors split the cost of monitoring. There are many equilibria. In the mixed-strategy equilibria,

$$x_a + x_b = \frac{\sqrt{a\omega\lambda(k-(1-\omega)(2\gamma-1))(1-\gamma)(2\gamma-1)}}{\gamma \sqrt{2 \quad b \quad k \quad \delta}}, \; p = \frac{\sqrt{2\lambda(1-\gamma)(k-(1-\omega)(2\gamma-1))}}{\gamma(1-\lambda)\sqrt{abk\omega\delta(2\gamma-1)}} - \frac{1-\gamma}{\gamma(1-\lambda)},$$

where $p \in (0, 1)$, and the monitors' participation constraints are satisfied,

$$\tfrac{1}{2}\omega a(2\gamma - 1)(1 - \lambda_0)(1 - p) - \epsilon - x_a \geq 0, \; \tfrac{1}{2}\omega a(2\gamma - 1)(1 - \lambda_0)(1 - p) - \epsilon - x_b \geq 0.$$

In the equilibria where p = 0,

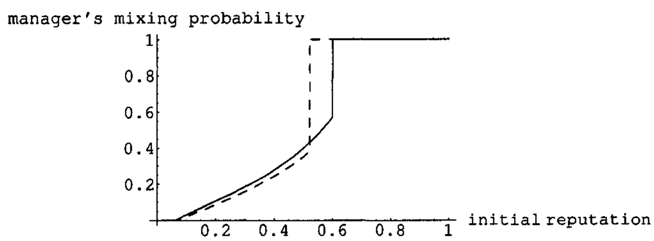
$$x_a + x_b = \frac{\lambda(k-(1-\omega)(2\gamma-1))}{bk\gamma\delta},$$

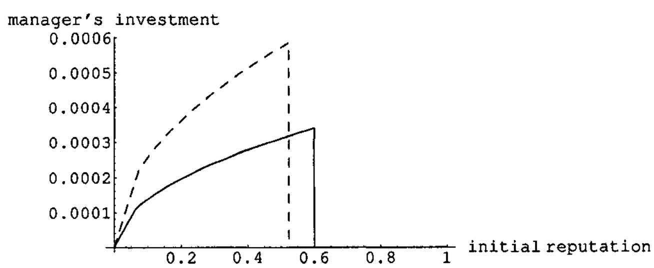
where the monitors' participation constraints are also satisfied.

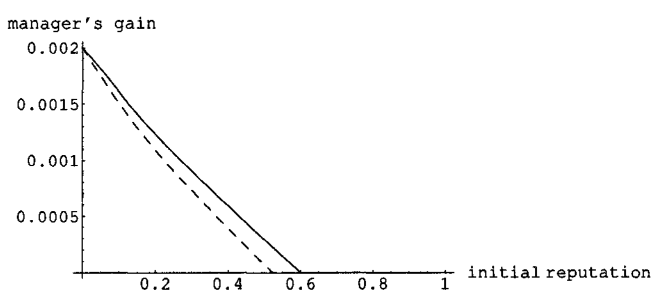
There are also equilibria where p = 1 and neither of the two monitors invest in monitoring technology.

Proof in Appendix B.

When the two monitors cooperate and split the cost of monitoring, monitoring takes place for regions where it is given up in the single-monitor case. The following figures compares the equilibrium outcome between the two cases, assuming that the two monitors split evenly the cost of monitoring. The solid line represents the outcome in the two-monitor case, and the dashed line represents the outcome in the single-monitor case. For the figures on monitor investment and gain, it represents the amount of investment and net profit from monitoring for one monitor. The parameter values are: $\gamma = 0.9$, k=1, $\delta = 0.9$, a=0.1, b=100, $\omega = 0.05$, and $\epsilon = 0.000001$.







In this example, since the cost of monitoring born by each monitor is reduced, we observe monitoring in some regions of parameter values where no monitoring occurs in the single-monitor case. However, there are many equilibria in which the monitors share the cost differently, and it is also an equilibrium in which only one monitor bear the full cost. How to coordinate their monitoring effort can be problematic.

2.6 Empirical Implications

The model predicts that under certain conditions, the presence of an effective monitor will reduce overinvestment. This aspect of the model is tested empirically by examing firms' M&A activity. The initial sample is drawn from the Execucomp data base. This data base lists each firm in the S&P 1500 (S&P 500, S&P Midcap 400, and S&P Small-Cap 600). Corporate financial information is obtained from COMPUSTAT and stock performance data is from CRSP. The sample is limited to securities identified by CRSP as ordinary common shares (with share codes 10, 11 or 12),[39] and excludes utilities, finance and insurance companies, and government agencies (2-digit SIC code 49, from 60 to 69, and above 89). Finally, I drop firms with December market capitalization less than one-hundredth the level of the S&P 500 index. Mergers and acquisitions information is obtained from the SDC domestic M&A database. To be included in my study, a deal has to be completed, with an acquisition of 100% of the target. The total number of M&A deals increases by 132 when considering deals in which acquirers acquired majorities of the targets. The results of the study do not change materially if the criterion of M&A deal inclusion is majority ownership of targets instead of 100% ownership. Both disclosed value and non-disclosed value deals are included, but disclosed value deals must have a value of at least 1 million. The final M&A data contains both public and private targets (from July 1993 to June 2001). The details of the data are discussed in Chapter 1.

Institutional ownership data is obtained from Thomson Financial. 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.

[39]This excludes American Depository Receipts, closed-end-funds, primes and scores, and Real Estate Investment Trusts.

Institutions which have involved in proxy proposal targeting are identified to be active monitors. These are: California Public Employees Retirement System, California State Teachers Retirement System, College Retirement Equities Fund, Florida State Board of Administration, New York State Common Retirement Fund, and State of Wisconsin Investment Board.

The fact that these institutions have been involved in corporate governance activity can be interpreted as their investment in monitoring in the fixed cost component. The model predicts that the presence of these institutions will reduce at least partially managerial-incentive-driven investment activity.

Table 19 presents the random effects logistic regression results.[40] The presence of an activist block holder reduces m&a likelihood by 7.02%, at the significance level of 5%. The regression also controls for other relevant variables. The governance index in Gompers, Ishii, and Metrick (2003) is included to control for firm-level governance provisions. Managerial incentives variables(such as insider stock ownership, CEO cash compensation, and CEO options), firm characteristics variables (such as prior m&a activity, firm leverage ratio, cash flow ratio, firm size, q ratio, capital expenditures ratio, and firm prior stock performance), industry characteristics (industrial concentration), and year dummies are also included in the analysis. Chapter 1 provides detailed explanation and summary statistics on these variables.

The model developed in this study provides a theoretical explanation for the empirical foundings documented in Chapter 1. Public pension funds, especially the activist funds reported in Table 19, have been very active in monitoring corporate governance for more than a decade. Having invested in the initial fixed cost, their current cost of monitoring may be much smaller, and their presence deters value-reducing activity by the management. Furthermore, Romano (1993) and others argue that public pension managers can be political motivated. In the settings of this model, one implication of this argument is that public pension funds may engage in monitoring activity to

[40]Chapter 1 provides a detailed analysis on this methodology.

accumulate political capital even if such activity is not optimal for the funds. Other shareholders benefit as an outcome. The overall welfare are very likely to be improved.

In the extension of the two-monitor case, there exists many equilibria. Thus coordination between the two monitors may be problematic if communication is not easy. One possible solution is for one monitor to buy out the other's holdings, paying a price that reflects the future improvement in investment efficience. The implication of this solution is little overlap of block holdings by those activist institutions. Table 20 reports this distribution of block holdings in CRSP firms from year 1980 to year 2000. Although the number of firms those activist institutions hold increases from 359 to 3,322 during this period, very rarely two activist institutions have block holdings (2% or 5%) in the same firm.

Other major predictions of the model are,

1. Managers with private incentives will behave earlier in their career due to their reputation concerns. Such concern no longer exists when they are at the later stages of their career or close to retirement. Controlling for external monitoring and managerial ability, the model predicts worse investment decisions by older CEOs.

2. Managers with private incentives yet higher reputation faces less outside monitoring, and will more likely invest in negative NPV projects.

These predictions remain to be tested.

2.7 Conclusion

This chapter develops a model of outside monitoring of investment decisions under uncertainty. It demonstrates that limited improvement in investment efficiency is an equilibrium outcome. Although outside monitoring can improve investment efficiency under information asymmetry, this improvement is facilitated by managers' own reputation concerns, and the monitor can not induce efficient outcome when managers no longer have reputation concerns. This difficulty will also exist for any internal monitoring mechanism. However, some weakness of outside monitoring does not apply to internal monitoring such as monitoring by the board. For example, this study highlights the possibility that an outside monitor may not monitor even if it controls a substantial block of the firm. This possibility arises when the expected gain from monitoring no longer exceeds the cost of monitoring. This weakness of outside monitoring suggests that it can not be substitute for monitoring by the board. Thus the proper governance structure to enable effective board monitoring is especially important.

2.8 Appendix B

Proof of Proposition 1:

The indifference condition for the "empire-building" manager to play mixed-strategy is,

$$(k+(1-\omega)(1-2\gamma))(1-\frac{bx}{1+bx}-\frac{1-\lambda_1}{1+bx})=\delta\gamma k\frac{bx}{1+bx} \tag{4}$$

Solving for the system of equation 1 and equation 3, we have the mixed-strategy equilibrium. There are two roots for x, one positive and the other negative. Obviously the negative root does not make economic sense.

Proof of Proposition 2:

It is obvious that $\frac{dx}{d\lambda}$ is positive.

In the mixed equilibrium,

$p=\frac{\sqrt{2\lambda(1-\gamma)(k-(1-\omega)(2\gamma-1))}}{\gamma(1-\lambda)\sqrt{abk\omega\delta(2\gamma-1)}}-\frac{1-\gamma}{\gamma(1-\lambda)}>0$

hence $2\sqrt{\lambda}\sqrt{k-(1-\omega)(2\gamma-1)}-\sqrt{2abk\omega\delta\lambda(1-\gamma)(2\gamma-1)}>0$

for $\lambda\in[0,1]$, $1+\lambda\geq 2\sqrt{\lambda}$, thus,

$(1+\lambda)\sqrt{k-(1-\omega)(2\gamma-1)}-\sqrt{2abk\omega\delta\lambda(1-\gamma)(2\gamma-1)}>0$

$\Longrightarrow \frac{dp}{d\lambda}>0$

Proof of Proposition 3:

If $(2-5\gamma+4\gamma^3)(1-\omega)-k(3\gamma-2)>0$, then $\frac{dx}{d\gamma}$ is positive. Since $-k(3\gamma-2)>0$ when $\gamma\in(0.5,\frac{2}{3})$, and $(2-5\gamma+4\gamma^3)(1-\omega)=0$ when $\gamma=0.5$, the sum of the two is positive when γ is sufficiently small.

When k=1 and ω=0.05, $\frac{dx}{d\gamma}>0$ if $\gamma\in(0.5,0.620192)$, and $\frac{dx}{d\gamma}<0$ if $\gamma\in(0.620192,1)$.

Proof of Proposition 9:

Each monitor maximizes his utility function,

$$\underset{x_i}{\mathcal{MAX}}\ \tfrac{1}{2}\omega a(\lambda_0(1+\delta)(2\gamma-1)+(1-\lambda_0)(2\gamma-1)(1-p))-\epsilon-x_i,$$

with the participation constraint,

$$\tfrac{1}{2}\omega a(1-\lambda_0)(2\gamma-1)(1-p)-\epsilon-x_i \geq 0.$$

In the mixed-strategy equilibria, since the amount of investment x_i is the utility maximizing value, neither monitor will want to deviate given the amount that the other monitor invests.

In equilibria where p=0, if one monitor reduces his investment by α, then the "empire-building" manager can no longer be kept from investing with a bad signal, $p > 0$. The reduction in expected utility due to the non-zero p is,

$$\frac{\omega abk\delta(1-\gamma)(2\gamma-1)\alpha}{2\lambda(k-(1-2\omega)(2\gamma-1))-2kb\gamma\delta\alpha}.$$

Given reasonable parameters, the decrease in the monitor's expected utility due to the increase in p is greater than the decrease in the cost of monitoring. Thus no monitor has incentive to deviate in these equilibria.

Table 19: Likelihood of M&A and Outside Monitoring

This table reports the marginal effects and P-values from random effects logistic regressions. Marginal effects at means are obtained by assuming the random effect u=0 and are reported as percentages. For a dummy variable, marginal effect reflects the change in probability when the value of the variable increases from 0 to 1. The intercepts are not reported in this table. The details of the data are discussed in Chapter 1.

Dependent variable — 1=m&a; 0=no m&a	
5% block of activist institutions	−7.02
	(0.030)
5% block of non-activist institutions	4.80
	(0.002)
Shareholder Rights	
Governance Index	0.49
	(0.074)
Managerial Incentives	
Insider ownership	−0.22
	(0.018)
CEO salary and bonus	0.98
	(0.268)
CEO options	0.08
	(0.001)
Firm Characteristics	
Prior M&A +ve	20.77
announcement return	(0.000)
Prior M&A -ve	18.52
announcement return	(0.000)
Leverage ratio	−0.08
	(0.029)
Cash flow ratio	0.08
	(0.099)
Size	3.06
	(0.000)
q ratio	1.58
	(0.000)
Capital expenditures ratio	−0.64
	(0.000)
Prior Performance	
CAR, benchmark	0.08
	(0.000)
Industry Characteristics	
Ln(industrial concentration)	−0.36
	(0.676)
Year Dummies	Yes
Observations	6,693
Number of firms	1,363

Table 20: Distribution of Blockholding among Activist Institutions

This table reports the distribution of 2% and 5% blockholdings among CRSP firms by year. The holding data are for the activist institutions, which include: California Public Employees Retirement System, California State Teachers Retirement System, College Retirement Equities Fund, Florida State Board of Administration, New York State Common Retirement Fund.

