

Institutional Ownership, Cost of Capital, and Corporate Investment

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Abstract

Neoclassical models postulate that firms' investment is determined by expected profitability and the cost of capital. Capital market imperfections, caused by information asymmetries and agency costs, lead to a modified investment scenario, where the external cost of capital is higher than the cost of internal funds. This, in turn, leads to the well-known result of underinvestment by firms. We hypothesize in this study that institutional investors alleviate some of the capital market frictions by their relatively efficient information processing and managerial monitoring activities, thereby mitigating the underinvestment problem. In support of this hypothesis, we provide evidence indicating that: (1) The size of institutional ownership in public companies is positively related to the rate of investment in fixed assets, corporate acquisitions, and R&D; (2) institutions that trade frequently attempting to exploit short-term mispricings are more effective in reducing information asymmetries and enhancing corporate investment than other institutions; and (3) institutional investors eliminate the documented mispricing of securities associated with business investments. Taken together, these findings suggest that institutional investors alleviate market imperfections, thereby mitigating the underinvestment problem.

Neoclassical investment theory identifies two major determinants of firms' investment: expected return on investment, and the cost of capital. These investment determinants are crystallized in Tobin's (1969) well-known q-theory, postulating a positive relation between the firm's q ratio—market value divided by the replacement cost of assets—and its rate of investment. The q ratio reflects both expected profitability and cost of capital, as perceived by investors. Indeed, extensive empirical testing corroborated the q ratio-investment rate association (Hubbard, 1998).

The firm's investment decision becomes more nuanced and complicated when capital market frictions are admitted, particularly information asymmetries (between managers, investors and creditors) and agency costs. With these frictions, the cost of external funds will generally be higher than the cost of internal funds:

“In the presence of incentive problems and costly monitoring of managerial actions, external suppliers of funds to firms require a higher return to compensate them for these monitoring costs and the potential moral hazard associated with managers' control over the allocation of investment funds” (Hubbard, 1998, pp. 194-95).

The existence of market frictions leads to a substantial modification of the neoclassical investment model, predicting: (a) information asymmetries and/or agency costs will result in underinvestment relative to the first-best benchmark,¹ and (b) increases in the availability of the lower-cost internal funds will positively affect the firm's investment rate. Empirical work corroborated these predictions (see research surveyed by Hubbard, 1998). In particular, measures of available funds (financial slack) were found to be positively associated with the firm's rate of investment, given the q ratio and other fundamentals (e.g., Fazzari et al., 1988). In the

¹ Firm underinvestment is predicted most clearly by the Myers and Majluf (1984) model. As stated by Stein (2001, p. 6): “To the extent that managers favor their current stockholders at the expense of potential future investors, they will wish to sell new shares at times when their private information suggests that these new shares are most overvalued. As a result, equity issues are rationally interpreted by the market as bad news ... which in turn make managers of good firms reluctant to sell equity in the first place. The bottom line is that even firms who are badly in need of new equity--say because they have good investment opportunities but scarce internal resources--may be unable or unwilling to raise it.”

neoclassical, frictionless investment model, internal funds should not affect the investment decision.

We focus in this study on the role of institutional investors in reducing the cost of external funds via monitoring managers' activities. Institutional investors frequently participate in board activities and occasionally intervene in firms' decisions to prevent self-serving managerial behavior.² Such monitoring can be expected to alleviate investors' concerns with agency issues, thereby reducing the cost of external funds. Perhaps more importantly, institutional investors gather, analyze, disseminate and trade upon valuation-relevant information on the firm, thereby improving price accuracy. This decrease in information asymmetry mitigates underinvestment and deters managers from taking actions that are not in the best interest of shareholders, as they realize that doing so would cause an immediate decrease in firm value. We thus hypothesize that institutional investors' activities narrow the wedge between the costs of internal and external funds, thereby improving the underinvestment problem.

We predict that: (a) Other things equal, the larger the share of institutional ownership in the firm (lowering the cost of external funds), the higher will be the rate of capital investment. (b) The importance of internal funds in mitigating the adverse effect of market frictions on firm investment, documented extensively by earlier research, should decrease in institutional ownership which reduces the wedge between the cost of internal and external funds. (c) Documented price inefficiencies associated with capital investments will decrease in institutional ownership, because institutions decrease information asymmetries between managers and external suppliers of funds. And (d) the role of institutions in mitigating underinvestment should be more pronounced for "active" institutions, which contribute to price efficiency (and hence

² The corporate governance interventions of CALPERS and TIAA-CREF, for example, get wide media coverage.

decrease information asymmetries) more than “passive” institutions. Our empirical findings for investments in fixed assets, corporate acquisitions, and R&D corroborate all four predictions.

Thus, this study postulates and comprehensively documents the vital positive role of institutional investors in firms’ investment decisions. These findings are particularly timely in the current scandal-ridden environment, where multiple and costly laws and regulations are enacted to improve the monitoring of managers. The free-market impact of institutional investors on mitigating information asymmetries and agency costs documented here is an obvious complement and perhaps even a partial substitute for regulation.³

The paper is organized as follows. Section 1 contains a literature review. Section 2 describes the data and research methodology. Section 3 presents the empirical results. Section 4 examines an alternative interpretation of the results, and Section 5 concludes the paper.