Year	Total # of firms	# of firms with 2% blockholder(s)	# of firms with only one 2% blockholder	# of firms with 5% blockholder(s)	# of firms with only one 5% blockholder
1980	359	143	135	1	1
1981	423	156	140	1	1
1982	797	140	123	1	1
1983	1,005	130	122	1	1
1984	1,236	136	133	12	12
1985	1,446	207	195	19	19
1986	1,502	235	225	21	21
1987	3,338	302	289	62	62
1988	3,444	422	379	105	105
1989	3,110	353	331	146	143
1990	3,169	380	353	171	168
1991	3,264	498	456	178	176
1992	3,456	557	503	220	217
1993	2,060	611	539	182	179
1994	2,244	623	572	182	182
1995	4,493	701	616	182	182
1996	3,170	570	531	154	154
1997	3,233	521	493	170	169
1998	3,349	390	384	159	157
1999	3,433	318	305	135	133
2000	3,322	255	248	128	127

3 Industry Conditions in Initial Public Offers (with Gerard Hoberg)

Introduction

This chapter shows that industry-specific conditions can predict (1) initial IPO returns, (2) long-term post-IPO stock performance, and (3) IPO volume. After controlling for firm size and other items known to predict initial returns, we find that industries in the top quartile based on the initial returns of their past IPOs experience future IPOs that are 13.1% (7.2% excluding the technology bubble) more underpriced than IPOs in the lowest quartile industries. In addition, industries in the hottest quartile based on a proxy for recent industry "temperature" experience future IPOs that are 13.2% (5.6% excluding the technology bubble) more underpriced than IPOs in the coldest quartile industries. Both industry effects are economically large and are first documented in this study. Both are also unique as neither can be explained by existing variables known to predict initial returns. Although we document that many industry characteristics can predict initial IPO returns, long-term IPO performance, and IPO volume in cross section, our results relating to industry concentration and industry leverage are perhaps most novel. After controlling for systematic risk, industries in the highest industry concentration quartile experience future IPOs that underperform those in the lowest concentration quartile by roughly 25% to 30% (including or excluding the technology bubble) in the three years following their IPO. More concentrated industries also experience higher future IPO volume. The unique relationships between industry concentration, industry leverage, and IPO activity are also first documented in this study.

Although this is the first study to fully examine their role in the IPO market, existing studies document that industry conditions are relevant to other aspects of corporate finance. For example, it is an accepted view that industry conditions impact financial structure and the interaction between competing firms. Early theory developed by Brander and Lewis (1986) and Maksimovic (1988) study the interaction between existing firms in concentrated industries. Later theory presented by Maksimovic and Zechner (1991), Williams (1995), and Fries, Miller, and Perraudin (1997) show that, in competitive industries, firms indeed account for the collective actions of their industry peers when making real and financial decisions. Chevalier (1995) and Phillips (1995) provide empirical evidence of this link between financial structures and product markets. MacKay and Phillips (2003) find empirical support for the aforementioned competitive industry models of financial structure. Although many factors may affect a firm's decision to go public, and some private firms face prohibitive capital constraints, the decision to go public is one that has direct implications for a firm's financial structure. These existing studies naturally lead us to ask: which industry conditions also matter within the IPO market?

Since Ibbotson (1975) first documented that initial public offerings are underpriced on average, a vast literature has explored this topic. Numerous studies show that price adjustments, market returns, underwriter characteristics, and firm-level characteristics can explain initial IPO returns in cross section.[41] However, little has been done to consider whether the characteristics of an issuing firm's industry are also relevant. This is surprising given the existing literature's extensive treatment of other corporate decisions related to financial structure. From 1980 to 1997, we find that industries in the highest quartile based on their exposure to industry conditions experience future IPOs with initial returns that are 13.1% higher than those in the lowest quartile (after controlling for issuer size, recent market returns, and past market-wide initial returns). Furthermore, we find that these industry conditions can be decomposed into effects related to: higher share turnover, lower leverage, lower book to market ratio, and smaller firm size.

[41]For example, see Carter and Manaster (1990), Hanley (1993), Lowry and Schwert (2002), Cliff and Denis (Forthcoming), Hoberg (2003), and Loughran and Ritter (2004).

Also from 1980 to 1997, industries in the highest quartile based on their exposure to short-term industry conditions experience future IPOs with initial returns that are 13.2% higher than those in the lowest quartile (after controlling for other variables known to predict initial IPO returns). It is noteworthy that these short-term industry conditions persist even after accounting for the well-known "hot-market" effects documented in Logue (1973), Ibbotson and Jaffe (1975), and Lowry and Schwert (2002). Our results suggest that industry-specific cycles matter in predicting initial IPO returns, and that they are often distinct from market-wide IPO cycles. Existing theories based on prospect theory (Loughran and Ritter (2002)) and the tradeoff between issue proceeds and success probabilities (Edelen and Kadlec (2003)) provide likely explanations for (1) the well-known ability of market-wide IPO cycles to predict future initial returns and (2) the ability of the industry-specific IPO cycles reported here to also predict future initial returns.

Ritter (1991) shows that firms underperform relative to market benchmarks in the three years after their IPO. Later studies identify variables that can predict long-term performance in cross section. Carter, Dark, and Singh (1998) show that more prestigious underwriters, where prestige is computed from underwriter placements on tombstone advertisements, issue IPOs that outperform those issued by less prestigious underwriters. Jain and Kini (1994) show that entrepreneurs who retain larger equity shares experience IPOs with superior long-term performance. Ritter (1991) also shows that IPO volume negatively predicts long-term returns in cross section, a result that is later confirmed by Lowry (2003). Teoh, Welch, and Wong (1998) show that firms reporting unusually high accruals just prior to the IPO experience inferior long-term performance. This result supports the notion of earnings manipulation. Finally, Krigman, Shaw, and Womack (1999) and Houge, Loughran, Suchanek, and Yan (2001) find that flipping by institutional investors can predict long-term performance in cross section.

Our study is the first to identify cross sectional differences in long-term performance related to industry-specific conditions. We first confirm that underwriter prestige (Carter, Dark, and Singh (1998)) and entrepreneur ownership (Jain and Kini (1994)) are important predictors of long-term IPO performance in cross section. In addition, we also report two new findings: IPOs in industries with (1) lower concentration,[42] and (2) lower leverage experience superior long-term performance following their IPO. For example, IPOs situated in the highest quartile based on past industry concentration experience three year abnormal returns that are roughly 30% less than those in the lowest quartile. These results are significant at the 5% level or better. To ensure robustness, we compute long-term abnormal performance using four asset pricing models.

In light of views presented in Ritter and Welch (2002), the use of many asset pricing models is necessary to ensure the robustness of our results. The authors argue that existing results concerning long-term performance are inconclusive and often dependent upon which asset pricing model is used. Since Ritter (1991), buy-and-hold abnormal returns have been a mainstay for researchers measuring long-term performance. Barber and Lyon (1997b) refine this method and advocate style benchmarked buy-and-hold abnormal returns. In contrast, Fama (1998b) argues that formal inferences about long-term returns should be based on cumulative abnormal returns.[43] Schultz (2001) shows that tests for abnormal returns are biased toward finding significant results when equal weighted averages (across all IPOs) are used. To control for this bias, Schultz (2001) recommends the use of calendar time portfolios.[44] Our study does not take a stand on which asset pricing model is preferable. However, to ensure robustness, (1) we present results using four methods for computing long-term abnormal returns: style-

[42]Concentration is computed using industry-level (by three-digit SIC codes) Herfindahl indices based on either market capitalization or sales. Due to limited data availability, concentration measures are only based on publicly traded firms.

[43]Benchmarked buy-and-hold abnormal returns are equal to a firm's raw three year return less the raw three year return of a portfolio matched by size and book to market (thus style adjusted). Cumulative abnormal returns are the sum of the firm's abnormal monthly returns relative to the style-matched benchmark portfolio's monthly returns over the three year period.

[44]The calendar time method generates portfolios that hold all recently issued IPOs in each month. When abnormal returns are computed as monthly time series averages based on these portfolio returns, the observation bias disappears.

matched buy-and-hold abnormal returns, style-matched cumulative abnormal returns, Fama-French three-factor abnormal returns, and style-matched calendar-time portfolio abnormal returns. We also compute industry-matched buy-and-hold abnormal returns as a means for comparing the performance of IPO firms with their industry peers.[45] (2) Furthermore, we present results for samples that include and exclude the late 1990s' technology bubble.

The finding that past industry concentration can predict the future long-term performance of IPOs is puzzling. However, two explanations are most supported. First, observing an IPO in a highly concentrated industry may suggest that barriers to entry have become low and profitable entry is now possible.[46] Thus, more firms may be expected to enter (a form of herding) and future concentration will likely decline. Because declining concentration results in greater product competition, this form of herding likely implies that future profits will be lower. If valuation analysts systematically ignore expected changes in concentration, the resulting pricing error can explain the relationship between industry concentration and long-term IPO performance. Second, it is possible that industry concentration may proxy for an unknown risk factor. Because the ability of industry concentration to predict long-term IPO performance is robust across risk-adjusted return measures, it is likely that known risk factors cannot explain this result. Further research is needed to fully resolve this debate.

Ibbotson and Jaffe (1975) first show that IPO volume in the overall market is serially correlated from month to month. Lowry (2003) offers a comprehensive study to identify the sources of volatility in IPO volume and shows that proxies for capital demands, investor sentiment, and asymmetric information can explain IPO volume in

[45]We require firms to be public for at least one year before they are included in industry benchmark portfolios.

[46]The concentration measures used in this study are based on public firms alone. It is reasonable to assume that the concentration of public firms is representative of the industry's overall concentration. A private firm going public can be viewed as a form of entry because (1) IPO firms typically sell both primary and secondary shares, thus expanding the overall size of the IPO firm within its industry. (2) Observed IPOs may be correlated with the entry of additional private firms. In either case, industry concentration declines and the concentration of public firms alone may be a reasonable proxy for an industry's overall concentration.

time series. Our goal is to examine whether industry conditions can also predict IPO volume in cross section. Like Pagano, Panetta, and Zingales (1998), Lowry (2003) does show that the past industry market to book ratio and past industry returns, can predict future IPO volume. As with initial returns, however, the existing literature does not thoroughly explore the cross sectional role of industry-wide conditions. After controlling for existing variables known to predict volume, we report that industries with (1) higher concentration and (2) higher prior *industry-specific* volume experience higher future IPO volume in cross section. A one standard deviation increase in industry concentration measured by market capitalization is associated with a roughly 0.7% increase in IPO volume next year, at the significance level of 1%. A one standard deviation increase in prior industry level IPO volume is associated with a roughly 5.2% increase in future IPO volume and is also significant at the 1% level. The large magnitude of the latter affect is a result of serial correlation, as first noted in Ibbotson and Jaffe (1975).

The rest of the chapter is organized as follows. In section I, we introduce our empirical setup. Section II covers IPO underpricing and section III identifies the sources of industry effects. Section IV presents results for long-term IPO performance. Section V analyses industry effects on IPO volume and section VI concludes.

3.1 Data and Methodology

3.1.1 Data Source

IPO data are from the Securities Data Company (SDC) U.S. New Issues Database. The sample initially consists of all U.S. IPOs issued between January 1, 1976 and December 31, 2000. We eliminate ADRs, unit issues, REITs, financial firms, and firms with offer prices less than five dollars. Observations satisfying either of the following two conditions are only used to compute stable starting values for industry condition variables (see section 3.1.2) and are otherwise excluded: (1) IPOs issued in the first four years 1976 to 1979 and (2) the first two IPOs observed in a given industry.[47] Because the number of past IPOs is public information, no bias is introduced by these exclusions. 5,349 IPO observations remain in 324 industries (based on three-digit SIC codes) for the period from 1980 to 2000. On average, 92 of the 324 industries experience at least one IPO in a given year. The subsequent IPO stock performance data and firm financial data are from CRSP and COMPUSTAT respectively.

3.1.2 Variables

The following two return variables are common in the existing IPO literature.

$$\Delta \mathsf{P} = \frac{P_{ipo} - P_{mid}}{P_{mid}}, \qquad \mathsf{IR} = \frac{P_{mkt} - P_{ipo}}{P_{ipo}}. \tag{5}$$

P_{mid}, P_{ipo}, and P_{mkt} are the filing date midpoint, the IPO price and the after market trading price respectively. ΔP is underwriter's activist price adjustment from the filing date midpoint to the IPO price. IR (initial return) is the market driven price adjustment from P_{ipo} to P_{mkt}. Investors who purchase shares at the IPO price P_{ipo} can realize returns equal to IR by selling their shares at the closing price on the first day of public trading.

We construct two industry condition variables based on a simple decomposition of an industry's past initial returns. Using industries based on three-digit SIC codes, we define two time-separable components: long-term industry effects and short-term "industry temperature" effects. Consider an industry i in which T past IPOs have been issued since 1976 (the beginning of our sample), and the (T+1)-th IPO is currently being issued. Suppose that the subset {J, J+1, ..., T} of the T past IPOs have been issued recently, within the past 30 trading days. $\{IR_{i,1}, ..., IR_{i,T}\}$ denote the initial returns of industry i's T past IPOs. $\{IRmkt_{i,1}, ..., IRmkt_{i,T}\}$ denote the market-wide average initial returns for all IPOs issued in the month prior to each IPO. An IPO's

[47] Similar results obtain when this cutoff is placed at 5 or 10 IPOs.

long-term industry condition, IndLong, is the following long-term average:

$$\mathsf{IndLong}_{i,T} = \frac{\sum_{t=1}^{J-1}(IR_{i,t} - IRmkt_{i,t})}{J-1}. \tag{6}$$

The numerator is a sum of abnormal initial returns, which are actual initial returns less contemporaneous market-wide averages. The sum is only based on the first J-1 IPOs to ensure that IndLong is minimally impacted by the hot market effects associated with the most recent IPOs. Thus, IndLong should be viewed as a long-term average, which measures whether a given industry's past initial returns are higher or lower than market-wide averages. Because it is based on abnormal initial returns, and because it is a long-term average, return predictability attributed to IndLong is likely explained by relatively stable industry characteristics such as price volatility, growth rates, hidden risk factors, or the profile of its typical investor. In contrast, IndTemp is based only on the most recent IPOs (from J to T), and is defined as the following short-term average:

$$\mathsf{IndTemp}_{i,T} = \frac{\sum_{t=J}^{T}(IR_{i,t} - IRmkt_{i,t})}{T-J+1} - IndLong. \tag{7}$$

IndTemp (industry temperature) measures whether an industry's recent abnormal initial return is higher or lower than its long-term average (IndLong). An industry with a positive (negative) IndTemp can be interpreted as being hot (cold). Importantly, IndTemp cannot be computed for roughly one-third of the IPOs in our database because there are several industry-month observations that did not experience any IPOs in the last thirty trading days. For these missing values, we set IndTemp to zero. In regressions that predict initial returns, in turn, we include an additional dummy variable (MissTemp, which is one when IndTemp is missing and zero otherwise) that controls for these missing observations. Intuitively, the "temperature" of IPOs that are missing IndTemp is likely to be "cold" because a missing IndTemp implies that no IPOs were issued. We find some support for this conjecture in the empirical section of this study.

For convenience, we drop the subscripts on IndLong and IndTemp for the remainder of this study. Because the typical waiting period between an IPO's filing date and its offer date is about three months, IndLong can be estimated early in the IPO process. In contrast, the short-term variable IndTemp is not known until the IPO date. Both IndLong and IndTemp are calculated by subtracting contemporaneous market-wide IPO returns to control for well-known hot IPO market effects. The existing IPO literature identifies many variables that are significant predictors of initial IPO returns. We control for the following variables:

ΔP+: Positive price adjustment, $\max[\Delta P, 0]$. ΔP+ and ΔP- model the partial adjustment phenomenon, which was first documented in Hanley (1993). Variables taking this percentage form were first used in Lowry and Schwert (2002).

ΔP–: Negative price adjustment, $\min[\Delta P, 0]$.

UWpastIR: Average abnormal initial return of the lead underwriter over the past five years. This measure of underwriter quality was first employed in Hoberg (2003).

UWshare: Equity market share of the lead underwriter in the previous calendar year. This measure of underwriter quality was first employed in Megginson and Weiss (1991).

CMrank: Carter Manaster Rank from Carter, Dark, and Singh (1998). This measure of underwriter quality was first employed in Carter and Manaster (1990).

Overhang: Shares retained by the entrepreneur (for all classes) divided by shares filed (including primary and secondary shares). This measure was first considered in Bradley and Jordan (2002).

VC: Dummy variable equal to unity if the firm is VC-backed, zero otherwise. The role of venture capital was first studied in Barry, et al (1990).

PastIR30: Average initial return of IPOs issued in the 30 days before the issue date. Ibbotson and Jaffe (1975) were the first to document autocorrelation in monthly average initial returns.

Mkt15: NASDAQ return for the 15 trading days preceding the issue date. Ibbotson and Jaffe (1975) were the first to examine whether past market returns can predict future underpricing.

InvPrice: A proxy for issuer risk equal to the reciprocal of the filing midpoint P_{mid}.

LogSize: Natural logarithm of the original filing amount.

Consistent with existing literature, the variables listed above are considered when predicting future initial returns. To fully study the role of industry-specific conditions, we also construct industry-specific averages of some variables that are known to influence other financial decisions such as capital structure. We construct these industry-specific averages over all existing public firms within a given three-digit SIC code. For an IPO issued in year t, these averages are based on data observed on each firm's fiscal year that ends in the twelve month period from July of year t-2 and June of year t-1. This conservative lagging structure ensures that all data used to predict future IPO returns and future IPO volume is at least six months old, and thus publicly available. We consider the following industry conditions:[48]

Size weighted industry concentration (HHI): Computed based on all firms with a valid CRSP market capitalization in a given three-digit SIC industry from July, year t-2 to June, year t-1. Concentration is computed as the Herfindahl Index (sum of squared market shares based on market capitalization).

Sales weighted industry concentration (HHI): Computed in the same fashion as above, except COMPUSTAT sales are used instead of market capitalization.

[48] In addition to the industry variables listed, we also tested tax variables such as Graham's modified tax rate (see Graham 2000). The tax variables are not presented here because they are not relevant in predicting any form of IPO activity.

Leverage Ratio: To compute leverage, we identify debt as the sum of the book value of short-term debt [COMPUSTAT 9] and long-term debt [COMPUSTAT 34]. We identify a firm's equity as its CRSP market capitalization. Leverage ratio is the equal-weighted average of each firm's debt divided by debt plus equity, over all existing public firms in a given three-digit SIC industry from July, year t-2 to June, year t-1. Welch (2004) explains why leverage based on the market value of equity, not book value of equity, is more relevant.

Prior IPO Volume: The total number of IPOs completed in the given industry in year t-1 divided by the number of existing publicly-traded firms in the given industry in year t-2.

Equity Volatility: For a given firm, equity volatility is the standard deviation of its twelve monthly stock returns in year t-1. An industry's equity volatility is the equal-weighted average over all existing public firms from July, year t-2 to June, year t-1.

Share Turnover: Equal-weighted average of share volume divided by shares outstanding over all existing public firms in a given three-digit SIC industry from July, year t-2 to June, year t-1. Gervais, Kaniel and Mingelgrin (2001) present a "visibility hypothesis" and show that trading volume can predict short-term returns.

Profitability (Income to Sales Ratio): For a given firm, this is the ratio of operating income [COMPUSTAT 13] divided by sales [COMPUSTAT 12], in year t-1. After winsorizing at the 10% level, an industry's income to sales ratio is the equal-weighted average over all existing public firms in a given three-digit SIC industry from July, year t-2 to June, year t-1. Shyam-Sunder and Myers (1999) document a relationship between profitability and capital structure.

Log of Book to Market: Equal-weighted average of the logarithm of the book value of equity [COMPUSTAT 60] divided by the CRSP market capitalization over all existing public firms in a given three-digit SIC industry from July, year t-2 to June, year t-1. Rajan and Zingales (1995) show that the book to market ratio is related to capital structure.

Log of Firm Market Cap: Equal-weighted average of the logarithm of CRSP market capitalization scaled by the S&P 500 index level in a given three-digit SIC industry from July, year t-2 to June, year t-1.[49]

Prior Returns: Equal-weighted average of the returns from July, year t-2 to June, year t-1 over all public firms in a given three-digit SIC industry.

3.1.3 Summary Statistics

Table 21 presents summary statistics for the 5,349 IPO observations from 1980 to 2000. The average initial return in this sample is 20.5%, with a standard deviation of 44.6%. The average price adjustment ΔP is just 0.9%, with a standard deviation of 22.9%. Because industry conditions are based on abnormal initial returns, which are adjusted by market-wide averages, we would expect IndLong and IndTemp to have means that are near zero. The table confirms that IndLong indeed has a mean of just 0.1%. Its standard deviation of 6.6% suggests that some industries experience initial returns that vary significantly from that of other industries. IndTemp has a larger mean of 1.2%. This shows that industries with sufficient information to compute IndTemp tend to be slightly "hotter" than the market in general. MissTemp's mean of .364, however, shows that roughly one third of all IPOs are missing IndTemp and are thus issued following months in which there was no IPO activity.[50] IndTemp also has a standard deviation of 21%, which shows that industry "temperature" can be volatile from month

[49] Market capitalization is measured in millions of dollars. To ensure that the logarithm is positive, we take the natural logarithm of one plus the scaled value of market capitalization.

[50] We substitute missing values of IndTemp with a value of zero. When predicting initial returns, we include a dummy variable MissTemp to control for the unknown impact on initial returns for cases where IndTemp is missing.

to month. The average NASDAQ market return fifteen days before IPO date is 1.1%, and the average market-wide past initial returns for IPOs issued thirty days before a given IPO's issue date is 21.9%.

Table 22 reports Pearson correlation coefficients. IndLong and IndTemp are just -11.1% correlated. This modest negative correlation may suggest that industry conditions have a slight tendency to mean-revert over time. The table also shows that IndLong is nearly uncorrelated with short-term market returns, past thirty day market-wide initial returns, underwriter characteristics, issuer size, and overhang (the portion of the firm retained by the issuer). Consistent with Bradley and Jordan (2002)'s view that there is a link between industries and venture capital financing, IndLong is somewhat more correlated with the venture capital dummy. However, we show later that other industry characteristics such as industry leverage, turnover, book to market ratio, size, and return volatility are more important than the venture capital dummy in explaining changes in IndLong. By construction, IndTemp also correlates little with most variables. Because IndTemp is based on recent IPOs, it is modestly correlated with PastIR30 (16.4%) and Mkt15 (5.2%). Generally, the overall modest correlations documented in Table 22 suggest that the ability of industry conditions to predict initial returns is truly novel.

3.1.4 Industry Conditions

From Table 23, we observe that past IndLong and IndTemp both predict future initial IPO returns in an economically relevant fashion. Within each year, the table sorts IPOs into quartiles based on their past IndLong and IndTemp and computes equal-weighted averages over the firms included in each group. The table shows that IPOs in industries with higher IndLong or higher IndTemp experience both higher raw initial returns and higher size-and-hot-market-adjusted initial returns. The increase in initial returns from the lowest to the highest quartile is monotonic in both cases. After controlling for size and hot IPO markets, IPOs in the highest IndLong quartile experience initial returns that are 13.1% (7.2% excluding the technology bubble) larger than IPOs in the lowest quartile. With similar controls, IPOs in the highest IndTemp quartile experience initial returns that are 13.2% (5.6% excluding the technology bubble) larger than those which have a missing value for IndTemp. The table also confirms that IPOs that are missing IndTemp[51] are indeed issued in "cold" IPO market conditions.

Table 23 also shows that IPOs issued following a higher market returns (Mkt15), or higher past market-wide initial IPO returns (PastIR30), experience higher initial returns. This finding confirms the results of many existing studies including Logue (1973), Ibbotson and Jaffe (1975), Lowry and Schwert (2002), and Bradley and Jordan (2002). It is especially noteworthy that IndTemp's ability to sort initial returns is robust to controls for these well-known hot market effects. We interpret this result to mean that industries experience their own "hot IPO" cycles, and that these cycles do not necessarily coincide with market-wide "hot IPO" cycles. The table also shows that the economic impact of both long-term and short-term industry conditions (first considered in this study) roughly matches that of these well-known hot-market effects.

3.2 Initial IPO Returns

In this section, we formally test whether past industry conditions can predict future initial IPO returns. In contrast to existing studies, which often control for industry effects using industry dummies, our study (1) directly measures the size of industry effects using a single variable, and (2) explores which industry characteristics best explain the sources of industry effects. Our focus is on industry characteristics that have been known to influence other financial structure decisions. The results of our study may shed light on how issuers make the decision to issue an IPO and why IPOs are underpriced.

[51] IPOs missing IndTemp are those issued in three-digit SIC industries that did not experience any IPOs in the past 30 trading days.

3.2.1 Predictability of Initial Returns

Table 24 reports the results of Fama and MacBeth (1973) style regressions that predict future initial IPO returns (IR). We first compute separate cross-sectional regression coefficients for all IPOs issued in each calendar year. The reported coefficients and T-statistics are then based on the average of these yearly coefficients. Results from pooled OLS regressions (not reported) are more significant than the reported Fama/MacBeth results.[52] Throughout this chapter, we present Fama/MacBeth results to avoid any possible bias in pooled OLS due to IPO clustering.

The table shows that both IndLong (long-term industry condition) and IndTemp (short-term industry condition) are significant predictors of future initial returns in the periods including the technology bubble (1980-2000) and excluding the technology bubble (1980-1997). A 1% increase in IndLong is associated with a 0.2—0.5% increase in future initial IPO returns, significant at the 1% level. A similar 1% increase in IndTemp is associated with a roughly 0.1% increase in future initial returns, which is also significant at the 1% to 5% level. Despite its smaller coefficient, IndTemp is similar to IndLong in economic significance because Table 21 shows that IndTemp's standard deviation of 21% is roughly three times larger than IndLong's 6.6%.[53]

Rows (3) and (4) on Table 24 show that IndTemp is significant even when the existing hot-market variables (IRpast30 and Mkt15) are controlled for. Like Lowry and Schwert (2003), who also find that IRpast30 is not significant when the Fama/MacBeth method is used, we find in rows (5) to (7) that IRpast30 is not significant when controls for the partial adjustment phenomenon, ΔP+ and ΔP−, are included.[54] The fact that IndTemp remains significant in all specifications of the Fama/MacBeth regressions, despite its 16.4% correlation with IRpast30, indicates that IndTemp makes a distinct

[52]Many existing studies, such as Bradley and Jordan (2002), use pooled OLS regressions.

[53]Because the dummy variable for missing IndTemp (MissTemp) is not significant, the substituted value of zero for cases where IndTemp is missing is a good approximation for the given industry's actual temperature.

[54]In pooled OLS regressions which are not reported, IRpast30 is significant under all specifications.

contribution to the initial returns. Because ΔP+ is the most significant predictor of initial returns, the table also confirms the important role of the partial adjustment phenomenon, which was first noted by Hanley (1993).

The results for IndLong are especially interesting because IndLong can be estimated early in the IPO process. Thus, underwriters have ample time to condition their choice of the initial filing range, or the IPO date price adjustment, on IndLong's value. The difference between Panels C and D is that Panel D controls for the order of events and recognizes that the price adjustment ΔP only becomes known on the IPO date (when it is too late to act), while other variables become known earlier. Specifically, Panel D uses residual dP+ and dP– instead of their raw values, where the residuals are from regressions of dP+ and dP– on all IPO-specific variables that are known on the filing date. For example, residual $\Delta P+$ is extracted from the following regression:

$$\Delta P+ = \alpha + \beta_1 \text{ IndLong} + \beta_2 \text{ UWpastIR} + \beta_3 \text{ UWshare} + \beta_4 \text{ Overhang} + \beta_5 \text{ LogSize} + \beta_6 \text{ InvPrice} + \beta_7 \text{ VC} + \tilde{\epsilon}. \tag{8}$$

Row (5) of Panel C shows that the addition of raw $\Delta P+$ and $\Delta P-$ to the regression in row (4) of Panel B partially subsumes IndLong and IndTemp. However, rows (6) and (7) of Panel D show that IndLong is most significant, both economically and statistically, when dP+ and dP– are used in their residual form. Because IndLong's coefficient is largest in rows (6) and (7), we conclude that the underwriter's price adjustment likely does not mitigate the impact of IndLong, and may in fact exacerbate its impact. In contrast, IndTemp is still partially subsumed in Panel D. Thus, underwriters may proactively adjust the IPO price to reduce the impact of IndTemp, but they may so only partially. This result is consistent with existing studies, such as Lowry and Schwert (2002) and Loughran and Ritter (2002), showing that underwriters adjust prices only partially after receiving public information.

The fact that long-term industry conditions persist, despite the fact that they are observed as early as the filing date, is puzzling. Because we control for several variables known to predict initial returns, Table 24 further shows that the ability of industry conditions to predict initial returns is unique. It is natural to ask: which industry characteristics best explain the ability of industry conditions to predict initial returns? This question is answered in the next section.

3.3 Sources of Initial Return Predictability

Table 25 reports the results from Fama/MacBeth style regressions. One observation is one IPO and the dependent variable is the IPO's initial return.[55] The independent variables include several industry-specific characteristics and controls for (1) filing date variables (see Table 24) and (2) recent market return variables Mkt15 and PastIR30. For an IPO issued in year t, industry-specific characteristics are equal-weighted averages over all existing public firms within the given industry in year t-1.

The table shows results supporting the hypothesis that initial IPO returns are higher for industries with lower leverage, lower book to market ratio, higher share turnover and smaller average firm size. The leverage affect is perhaps most striking due to its large T-statistic that remains (relatively) little changed when additional controls are added, or the technology bubble is excluded from the sample. Based on the higher significance levels when the late 1990s are excluded, we conclude that leverage effects likely are not driven by the clustering of IPOs in hot markets. In contrast, the turnover coefficient roughly doubles in magnitude and becomes more significant when the technology bubble is included. This suggests that the impact of turnover on initial returns may be somewhat stronger in hot IPO markets. Table 25 also shows that industry-specific equity volatility does not significantly predict initial IPO returns.

Studies related to capital structure often focus on a firm's growth opportunities.

[55] In results not reported to conserve space, our results are even stronger if we use an annual version of IndLong as the dependent variable instead of initial returns. We report results for initial returns to maintain consistency with existing studies.

For example, Smith and Watts (1992) and Gaver and Gaver (1993) find an inverse relation between leverage and proxies for growth opportunities. Goyal, Lehn, and Racic (2002) confirm this relationship within the U.S. defense industry. The negative leverage coefficients in Table 25 are thus consistent with the notion that firms with more growth opportunities experience higher underpricing. In turn, this result may be consistent with growth firms being more difficult to value. It is also plausible that underwriters may systematically overlook the net implications of industry leverage when pricing IPOs, leaving the market to correct the price on the first trading day.

Smith and Watts (1992) and Collins and Kothari (1989) consider the book to market ratio to be a proxy for a firm's growth opportunities. Although the book to market ratio becomes statistically insignificant when we exclude the technology bubble from our regressions and control for market variables, the results in Table 25 confirm that the book to market ratio is generally negatively related to initial returns.[56] Thus, the results for both industry leverage and industry book to market ratio are both consistent with the conjecture that growth opportunities and underpricing are positively related.

The positive relationship between share turnover and higher initial returns documented in Table 25 is consistent with the visibility hypothesis offered by Gervais, Kaniel, and Mingelgrin (2001). We consider the larger turnover coefficient reported during the technology bubble to further support this hypothesis because visibility is likely to be higher during hot IPO markets. Because turnover has historically been used as a proxy for liquidity, it is also possible that the turnover effect may be explained by underwriters not fully accounting for the added value from higher liquidity. Because turnover is only a poor proxy for liquidity (but is a good proxy for visibility), we refer readers to Ellul and Pagano (2004) for a full treatment of the interaction between liquidity and initial returns.

In summary, Table 25 shows that several industry characteristics are related to

[56]The correlations between the book to market ratio and other variables such as equity volatility, leverage ratio, and share turnover are very high as reported in Table 22. Thus separate regression specifications are employed for analysis of these variables.

initial IPO returns. Moreover, these results cannot be explained by existing variables known to predict underpricing that are known on the filing date. They also cannot be explained by recent market returns, or the initial returns of recent IPOs. Although we present some hypotheses that might explain these effects, our goal is not to promote any one hypothesis over any other. Rather, our study is empirically oriented and we believe that future theoretical research should further examine the relationships documented here.

3.4 Long-Term IPO Performance

Ritter (1991) and Loughran and Ritter (1995) document that IPOs underperform in the long-term when compared to non-IPO firms. However, Eckbo and Norli (2001) and Ritter and Welch (2002) show that non-IPO firms with similar styles also perform poorly in the long-term. We do not take a position on the matter of whether IPOs significantly underperform in the long-term. Instead, the goal of this section is to identify any industry-specific factors that can explain the long-term performance of IPO firms in cross section.

Table 26 presents the average three year post-IPO abnormal returns for IPOs grouped into quartiles based on two measures of industry concentration and one measure of average industry leverage. Adopting methodologies from Barber and Lyon (1997b), Fama (1998b), Schultz (2001), and Rau and Vermaelen (1998), we first compare long-term abnormal returns across quartiles using four methods: style-matched buy-and-hold abnormal returns, style-matched cumulative abnormal returns, style-matched calendar time abnormal returns, and Fama-French three-factor abnormal returns. By considering a fifth measure, industry-matched buy-and-hold abnormal returns, we are then able to test whether IPO firms in each group perform better or worse than existing public firms in their corresponding three-digit SIC industries.

For IPOs issued between 1980 and 2000, Panel A of Table 26 shows that those issued within industries in the lowest concentration quartile (based on market capitalization) outperform those issued within industries in the highest concentration quartile by 31.5% style-matched buy-and-hold abnormal returns, 38.2% style-matched cumulative abnormal returns, 28.9% Fama-French-three-factor abnormal returns, and 28.4% style-matched calendar time abnormal returns. These differences are all significant at the 1% level. Moreover, the results are similar in magnitude regardless of whether the technology bubble (1998-2000) is included or excluded. We conclude that IPOs in low concentration industries routinely outperform IPOs in their more concentrated counterparts, and that this result is robust both over time, and to the choice of asset pricing model. The table also shows that the relationship between concentration and industry-matched buy-and-hold abnormal returns[57] is negligible and non-monotonic. We conclude that existing public firms within concentrated industries perform just as poorly as the IPO firms themselves (conditional on the existence of recent IPO firms in the given industry).[58] The table also confirms that industry concentration does not sort issuer size nor initial IPO returns in a stable fashion. Thus, we conclude that the role of concentration cannot be explained by size effects.[59]

Panel C of Table 26 shows that firms residing in low leverage industries outperform those in high leverage industries in the three years following their IPO. This effect is slightly less stable than the concentration effect, but IPOs in the lowest leverage quartile still experience abnormal returns that are roughly 15% to 35% larger than IPOs residing in the highest leverage quartile. Although any reduced stability appears to be associated with the inclusion of the technology bubble in the sample, this leverage

[57]To avoid the new listing bias, we require firms to be public for at least one year to be included in the industry benchmark portfolio.

[58]It is important to note that the reported averages are equal-weighted over IPOs. Thus, we do not conclude that concentrated industries underperform in general. Rather, we conclude that existing public firms residing in concentrated industries do underperform following the recent issuance of a positive number of IPOs within their given industry.

[59]Several measures have been taken to assure readers that the concentration effect cannot be explained by size effects. In Table 22, we show that average within-industry firm size and industry concentration are just as weakly correlated as IPO-issuer size and industry concentration. In Table 27, we confirm that concentration, not within-industry firm size, can explain long-term IPO performance. Based on additional robustness checks (not reported), we also find that *underwriter* size cannot explain this result either.

effect remains robust across all four asset pricing models. As with the concentration effect reported in Panels A and B, the relationship between leverage and industry-matched buy-and-hold abnormal returns is non-monotonic, so existing public firms within highly leveraged industries perform just as poorly as the IPO firms themselves (conditional on the existence of IPO firms).[60] Panel C also shows that there is a positive relationship between industry leverage and issuer size. However, later in this section we will show that, even after controlling for issuer size, the ability of leverage to predict long-term abnormal performance remains robust.

Table 27 formally tests the relationship between long-term IPO performance and industry conditions using Fama/MacBeth regressions. The dependent variable is the three year post-IPO abnormal return of each IPO. One observation is one IPO, and from 1980 to 2000, we have 5,565 observations. As in Table 26, we define the dependent variable (long-term abnormal returns) using four different asset pricing models, and the results of each is reported in Panels A to D.

When testing whether industry conditions can predict long-term performance, Table 27 controls for, and confirms, the results of existing studies. For example, the table confirms the Carter, Dark, and Singh (1998) result that long-term IPO performance is positively correlated with underwriter reputation, as measured by the Carter-Manaster Rank. This result is economically large and robust (1) across all four asset pricing models and (2) across samples that include or exclude the technology bubble. Because overhang is positively correlated with long-term performance, the table also confirms the Jain and Kini (1994) result that issuers who retain larger equity shares experience IPOs with superior long-term performance. Though it is not significant in Panel B for cumulative abnormal returns, this result is generally stable across asset pricing models and over sub-samples. Although not reported to conserve space, we also find that past IPO volume does not significantly predict future long-term performance. This

[60]Similarly, we do *not* conclude that high leverage industries unconditionally underperform low leverage industries. Rather, they underperform conditional on the existence of IPOs within the given high leverage industry.

confirms the Lowry (2003) result showing that past IPO volume, though it can predict raw long-term returns, cannot predict *abnormal* long-term returns. Also not reported, we find support for the Ritter and Welch (2002) result showing that an IPO's initial return does not reliably predict its long-term abnormal performance.

Panels A, B and C of Table 27 also show (1) a significant negative relationship between industry concentration and long-term performance and (2) a significant negative relationship between industry leverage and long-term IPO performance. Panel D additionally confirms (3) that neither effect is significant for industry-matched abnormal returns. All three results are robust to including controls for variables known to predict long-term performance and are also robust to including or excluding the late 1990s technology bubble. We conclude that (1) IPOs issued in concentrated industries underperform relative to those in less concentrated industries; (2) IPOs issued in more leveraged industries underperform relative to those in less leveraged industries; and (3) Existing public firms in either concentrated or leveraged industries perform just as badly (or just as well) as their corresponding IPO firms, conditional on a positive number of IPOs being issued.

Because the ability of both industry leverage and industry concentration to predict long-term IPO performance is robust across risk-adjusted abnormal return measures, it is likely that known risk factors cannot explain either result. Thus, both relationships are a mystery given the current state of the asset pricing literature. It is possible that concentration or leverage may proxy for an unknown risk factor, after conditioning on the existence of IPOs. Behavioral biases or underwriter mispricing may also be responsible.

A competitive explanation for the relationship between concentration and long-term IPO performance may also be plausible. Observing an IPO in a concentrated industry may suggest that barriers to entry have become low, and profitable entry is now possible. Thus, more firms may be expected to enter (a form of herding) and future concentration will likely decline. Section 3.5 supports this argument and will show that both higher concentration and prior IPO volume are positively correlated with higher future IPO volume. Because declining concentration results in greater product competition, this form of herding likely implies that future profits will be lower. If the marginal investor systematically ignores expected changes in concentration when valuing firms, the resulting pricing error can explain the relationship between industry concentration and long-term IPO performance reported in Panels A, B and C.[61] This hypothesis predicts that all firms within an industry (not just IPO firms) should underperform when (1) investors ignore expected changes in concentration when valuing new *and existing* firms, and (2) concentration is expected to decline. The absence of a relationship between concentration and industry-matched abnormal returns in Panel D further supports this argument as the IPO firms appear to perform just as well as their existing industry peers.

Regarding concentration and leverage, further research is needed to fully understand their relationship with long-term IPO performance.

3.5 IPO Volume

Ibbotson and Jaffe (1975) first document that IPO volume is highly correlated in time series. However, they do not find a statistically significant relationship between past underpricing and the number of IPOs. Lowry (2003) finds that capital demands and investor sentiment drive much of the variation in IPO volume. Given the findings in Table 25 that industry conditions can predict initial IPO returns, it is natural to ask whether industry conditions can also predict industry-specific IPO volume.

Table 28 reports the results from Fama/MacBeth style regressions[62] predicting

[61]This form of valuation error is more likely if investors rely on valuation multiples when pricing IPO firms, as is often conjectured in the IPO literature. Specifically, such investors would likely use multiples based on the current price of existing public firms within the industry. Because such valuations would be based on pre-IPO levels of concentration, these investors would indeed be ignoring the expected changes in concentration.

[62]Fama/MacBeth regressions are used because we are more interested in cross-sectional analysis

industry-specific IPO volume. One observation is one industry in one year and the dependent variable is the number of IPOs in the given industry in year t scaled by the number of public firms within the industry at the end of year t-1. Each industry is defined by its three-digit SIC code.

Perhaps the most interesting result in Table 28 is the stable, positive relationship between industry concentration and IPO volume. Given an increase of one standard deviation (0.21) in concentration based on market capitalization (Size HHI), IPO volume increases by 0.7% in cross-section.[63] This effect is statistically significant at the 1% level, and is robust to controls for variables known to predict IPO volume. The economic effect is slightly larger when we exclude the technology bubble (1998-2000). It suggests that the arrival of new IPO firms is more likely in concentrated industries. The results are similar for industry concentration based on sales (Sales HHI).

The table also confirms the results of existing studies on an industry-specific basis. For example, prior industry-specific IPO volume also has a significant impact on current IPO volume and is the most important predictor of future IPO volume, both statistically and economically. A one standard deviation (.30) increase in prior industry-specific IPO volume results in a roughly 5.2% increase in current IPO volume. This finding suggests that IPO volume is not only highly correlated market-wide, as documented by Ibbotson and Jaffe (1975), but it is also highly correlated at the industry level.

Similar to findings in Pagano, Panetta, and Zingales (1998) and Lowry (2003), we also find a significant negative relationship between industry book to market ratio and IPO volume. A one standard deviation (0.46) increase in the log of the industry book to market ratio results in a 0.6% decrease in industry-specific IPO volume. Also

than time-series analysis. Results are similar if we use dynamic panel data treatment. Results are available upon request.

[63]We also include industry-year observations in which there is no IPO activity (and assign such observations an IPO volume of zero) to ensure that the results are not influenced by selection bias. Thus, unlike the correlation coefficients in Table 22 (which are based on industry-years in which IPOs actually occur), the data for Table 28 includes annual observations for all industries.

confirming results in Lowry (2003), we find that prior industry returns are positively correlated with future IPO volume. The size of the average firm within an industry also matters and negatively impacts IPO volume.

Ibbotson and Jaffe (1975) show that past initial returns do not predict IPO volume on a market-wide basis. Though not reported to conserve space, we also find that past industry-specific initial IPO returns do not predict IPO volume. Industry-specific equity volatility also shows no reliable ability to predict IPO volume. Although industry leverage is related to initial returns and long-term performance, it is not related to IPO volume.

The average R-squared from the Fama/MacBeth regressions in Table 28 is roughly 28%, which suggests that industry conditions can explain a substantial amount of the cross sectional variation in industry-specific IPO volume.

3.6 Conclusion

Existing literature has done little to explore whether industry conditions can predict future initial IPO returns, future long-term IPO performance, and future IPO volume. This study is the first to show that industry-specific factors exist and that they are economically important. We also present an innovative decomposition of industry conditions (with respect to initial returns) into a long-term component and short-term "temperature" component. Both elements, by construction, have built in controls for the well-known "hot IPO markets" phenomenon.

The ability of industry conditions to predict initial returns can be further attributed to specific characteristics. We document that industries with (1) lower leverage, (2) higher share turnover, (3) and smaller firm size experience higher initial returns. These three results are robust to variables known to predict initial returns and are significant in both hot and cold IPO markets. We also find that IPOs in industries with lower average book to market ratios experience higher initial returns. However, this result is not robust to the exclusion of the technology bubble. Examination of short-term conditions shows that industry-specific market cycles exist, and that they can also be distinct from market-wide IPO cycles. Our new measures of "long-term industry conditions" and "short-term industry temperature" both make distinct contributions to initial return predictability.

An industry's condition can also predict future long-term IPO performance and future IPO volume. After controlling for variables known to predict long-term abnormal IPO returns, we find that (1) more concentrated industries and (2) more leveraged industries experience inferior performance in the three years following their IPO. These results are robust to four different methods for computing long-term abnormal returns. Therefore, we conclude that these results cannot be explained by known sources of systematic risk. After controlling for variables known to predict IPO volume, we also find that industries with higher past concentration experience higher future IPO volume in cross section.

Though we discuss various hypotheses to explain these results, the goal of this study is not to promote any one explanation. We believe that future theoretical researchers should consider both rational and behavioral explanations. We also believe that understanding how underwriters compute the value of IPO firms may be informative, as the results are consistent with the notion that some elements of valuation may be systematically ignored in practice.

Table 21: Summary Statistics

Explanation: Summary statistics are reported for IPOs issued in the US from 1980 to 2000 excluding: firms with an issue price less than five dollars, ADRs, financial firms, and REITs. IPOs issued from 1976 to 1979 are used to compute stable starting values for IndLong and IndTemp, and are otherwise excluded. ΔP is the implied return from the filing date midpoint to the IPO price and is the underwriter's activist price adjustment. **Initial Return** (IR), is the implied return from the IPO price to the after market trading price. For a given IPO, **IndLong** is the average abnormal initial return of all IPOs issued in its industry at least one month prior to the given IPO's issue date. **IndTemp** (industry temperature) is the average industry-wide IPO initial return over the 30 trading days prior to the given IPO's issue date minus IndLong. IndTemp is set to zero when it is missing (i.e., when no IPOs were issued in the given IPO's industry in the past 30 days), and the dummy variable **MissTemp** is one when IndTemp is missing and zero otherwise. Both IndLong and IndTemp are based on three-digit SIC codes. For a given IPO, **UWpastIR** is equal to the average abnormal initial returns of the past IPOs underwritten by the lead underwriter. Abnormal initial returns are actual initial returns less market-wide average initial returns in the same month. This average includes all IPOs issued by the given underwriter in the five years preceding the filing date of the given IPO. **CMrank** is the Carter-Manaster rank as listed in Carter, Dark and Singh (1998). **UWshare** is the lead underwriter's equity market share computed over the previous calendar year. **Overhang** is equal to the pre-IPO shares retained by the issuer divided by the shares filed, both primary and secondary. **InvPrice** is the reciprocal of the filing date midpoint. **LogSize** is the natural logarithm of the original filing amount. **VC** is a dummy that is equal to one if the firm is VC-backed. **ΔP+** and **ΔP−** are the positive and negative truncated components of ΔP, which is the implied return from the filing date midpoint to the IPO price (the underwriter's price adjustment). **Mkt15** is the cumulative NASDAQ return over the 15 trading days prior to the issue date. **PastIR30** is the average underpricing for all IPOs issued in the 30 day window preceding the issue date. For an IPO issued in year t, the average industry characteristics are equal-weighted averages of the given quantity over all existing public firms in the IPO's given three-digit SIC industry, over the twelve-month period from July, year t-2 to June, year t-1.

Variable	Description	Mean	Std. Dev.	Minimum	Median	Maximum	Observations
	Price Variables						
IR	Initial returns	0.205	0.446	−0.404	0.070	6.975	5,349
ΔP	% Price adjustment: P_{mid} to P_{ipo}	0.009	0.229	−0.677	0.000	2.200	5,349
	IPO-Level Explanatory Variables						
IndLong	Industry's long-term abnormal IR	0.001	0.066	−0.339	−0.005	0.539	5,349
IndTemp	Industry's short-term abnormal IR	0.012	0.210	−1.306	0.000	2.538	5,349
MissTemp	Dummy for missing IndTemp	0.364	0.481	0.000	0.000	1.000	5,349
Mkt15	NASDAQ returns 15 days pre-IPO	0.011	0.046	−0.219	0.012	0.250	5,349
PastIR30	Average IR 30 days before IPO	0.219	0.271	−0.053	0.135	4.735	5,349
UWpastIR	Lead underwriter's past abnormal IR	0.008	0.082	−0.490	0.000	1.059	5,349
CMrank	Lead UW's Carter/Manaster rank	7.071	2.112	0.000	8.000	9.000	5,344
UWshare	Lead UW's equity market share	0.036	0.055	0.000	0.013	0.435	5,349
Overhang	Shares retained / shares filed	2.990	2.075	0.000	2.486	31.692	5,349
InvPrice	One divided by the offer price	0.093	0.036	0.011	0.083	0.286	5,349
LogSize	Natural Logarithm of filing amount	18.421	1.208	15.251	18.388	24.572	5,349
VC	Venture capital dummy	0.416	0.493	0.000	0.000	1.000	5,349
ΔP+	Positive truncated component of ΔP	0.082	0.166	0.000	0.000	2.200	5,349
ΔP−	Negative truncated component of ΔP	−0.074	0.113	−0.677	0.000	0.000	5,349
	Average Characteristics of Existing Public Firms						
Size HHI	Herfindahl based on market cap	0.254	0.209	0.179	0.021	1.000	5,580
Sales HHI	Herfindahl based on sales	0.227	0.197	0.178	0.023	1.000	5,577
Leverage Ratio	Debt / debt plus market cap	0.229	0.133	0.200	0.000	0.892	5,577
IPO Volume	# of IPOs / # of public firms in t-1	0.194	0.304	0.122	0.002	5.000	5,580
Equity Volatility	Monthly return std deviation	0.150	0.040	0.150	0.029	0.371	5,580
Share Turnover	Share volume / shares outstanding	0.080	0.029	0.079	0.009	0.175	5,580
Profitability	Operating income / sales	0.120	0.066	0.074	0.000	0.537	5,576
Book/Market	Log of book to market ratio	-5.424	0.459	-5.422	-9.130	-3.545	5,580
Firm Size	Log of market capitalization	0.668	0.506	0.519	0.001	3.952	5,580
Prior Returns	One year stock return, t-1	0.088	0.298	0.040	-0.806	2.673	5,577
Indlong_{t-2}	Two year lagged Indlong	-0.001	0.074	-0.005	-0.355	1.126	5,252

Table 22: Correlation Coefficients

Explanation: Pearson correlation coefficients are reported for IPOs issued in the US from 1980 to 2000 excluding: firms with an issue price less than five dollars, ADRs, financial firms, and REITs. IPOs issued from 1976 to 1979 are used to compute stable starting values for IndLong and IndTemp, and are otherwise excluded. ΔP is the implied return from the filing date midpoint to the IPO price and is the underwriter's activist price adjustment. **Initial Return** (IR), is the implied return from the IPO price to the after market trading price. For a given IPO, **IndLong** is the average abnormal initial return of all IPOs issued in its industry at least one month prior to the given IPO's issue date. **IndTemp** (industry temperature) is the average industry-wide IPO initial return over the 30 trading days prior to the given IPO's issue date minus IndLong. IndTemp is set to zero when it is missing (i.e., when no IPOs were issued in the given IPO's industry in the past 30 days), and the dummy variable **MissTemp** is one when IndTemp is missing and zero otherwise. Both IndLong and IndTemp are based on three-digit SIC codes. For a given IPO, **UWpastIR** is equal to the average abnormal initial returns of the past IPOs underwritten by the lead underwriter. Abnormal initial returns are actual initial returns less market-wide average initial returns in the same month. This average includes all IPOs issued by the given underwriter in the five years preceding the filing date of the given IPO. **CMrank** is the Carter-Manaster rank as listed in Carter, Dark and Singh (1998). **UWshare** is the lead underwriter's equity market share computed over the previous calendar year. **Overhang** is equal to the pre-IPO shares retained by the issuer divided by the shares filed, both primary and secondary. **InvPrice** is the reciprocal of the filing date midpoint. **LogSize** is the natural logarithm of the original filing amount. **VC** is a dummy that is equal to one if the firm is VC-backed. **ΔP+** and **ΔP−** are the positive and negative truncated components of ΔP, which is the implied return from the filing date midpoint to the IPO price (the underwriter's price adjustment). **Mkt15** is the cumulative NASDAQ return over the 15 trading days prior to the issue date. **PastIR30** is the average underpricing for all IPOs issued in the 30 day window preceding the issue date.

Variable	Description	IR	ΔP	IndLong	IndTemp	Mkt15	PastIR30
	Price Change Variables						
IR	Initial returns	1.000	0.474	0.104	0.125	0.183	0.174
ΔP	% Price adjustment from P_{mid} to P_{ipo}	0.474	1.000	0.085	0.136	0.118	0.267
	Explanatory Variables						
IndLong	Industry's long-term average abnormal IR	0.104	0.085	1.000	–0.111	–0.001	0.02
IndTemp	Industry's short-term temperature	0.125	0.136	–0.111	1.000	0.052	0.164
MissTemp	Dummy for missing IndTemp	–0.047	–0.067	–0.160	–0.052	0.041	0.016
Mkt15	NASDAQ returns 15 days before IPO date	0.183	0.118	–0.001	0.052	1.000	0.142
PastIR30	Average IR 30 days before IPO date	0.174	0.267	0.022	0.164	0.142	1.000
UWpastIR	Lead underwriter's past abnormal IR	0.163	0.135	0.051	0.025	0.004	0.013
CMrank	Lead underwriter's Carter/Manaster rank	–0.043	0.054	–0.000	0.001	0.011	0.014
UWshare	Lead underwriter's equity market share	0.039	0.107	–0.002	–0.008	0.010	0.009
Overhang	Shares retained / shares filed	0.125	0.104	0.046	–0.022	–0.023	–0.056
InvPrice	One divided by the offer price	0.123	0.047	0.059	0.029	–0.007	0.016
LogSize	Natural Logarithm of filing amount	–0.030	0.065	–0.027	–0.016	0.003	–0.005
VC	Dummy = one if venture capital backed	0.060	0.051	0.129	–0.009	0.018	0.028
ΔP+	Positive truncated component of ΔP	0.459	0.814	0.096	0.121	0.145	0.214
ΔP-	Negative truncated component of ΔP	0.321	0.817	0.041	0.110	0.060	0.235

Table 22: Correlation coefficients: Cont'd

Explanation: Pearson correlation coefficients are reported for IPOs issued in the US from 1980 to 2000 excluding: firms with an issue price less than five dollars, ADRs, financial firms, and REITs. IPOs issued from 1976 to 1979 are used to compute stable starting values for IndLong and IndTemp, and are otherwise excluded. For an IPO issued in year t, the average industry characteristics are equal-weighted averages of the given quantity over all existing public firms in the IPO's given three-digit SIC industry, over the twelve-month period from July, year t-2 to June, year t-1. **Size HHI** is the industry's concentration, computed as the Herfindahl index (sum of squared market shares of existing public firms), where each firm's market share is its CRSP market capitalization divided by the total market capitalization of all existing public firms within the given industry. **Sales HHI** is the Herfindahl index based on each firm's COMPUSTAT sales instead of its market capitalization. **Leverage ratio** is the book value of short-term and long-term debt divided by (market cap + book value of debt). **IPO volume** is the number of IPOs in a given year scaled by number of public firms at the end of the prior year. A company's **equity volatility** is the standard deviation of its monthly returns. **Share turnover** is share volume divided by shares outstanding (winsorized at the 10% level). **Profitability** is the income to sales ratio, which is a firm's operating income divided by its sales (winsorized at the 10% level). **Book to market** is the log of book value of equity (Compustat item [60]) divided by December market capitalization. **Firm size** is the logarithm of (one plus the market capitalization of a given firm in millions of dollars scaled by S&P500 level of the given year). **Prior return** is the equal-weighted industry-wide returns in the prior year. **IndLong,t-2** is the average abnormal initial returns for all IPOs issued in the given industry from 1976 to year t-2. Abnormal initial returns are actual initial returns less market-wide average initial returns in the same month.

Variable	Size HHI	Sale HHI	Leverage Ratio	IPO Volume	Equity Volatility	Share Turnover	Profit-ability	Book to Market	Firm Size	Prior Returns	Indlong t-2
					Industry Characteristics Variables						
Size HHI	1.000										
Sale HHI	0.866	1.000									
Leverage	0.297	0.321	1.000								
IPO Volume	0.346	0.362	0.138	1.000							
Volatility	-0.224	-0.272	-0.387	-0.082	1.0000						
Turnover	-0.299	-0.344	-0.500	-0.080	0.646	1.000					
Profitability	0.072	0.147	0.304	0.193	-0.210	-0.088	1.000				
Book/Market	0.265	0.231	0.629	-0.028	-0.494	-0.600	0.017	1.000			
Firm Size	0.027	-0.017	0.050	-0.002	-0.166	-0.040	0.245	-0.115	1.000		
Prior Returns	-0.036	-0.014	-0.015	0.123	0.027	0.112	0.143	-0.133	0.243	1.000	
Indlong_{t-2}	-0.076	-0.116	-0.311	0.014	0.214	0.264	-0.125	-0.285	0.032	-0.094	1.000

Table 23: IPO Characteristics by Quartile

Explanation: Mean characteristics are reported for IPOs issued in the US from 1980 to 2000 (numbers in parentheses are for the sub-period that excludes the technology bubble: 1980 to 1997) excluding: firms with an issue price less than five dollars, ADRs, financial firms, and REITs. IPOs issued from 1976 to 1979 are used to compute stable starting values for IndLong and IndTemp, and are otherwise excluded. Within each calendar year, IPOs are grouped into quartiles based on four variables: IndLong, IndTemp, Mkt15 and PastIR30 for Panels A, B, and C respectively. The reported characteristics are equal-weighted averages over all observations grouped into each quartile. **IR** is the implied return from the IPO price to the after market trading price and is the market driven price correction. For a given IPO, **IndLong** is the average abnormal initial return of all IPOs issued in its industry at least one month prior to the given IPO's issue date. **IndTemp** (industry temperature) is the given IPO's average industry-wide initial return over the 30 trading days prior to the given IPO's issue date minus IndLong. Abnormal initial returns are actual initial returns less market-wide average initial returns in the same month. IndTemp can be missing for an industry in a given year (when no IPOs were issued in the past month). These missing observations are identified separately. Both IndLong and IndTemp are based on three-digit SIC codes. **Mkt15** is the cumulative NASDAQ return over the 15 trading days prior to the issue date. **PastIR30** is the average underpricing for all IPOs issued in the 30 day window preceding the issue date. **Issuer Size** is the original filing amount in millions. **Residual IR** controls for size and market-wide hot market effects: Mkt15 and PastIR30. It is computed as the residuals from the following OLS regression equation: $IR = \beta_1 \text{ Mkt15} + \beta_2 \text{ PastIR30} + \beta_3 \text{ LogSize} + \beta_4 \text{ LogSize}^2 + \tilde{\epsilon}$.

	Characteristics for IPOs issued from 1980 to 2000 (1980 to 1997 in parentheses)							
Quartile	IR	Residual IR	IndLong	IndTemp	Mkt15	PastIR30	Issuer Size	# Obs.
				Panel A: IndLong Quartiles				
Lowest IndLong	12.9 (8.8)	-7.0 (-4.9)	-7.1 (-7.3)	0.6 (1.6)	0.8 (0.8)	11.3 (9.5)	379.0 (209.7)	1,327 (1,074)
Quartile 2	16.7 (10.0)	-3.8 (-4.1)	-2.0 (-2.3)	-1.0 (0.0)	1.2 (1.1)	11.5 (9.7)	245.8 (162.4)	1,339 (1,081)
Quartile 3	25.9 (13.5)	4.7 (-0.4)	2.2 (1.1)	3.5 (1.1)	1.3 (1.1)	11.8 (9.6)	200.5 (149.4)	1,354 (1,089)
Highest IndLong	26.5 (15.8)	6.1 (2.3)	7.2 (6.4)	1.7 (-0.2)	1.0 (0.8)	11.6 (9.5)	190.7 (135.3)	1,329 (1,081)
				Panel B: IndTemp Quartiles				
Missing IndTemp	12.3 (9.9)	-4.7 (-3.6)	-1.9 (-1.8)	0.0 (0.0)	1.2 (1.1)	10.4 (9.4)	271.8 (178.2)	1,948 (1,699)
Lowest IndTemp	19.3 (10.3)	-1.3 (-2.6)	1.9 (2.0)	-20.7 (-14.1)	1.1 (0.8)	11.5 (9.4)	259.2 (146.4)	842 (650)
Quartile 2	19.4 (11.1)	0.4 (-1.8)	1.0 (-0.1)	-5.9 (-4.5)	0.2 (0.7)	11.3 (9.4)	271.3 (188.4)	852 (656)
Quartile 3	26.0 (14.6)	3.0 (0.4)	1.4 (0.3)	5.1 (3.1)	0.9 (1.0)	12.4 (9.7)	210.5 (140.2)	859 (666)
Highest IndTemp	36.1 (17.7)	8.5 (2.0)	0.6 (-0.8)	29.1 (19.5)	1.8 (1.1)	13.6 (10.2)	232.5 (145.3)	848 (654)
				Panel C: Mkt15 Quartiles				
Lowest Mkt15	16.3 (7.9)	N/A	-0.2 (-0.7)	-3.3 (-1.8)	0.6 (0.3)	9.0 (8.2)	240.2 (168.3)	1,338 (1,085)
Quartile 2	18.0 (10.7)	N/A	0.2 (-0.5)	-0.1 (0.3)	0.3 (0.7)	10.5 (9.0)	251.7 (159.1)	1,346 (1,083)
Quartile 3	20.4 (14.5)	N/A	0.1 (-0.4)	2.0 (1.1)	1.2 (1.8)	12.0 (9.9)	237.1 (158.6)	1,322 (1,066)
Highest Mkt15	27.5 (15.1)	N/A	0.3 (-0.5)	6.3 (2.8)	2.1 (1.1)	14.7 (11.2)	285.4 (170.5)	1,343 (1,091)
				Panel D: PastIR30 Quartiles				
Lowest PastIR30	12.8 (8.6)	N/A	0.0 (-0.4)	0.5 (0.1)	-4.3 (-3.7)	10.9 (9.3)	253.1 (168.2)	1,354 (1,099)
Quartile 2	18.3 (11.3)	N/A	0.1 (-0.5)	0.9 (0.3)	-0.2 (0.1)	11.4 (9.6)	207.8 (141.3)	1,332 (1,071)
Quartile 3	21.6 (12.1)	N/A	0.0 (-0.7)	1.0 (1.2)	2.7 (2.4)	11.2 (9.7)	254.9 (177.9)	1,338 (1,087)
Highest PastIR30	29.6 (16.2)	N/A	0.3 (-0.4)	2.7 (0.9)	6.2 (5.2)	12.7 (9.7)	299.1 (168.8)	1,325 (1,068)

Table 24: Fama/MacBeth Style Regressions Predicting Future Initial Returns

Explanation: Fama/MacBeth style regression coefficients and T-statistics (in parentheses) are reported for IPOs issued in the US from 1980 to 2000 excluding: firms with an issue price less than five dollars, ADRs, financial firms, and REITs. IPOs issued from 1976 to 1979 are used to compute stable starting values for IndLong and IndTemp, and are otherwise excluded. The dependent variable, **Initial Return** (IR), is the implied return from the IPO price to the after market trading price. For a given IPO, **IndLong** is the average abnormal initial return of all IPOs issued in its industry at least one month prior to the given IPO's issue date. **IndTemp** (industry temperature) is the average industry-wide IPO initial return over the 30 trading days prior to the given IPO's issue date minus IndLong. IndTemp is set to zero when it is missing (i.e., when no IPOs were issued in the given IPO's industry in the past 30 days), and the dummy variable **MissTemp** is one when IndTemp is missing and zero otherwise. Both IndLong and IndTemp are based on three-digit SIC codes. For a given IPO, **UWpastIR** is equal to the average abnormal initial returns of the past IPOs underwritten by the lead underwriter. Abnormal initial returns are actual initial returns less market-wide average initial returns in the same month. This average includes all IPOs issued by the given underwriter in the five years preceding the filing date of the given IPO. **CMrank** is the Carter-Manaster rank as listed in Carter, Dark and Singh (1998). **UWshare** is the lead underwriter's equity market share computed over the previous calendar year. **Overhang** is equal to the pre-IPO shares retained by the issuer divided by the shares filed, both primary and secondary. **InvPrice** is the reciprocal of the filing date midpoint. **LogSize** is the natural logarithm of the original filing amount. **VC** is a dummy that is equal to one if the firm is VC-backed. **ΔP+** and **ΔP−** are the positive and negative truncated components of ΔP, which is the implied return from the filing date midpoint to the IPO price (the underwriter's price adjustment). **Mkt15** is the cumulative NASDAQ return over the 15 trading days prior to the issue date. **PastIR30** is the average underpricing for all IPOs issued in the 30 day window preceding the issue date. The Fama/MacBeth method first computes annual cross-sectional regression coefficients for the IPOs issued in each calendar year. The displayed coefficients and T-statistics are computed from the time series average of the cross sectional coefficients. The R-Square is the average R-Square of the cross sectional regressions. In Panel D, ΔP+ and ΔP− are residuals from the following OLS regressions of the following form: $\Delta P+ = \alpha + \beta_1$ IndLong $+ \beta_2$ UWpastIR $+ \beta_3$ UWshare $+ \beta_4$ Overhang $+ \beta_5$ LogSize $+ \beta_6$ InvPrice $+ \beta_7$ VC $+ \tilde{\epsilon}$. Panel D is thus consistent with the actual order of events and controls for variables that are known before ΔP is realized.

Dependent variable = initial returns, T-statistics in parentheses

		Industry Variables			*Filing Date Control Variables*						*Market and Price Variables*					
Row	Sample Period	IndLong	IndTemp	MissTemp	UW-pastIR	UW-share	Over-hang	Log-Size	Inv-Price	VC	Mkt15	Past-IR30	ΔP+	ΔP−	RSQ	Obs.
					Panel A: IPO Characteristics known on the filing date											
(1)	1980 to 1997	0.221			0.336	0.140	0.011	0.002	0.651	0.008					0.129	4320
		(2.53)			(4.40)	(1.43)	(2.81)	(0.36)	(3.91)	(1.40)						
(2)	All (1980-2000)	0.400			0.296	0.396	0.021	−0.014	0.736	0.027					0.138	5344
		(3.02)			(3.77)	(2.33)	(3.28)	(−1.29)	(4.31)	(1.61)						
					Panel B: Add Market Variables											
(3)	1980 to 1997	0.235	0.108	0.000	0.294	0.149	0.013	0.001	0.559	0.007	0.731	2.206			0.218	4320
		(3.04)	(3.03)	(0.00)	(5.18)	(1.58)	(3.48)	(0.16)	(3.18)	(0.84)	(8.69)	(3.45)				
(4)	All (1980-2000)	0.318	0.136	−0.012	0.269	0.398	0.023	−0.019	0.535	0.019	0.968	1.979			0.229	5344
		(3.71)	(3.88)	(−1.11)	(4.83)	(2.39)	(3.54)	(−1.49)	(2.76)	(1.25)	(6.33)	(3.52)				
		Panel C: Add Price Adjustment Variables ΔP+ and ΔP−, but assume effects are separate from characteristics known on filing date														
(5)	All (1980-2000)	0.183	0.074	−0.004	0.172	0.280	0.015	−0.022	−0.078	0.007	0.680	0.233	0.746	0.255	0.382	5344
		(2.68)	(2.30)	(−0.42)	(2.49)	(2.26)	(3.18)	(−1.92)	(−0.24)	(0.59)	(6.27)	(0.41)	(8.30)	(5.53)		
		Panel D: Use residual ΔP+ and ΔP−, which controls for the correlation between ΔP+, ΔP−, and variables known on the filing date														
(6)	All (1980-2000)	0.453	0.074	−0.004	0.379	0.505	0.023	−0.004	0.719	0.029	0.680	0.233	0.746	0.255	0.382	5344
		(5.41)	(2.30)	(−0.42)	(5.48)	(3.53)	(4.44)	(−0.40)	(2.69)	(2.06)	(6.27)	(0.41)	(8.30)	(5.53)		
(7)	All (1980-2000)	0.467	0.082	−0.001	0.397	0.490	0.023	−0.003	0.779	0.031	0.654		0.747	0.269	0.375	5344
		(5.84)	(2.45)	(−0.12)	(4.92)	(3.50)	(4.28)	(−0.29)	(2.88)	(2.32)	(6.36)		(8.52)	(5.03)		

Table 25: Fama/MacBeth Style Regressions Predicting Future Initial Returns Using Past Industry Conditions

Explanation: Fama/MacBeth style regression coefficients and t-statistics (in parentheses) are reported. The study includes all IPOs issued in the US from 1980 to 2000 excluding: firms with an issue price less than five dollars, ADRs, financial firms, and REITs. The dependent variable, **Initial Return** (IR), is the implied return from the IPO price to the after market trading price. For an IPO issued in year t, the variables measuring industry characteristics are equal-weighted averages of the given quantity over all existing public firms in the IPO's given three-digit SIC industry, over the twelve-month period from July, year t-2 to June, year t-1. These variables are firm equity volatility, leverage ratio, income to sales ratio, book to market, average firm size, share turnover, and prior IPO volume. A company's **Equity Volatility** is the standard deviation of its monthly returns. **Leverage ratio** is the book value of short-term and long-term debt divided by (market cap + book value of debt). **Profitability** is the income to sales ratio, which is a firm's operating income divided by its sales (winsorized at the 10% level). **Book to market** is the log of book value of equity (Compustat item [60]) divided by December market capitalization. **Firm size** is the logarithm of (one plus the market capitalization of a given firm in millions of dollars scaled by S&P500 level of the given year). **Share turnover** is share volume divided by shares outstanding (winsorized at the 10% level). **Prior IPO volume** is the number of IPOs in the prior year scaled by number of public firms at the beginning of the prior year. When specified, the regressions also control for IPO filing date variables and market variables used in Table 24. The **filing date controls** are UWpastIR, UWshare, Overhang, LogSize, InvPrice, and VC. The **market controls** are Mkt15 and PastIR30.

		Dependent variable = initial returns, T–statistics in parentheses										
		Industry–wide Characteristics										
Row	Sample Period	Equity Volatility	Leverage Ratio	Book to Market	Share Turnover	Profit-ability	Firm Size	Prior IPO Volume	*Filing Date Controls*	*Market Controls*	R–Squared	Number of Obs.
(1)	All (1980–2000)	0.287	–0.175			–0.013	–0.008	0.070	Yes	No	0.167	4,657
		(1.50)	(–3.84)			(–0.20)	(–1.14)	(1.28)				
(2)	All (1980–2000)	0.320	–0.181			0.075	–0.010	0.038	Yes	Yes	0.243	4,657
		(1.43)	(–3.17)			(0.91)	(–1.11)	(0.57)				
(3)	All (1980–2000)			–0.028		–0.148	–0.017	0.108	Yes	No	0.156	4,657
				(–1.90)		(–1.56)	(–2.17)	(1.38)				
(4)	All (1980–2000)			–0.037		–0.046	–0.024	0.072	Yes	Yes	0.230	4,657
				(–2.01)		(–0.63)	(–2.25)	(0.79)				
(5)	All (1980–2000)				1.167	–0.079	–0.017	0.066	Yes	No	0.164	4,657
					(2.72)	(–1.18)	(–2.77)	(1.05)				
(6)	All (1980–2000)				1.188	0.006	–0.020	0.037	Yes	Yes	0.236	4,657
					(2.60)	(0.11)	(–2.46)	(0.49)				
(7)	1980-1997	0.032	–0.121			–0.007	–0.011	0.031	Yes	No	0.167	3,747
		(0.29)	(–5.22)			(–0.11)	(–1.70)	(1.30)				
(8)	1980-1997	0.023	–0.108			–0.006	–0.010	0.032	Yes	Yes	0.238	3,747
		(0.18)	(–4.04)			(–0.11)	(–1.60)	(1.44)				
(9)	1980-1997			–0.010		–0.049	–0.011	0.037	Yes	No	0.155	3,747
				(–1.50)		(–0.94)	(–1.82)	(1.47)				
(10)	1980-1997			–0.007		–0.033	–0.011	0.039	Yes	Yes	0.224	3,747
				(–0.97)		(–0.70)	(–1.77)	(1.70)				
(11)	1980-1997				0.573	–0.038	–0.010	0.017	Yes	No	0.163	3,747
					(2.04)	(–0.70)	(–1.74)	(0.96)				
(12)	1980-1997				0.517	–0.020	–0.010	0.018	Yes	Yes	0.230	3,747
					(1.85)	(–0.40)	(–1.59)	(1.07)				

Table 26: Long-term Abnormal IPO Returns by Quartile

Explanation: Mean characteristics are reported for IPOs issued in the US from 1980 to 2000 (numbers in parentheses are for the sub-period that excludes the technology bubble: 1980 to 1997) excluding: firms with an issue price less than five dollars, ADRs, financial firms, and REITs. IPOs issued from 1976 to 1979 are used to compute stable starting values for IndLong, and are otherwise excluded. Within each calendar year, IPOs are grouped into quartiles based on three variables: size-weighted HHI, sales-weighted HHI, and industry leverage for Panels A, B, and C respectively. The reported characteristics are equal-weighted averages over all observations within each quartile. **IR** is the implied return from the IPO price to the closing price after the firm's first day of public trading. We compute abnormal long-term returns using four popular methodologies, where an IPO's long-term returns are for the three years starting from the end of its first day of trading to its third anniversary. **style-matched buy-and-hold abnormal returns** are equal to an IPO's actual three year raw return less the three year return of a style-matched benchmark portfolio, where matching is based on 10 size and 5 book to market portfolios with NYSE breakpoints = 50 benchmark portfolios. **style-matched cumulative abnormal returns** are the abnormal monthly returns relative to the benchmark, accumulated over the 36 months following an IPO. **style-matched calendar time abnormal returns** are the average monthly abnormal returns (multiplied by 36 for convenience) using the same benchmark for four quartile portfolios that span each sample period. Each quartile portfolio has rotating membership and a given IPO enters its respective quartile portfolio in the month of its issuance and exits after its three year anniversity. **Fama-French three-factor abnormal returns** are the intercept (multiplied by 36 for convenience) of Fama/French time series regressions, where each stock's excess returns are regressed on the market factor, the HML factor, and the SMB factor. **Industry-matched buy-and-hold abnormal returns** are equal to an IPO's actual three year return less the equal-weighted average three year return of all existing public firms in the given IPO's industry (based on three-digit SIC codes). **Issuer Size** is the original filing amount in millions. **Size HHI** is the industry's concentration, computed as the Herfindahl index (sum of squared market shares of existing public firms), where each firm's market share is its CRSP market capitalization divided by the total market capitalization of all existing public firms within the given industry. **Sales HHI** is the Herfindahl index based on each firm's COMPUSTAT sales instead of its market capitalization. **Industry leverage** is the book value of short-term and long-term debt divided by (market cap + book value of debt). At the bottom of each panel, significance levels for the difference between an item's average in the first quartile versus its average in the last quartile are reported in brackets for the entire sample and for the sample from 1980 to 1997. Significance levels denoted by ***, **, and * refer to the 1%, 5%, and 10% levels respectively.

	Characteristics for IPOs issued from 1980 to 2000 (1980 to 1997 in parentheses)							
Quartile	Initial Return (IR)	Syle-Matched Buy-and-hold Abnormal Return	Style-Matched Cumulative Abnormal Return	Fama-French Three Factor Abnormal Return	Style-Matched Calendar-Time Abnormal Return	Industry-Matched Buy-and-hold Abnormal Return	Issuer Size	Number of Observations
			Panel A: Size-Weighted Industry Concentration (Size HHI) Quartiles					
Least Concentrated	19.5 (15.3)	13.1 (21.8)	5.7 (15.1)	16.7 (10.6)	8.7 (18.4)	−10.3 (−6.7)	253.4 (154.7)	1373 (1180)
Quartile 2	25.2 (9.9)	−13.7 (6.6)	−17.0 (2.3)	19.1 (−6.1)	−10.7 (−0.8)	−15.2 (−7.9)	253.3 (176.1)	1500 (1121)
Quartile 3	14.5 (11.3)	2.7 (9.4)	−15.6 (−8.0)	−7.3 (−11.1)	−10.6 (−1.0)	−5.0 (−2.1)	226.6 (161.6)	1311 (1134)
Most Concentrated	16.4 (10.2)	−18.4 (−11.2)	−32.5 (−18.3)	−12.2 (−22.3)	−19.7 (−18.8)	−13.5 (−9.7)	254.5 (158.8)	1396 (1150)
Significance Level	[**/***]	[***/***]	[***/***]	[***/***]	[***/***]	[/]	[/]	
			Panel B: Sales-Weighted Industry Concentration (Sales HHI) Quartiles					
Least Concentrated	28.5 (14.6)	0.8 (24.6)	−3.9 (19.9)	30.8 (13.2)	9.7 (24.9)	−15.1 (−7.0)	195.1 (128.6)	1488 (1144)
Quartile 2	13.7 (10.7)	3.4 (4.6)	−7.4 (−7.1)	−1.7 (−10.8)	−5.9 (3.9)	−4.2 (−2.0)	241.3 (174.2)	1293 (1143)
Quartile 3	16.7 (11.4)	−11.6 (−2.1)	−18.2 (−8.2)	−1.6 (−12.9)	−17.3 (−16.8)	−16.4 (−14.1)	276.5 (183.4)	1406 (1152)
Most Concentrated	16.4 (10.1)	−10.2 (−0.2)	−30.8 (−13.1)	−11.5 (−18.1)	−18.5 (14.3)	−8.2 (−3.3)	279.7 (164.2)	1390 (1143)
Significance Level	[***/***]	[/***]	[***/***]	[***/***]	[***/***]	[/]	[***/**]	
				Panel C: Leverage Quartiles				
Least Levered	29.1 (15.0)	0.3 (23.7)	−3.4 (19.2)	33.1 (14.7)	3.3 (14.4)	−11.4 (−2.3)	199.2 (142.5)	1504 (1158)
Quartile 2	14.4 (12.4)	4.6 (5.7)	−7.1 (−6.3)	0.2 (−7.1)	−2.3 (4.2)	−10.6 (−8.8)	187.7 (145.6)	1286 (1133)
Quartile 3	19.0 (10.9)	−7.8 (3.3)	−22.1 (−7.3)	−6.2 (−15.7)	−16.2 (−0.1)	−7.7 (−2.6)	244.0 (173.0)	1399 (1147)
Most Levered	12.6 (8.6)	−14.7 (−6.1)	−27.8 (−14.5)	−12.2 (−21.4)	−15.9 (−16.1)	−15.1 (−12.9)	358.3 (189.4)	1388 (1144)
Significance Level	[***/***]	[**/***]	[***/***]	[***/***]	[*/***]	[/]	[***/***]	

Table 27: Fama/MacBeth Style Regressions Predicting Long-term Abnormal IPO Returns

Explanation: Fama/MacBeth style regression coefficients and T-statistics (in parentheses) are reported for IPOs issued in the US from 1980 to 2000 excluding: firms with an issue price less than five dollars, ADRs, financial firms, and REITs. The dependent variable is the three year abnormal return after the IPO issue date. In Panel A, abnormal returns are computed using **style-matched buy-and-hold abnormal returns** (style matching is based on 10 size and 5 book to market portfolios with NYSE breakpoints = 50 benchmark portfolios) for 36 months. In Panel B, **style-matched cumulative abnormal returns** are monthly abnormal return cumulated over 36 months. In Panel C, **Fama-French three-factor abnormal returns** are the intercept (multiplied by 36 for convenience) of Fama/French time-series regressions, where each stock's excess returns are regressed on the market factor, the HML factor, and the SMB factor. In Panel D, **industry-matched abnormal returns** are actual returns less equal-weighted industry returns. For an IPO issued in year t, the average industry characteristics are equal-weighted averages of the given quantity over all existing public firms in the IPO's given three-digit SIC industry, over the twelve-month period from July, year t-2 to June, year t-1. **Size HHI** is the industry's concentration, computed as the Herfindahl index (sum of squared market shares of existing public firms), where each firm's market share is its CRSP market capitalization divided by the total market capitalization of all existing public firms within the given industry. **Sales HHI** is the Herfindahl index based on each firm's COMPUSTAT sales instead of its market capitalization. **Leverage ratio** is the book value of short-term and long-term debt divided by (market cap + book value of debt). **Firm Size** is the log of (1 + average firm market capitalization, in million dollars, in a given industry scaled by S&P500 level). The **Carter/Manaster rank** is the average rank of the lead underwriter for all IPOs in the given industry in year t-1. **Overhang** is equal to the pre-IPO shares retained by the issuer divided by the shares filed, both primary and secondary. All post-IPO return and accounting variables are obtained from the CRSP and COMPUSTAT databases. **Log Issuer Size** is the natural logarithm of the original filing amount. **PastIR30** is the average underpricing for all IPOs issued in the 30 day window preceding each issue date.

		Dependent variable = Long-term Abnormal returns, T-statistics in parentheses									
		Industry-wide Characteristics				*IPO Characteristics*					
Row	Time Period	Size HHI	Sales HHI	Leverage Ratio	Firm Size	Carter/ Manaster Rank	Overhang	Log Issuer Size	PastIR30	R-Squared	Observations
					Panel A: style-matched Buy-and-Hold Abnormal Returns						
(1)	All (1980-2000)	-0.237		-0.409	-0.069	0.101	0.049	-0.103	-0.571	0.068	5,565
		(-2.36)		(-1.19)	(-0.77)	(3.67)	(2.22)	(-2.03)	(-1.28)		
(2)	All (1980-2000)		-0.207	-0.434	-0.079	0.102	0.049	-0.102	-0.565	0.068	5,565
			(-1.96)	(-1.29)	(-0.90)	(3.75)	(2.26)	(-2.03)	(-1.25)		
(3)	1980-1997	-0.332		-0.430	-0.116	0.114	0.053	-0.125	-0.660	0.065	4,570
		(-3.30)		(-1.07)	(-1.35)	(4.00)	(2.10)	(-2.19)	(-1.27)		
(4)	1980-1997		-0.263	-0.468	-0.127	0.115	0.052	-0.123	-0.654	0.065	4,570
			(-2.22)	(-1.20)	(-1.53)	(4.11)	(2.14)	(-2.19)	(-1.24)		
					Panel B: style-matched Cumulative Abnormal Returns						
(5)	All (1980-2000)	-0.241		-0.787	-0.050	0.078	0.018	-0.062	-0.633	0.076	5,565
		(-2.21)		(-3.44)	(-0.56)	(3.45)	(1.01)	(-1.58)	(-1.60)		
(6)	All (1980-2000)		-0.260	-0.794	-0.055	0.077	0.018	-0.059	-0.616	0.078	5,565
			(-1.54)	(-3.24)	(-0.60)	(3.32)	(1.00)	(-1.53)	(-1.59)		
(7)	1980-1997	-0.210		-0.729	-0.103	0.082	0.016	-0.064	-0.692	0.080	4,570
		(-1.75)		(-2.93)	(-1.28)	(3.63)	(1.05)	(-1.53)	(-1.49)		
(8)	1980-1997		-0.180	-0.744	-0.107	0.082	0.016	-0.062	-0.670	0.081	4,570
			(-1.37)	(-2.95)	(-1.32)	(3.60)	(1.02)	(-1.50)	(-1.48)		

Table 27: Fama/MacBeth style regressions predicting long-term abnormal IPO returns: Cont'd

Explanation: Fama/MacBeth style regression coefficients and T-statistics (in parentheses) are reported for IPOs issued in the US from 1980 to 2000 excluding: firms with an issue price less than five dollars, ADRs, financial firms, and REITs. The dependent variable is the three year abnormal return after the IPO issue date. In Panel A, abnormal returns are computed using **style-matched buy-and-hold abnormal returns** (style matching is based on 10 size and 5 book to market portfolios with NYSE breakpoints = 50 benchmark portfolios) for 36 months. In Panel B, **style-matched cumulative abnormal returns** are monthly abnormal return cumulated over 36 months. In Panel C, **Fama-French three-factor abnormal returns** are the intercept (multiplied by 36 for convenience) of Fama/French time-series regressions, where each stock's excess returns are regressed on the market factor, the HML factor, and the SMB factor. In Panel D, **industry-matched abnormal returns** are actual returns less equal-weighted industry returns. For an IPO issued in year t, the average industry characteristics are equal-weighted averages of the given quantity over all existing public firms in the IPO's given three-digit SIC industry, over the twelve-month period from July, year t-2 to June, year t-1. **Size HHI** is the industry's concentration, computed as the Herfindahl index (sum of squared market shares of existing public firms), where each firm's market share is its CRSP market capitalization divided by the total market capitalization of all existing public firms within the given industry. **Sales HHI** is the Herfindahl index based on each firm's COMPUSTAT sales instead of its market capitalization. **Leverage ratio** is the book value of short-term and long-term debt divided by (market cap + book value of debt). **Firm Size** is the log of (1 + average firm market capitalization, in million dollars, in a given industry scaled by S&P500 level). The **Carter/Manaster rank** is the average rank of the lead underwriter for all IPOs in the given industry in year t-1. **Overhang** is equal to the pre-IPO shares retained by the issuer divided by the shares filed, both primary and secondary. All post-IPO return and accounting variables are obtained from the CRSP and COMPUSTAT databases. **Log Issuer Size** is the natural logarithm of the original filing amount. **PastIR30** is the average underpricing for all IPOs issued in the 30 day window preceding each issue date.

		Dependent variable = Long-term Abnormal returns, T-statistics in parentheses									
		Industry-wide Characteristics				*IPO Characteristics*					
Row	Time Period	Size HHI	Sales HHI	Leverage Ratio	Firm Size	Carter/ Manaster Rank	Overhang	Log Issuer Size	PastIR30	R-Squared	Observations
				Panel C: fama-french three-factor Abnormal Returns							
(9)	All (1980-2000)	−0.224		−0.943	−0.024	0.066	0.046	−0.082	−0.449	0.075	4,965
		(−2.03)		(−3.18)	(−0.33)	(3.98)	(2.73)	(−2.41)	(−1.08)		
(10)	All (1980-2000)		−0.219	−0.941	−0.034	0.067	0.044	−0.076	−0.469	0.075	4,965
			(−2.27)	(−3.14)	(−0.48)	(4.07)	(2.62)	(−2.30)	(−1.12)		
(11)	1980-1997	−0.245		−0.816	−0.095	0.061	0.033	−0.055	−0.528	0.076	4,175
		(−2.78)		(−2.45)	(−1.35)	(3.72)	(2.06)	(−1.71)	(−1.08)		
(12)	1980-1997		−0.190	−0.835	−0.106	0.063	0.031	−0.052	−0.548	0.076	4,175
			(−1.77)	(−2.49)	(−1.55)	(3.83)	(1.93)	(−1.62)	(−1.11)		
				Panel D: Industry-adjusted Abnormal Returns							
(13)	All (1980-2000)	−0.045		−0.013	−0.054	0.090	0.038	−0.052	−0.553	0.053	5,565
		(−0.41)		(−0.05)	(−0.76)	(3.51)	(1.93)	(−1.09)	(−1.78)		
(14)	All (1980-2000)		−0.036	−0.008	−0.055	0.091	0.038	−0.055	−0.563	0.054	5,565
			(−0.26)	(−0.03)	(−0.79)	(3.55)	(1.99)	(−1.14)	(−1.79)		
(15)	1980-1997	−0.097		−0.067	−0.102	0.099	0.039	−0.051	−0.650	0.053	4,570
		(−0.81)		(−0.21)	(−1.40)	(3.54)	(1.77)	(−0.91)	(−1.83)		
(16)	1980-1997		−0.074	−0.061	−0.106	0.099	0.040	−0.053	−0.664	0.055	4,570
			(−0.48)	(−0.20)	(−1.49)	(3.58)	(1.83)	(−0.95)	(−1.84)		

Table 28: Fama/MacBeth Style Regressions Predicting IPO Volume

Explanation: Fama/MacBeth regression coefficients and t-statistics (in parentheses) are reported. One observation represents a three-digit SIC code in one year. The dependent variable is the IPO volume in an industry in year t. It is measured as the number of IPOs in year t scaled by the number of public firms in the industry at the end of prior year. **Prior Volume** is the past year's IPO volume within the given industry (i.e., from year t-1). The independent variables measuring industry characteristics are equal-weighted averages of the given quantity over all existing public firms in the three-digit SIC industry, over the twelve-month period from July, year t-2 to June, year t-1. **Size HHI** is the industry's concentration, computed as the Herfindahl index (sum of squared market shares of existing public firms), where each firm's market share is its CRSP market capitalization divided by the total market capitalization of all existing public firms within the given industry. **Sales HHI** is the Herfindahl index based on each firm's COMPUSTAT sales instead of its market capitalization. **Leverage ratio** is the book value of short-term and long-term debt divided by (market cap + book value of debt). **Equity volatility** is the standard deviation of monthly stock returns for all existing public firms in the given three-digit SIC code. **Firm Size** is the log of (1 + average firm market capitalization, in million dollars, in a given industry scaled by S&P500 level). **Book to market** is the log of book value of equity (Compustat item [60]) divided by December market capitalization. **Prior return** is the equal-weighted industry-wide returns in the period July, year t-2 to June, year t-1. **IndLong,t-2** is the average abnormal initial returns for all IPOs issued in the given industry from 1980 to year t-2. Abnormal initial returns are actual initial returns less market-wide average initial returns in the same month.

Dependent variable = IPO volume in an industry, t-statistics in parentheses

Row	Sample Period	Size HHI	Sales HHI	Prior Volume	Equity Volatility	Leverage Ratio	Book to Market	Firm Size	Prior Return	IndLong,t-2	R-Squared	Number of Observations
(1)	All (1980-2000)	0.027		0.166	0.057	0.001		–0.008	0.044	0.029	0.186	4,157
		(2.23)		(4.54)	(0.54)	(0.03)		(–1.45)	(3.30)	(1.17)		
(2)	All (1980-2000)		0.026	0.166	0.054	–0.001		–0.007	0.043	0.031	0.186	4,156
			(2.06)	(4.57)	(0.52)	(–0.02)		(–1.35)	(3.25)	(1.29)		
(3)	All (1980-2000)	0.027		0.167	–0.003		–0.014	–0.010	0.042	0.018	0.184	4,154
		(2.32)		(4.69)	(–0.04)		(–2.22)	(–1.89)	(3.49)	(0.61)		
(4)	All (1980-2000)		0.025	0.167	–0.004		–0.014	–0.010	0.041	0.021	0.184	4,153
			(2.09)	(4.71)	(–0.05)		(–2.21)	(–1.77)	(3.42)	(0.73)		
(5)	1980-1997	0.033		0.180	0.013	0.009		–0.010	0.049	0.025	0.200	3,289
		(2.33)		(4.21)	(0.11)	(0.23)		(–1.47)	(3.16)	(0.85)		
(6)	1980-1997		0.031	0.180	0.009	0.007		–0.009	0.048	0.028	0.200	3,288
			(2.12)	(4.24)	(0.08)	(0.19)		(–1.37)	(3.11)	(0.97)		
(7)	1980-1997	0.032		0.181	–0.053		–0.013	–0.011	0.047	0.012	0.197	3,287
		(2.40)		(4.38)	(–0.59)		(–1.79)	(–1.79)	(3.37)	(0.34)		
(8)	1980-1997		0.030	0.181	–0.055		–0.013	–0.011	0.046	0.016	0.197	3,286
			(2.12)	(4.40)	(–0.59)		(–1.78)	(–1.66)	(3.29)	(0.46)		

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