1. Relevant Research

In the neoclassical, frictionless scenario, the firm’s investment should be strongly associated with Tobin’s q , since the latter reflects investors’ perceptions about expected profitability and cost of capital. This association has indeed been corroborated by empirical research, but it was not found to be as strong and pervasive as suggested by the neoclassical model (e.g., Morck, Shleifer, and Vishny (1990)). Further, research has documented that other factors in addition to Tobin’s q play an important role in the investment decision. Prominent among the factors are those reflecting the availability of internal funds (e.g., cash in hand), the ability to borrow (e.g.,

³ Stein (2001) links underinvestment to earnings management, arguing that managers will underinvest in assets which are difficult for investors to monitor (e.g., R&D and maintenance), thereby inflating short-term earnings. There is some evidence supporting such behavior (e.g., Dechow and Sloan, 1991).

leverage), and the wedge between the cost of external and internal funds (e.g., information asymmetries and underwriting costs).⁴

In his review of research on the effects of capital-market imperfections on corporate investments, Hubbard (1998, p. 201) suggests that “... to be useful in empirical tests, sorting criteria should focus on a firm’s characteristics that are associate with information costs. That is, these criteria should attempt to identify firms likely to face a significant spread between the cost of external financing and internal financing.” Our focus in this study on institutional investors can be considered in Hubbard’s spirit as a sorting of firms by information costs. Institutional investors gather, analyze, disseminate and trade upon valuation-relevant information on the firm, and should therefore mitigate information asymmetries and reduce the gap between the costs of internal and external funds.⁵ This, in turn, should alleviate underinvestment by the firm, lead to a smaller effect of financial slack on firm investment, and cause higher share price accuracy. These predictions are tested in the current study.

Although many prior studies find that institutions reduce information asymmetry and improve price accuracy (see footnote 5), some show that institutional investments may actually contribute to price inefficiency and induce myopic behavior by managers. Articles in the financial press suggest that institutional investors are overly focused on current profitability, and empirical research provides some support.⁶ Bushee (1998) demonstrates that the short-term focus of many institutional investors induces some firms to reduce R&D when earnings are expected to

⁴ See references in Stein (2001, p. 24).

⁵ Institutional investors have relatively low marginal costs of gathering information (Lev (1988)) and enjoy increasing returns to scale in processing information (Wilson (1975)). Empirical research generally finds that institutional investors are on average more sophisticated than other investors (e.g., Hand (1990), Walter (1997), Utama and Cready (1997), Bushee (1998) and Jiambalvo et al. (2002)).

⁶ See Jiambalvo et al. (2002) for examples of media articles, and Hessel and Norman (1992), Potter (1992) and Bushee (2001) for empirical evidence.

decline. Research has also demonstrated that the preferences of institutional investors for certain stock characteristics (e.g., large firm size) have a distorting effect on institutions' contribution to price efficiency (e.g., Gompers and Metrick (2001)). Moreover, several studies find that institutional ownership increases stock return volatility (e.g., Potter (1992), Sias (1996), Bushee and Noe (2000)), which may increase the cost of equity capital and reduce corporate investment. Thus, the extent to which institutional investors mitigate firm underinvestment is an empirical question, which this study addresses.

Our study is related to Richardson (2002), which finds that managers of firms with large institutional ownership are less likely to overinvest surplus cash, due to the monitoring (corporate governance) activities of institutions.⁷ We instead focus on the instance of underinvestment by companies and extend the contribution of Richardson (2002) in several directions. First, controlling for financial slack (cash) and investment opportunities, we find that the level of institutional ownership *positively* affects firm investment. Second, we document and explain similarities and differences in the effects of institutional ownership on different types of corporate investments (property, plant & equipment, corporate acquisition, and R&D). Third, we demonstrate that the positive effect of institutional ownership on firm underinvestment varies considerably across institution type. Fourth, we show that institutional investors improve stock mispricing associated with corporate investment. These extensions to available research are important especially because they lead us to a different inference: Institutional ownership reduces firm underinvestment, and this effect is primarily due to the reduction in information asymmetries (rather than to corporate governance activities). Nevertheless, our findings are not

⁷ As discussed in Section 4 below, prior research has demonstrated that some firms invest in negative present value projects. This phenomenon is referred to as “overinvestment.” Note, however, that firms may simultaneously overinvest in some projects (e.g., corporate jets and other “perks” or projects that achieve diversification but destroy shareholder value) and underinvest in others (e.g., new machines or R&D).

contradicting those of Richardson (2002). Indeed, as discussed in Section 4, the results of the stock return tests suggest that firms with high levels of institutional ownership are less likely to overinvest in addition to being less prone to underinvest.

2. Research Methodology and Data

Our primary research design involves regressions of firm rates of investment on the previous year's levels of proxies for investment opportunities, financial slack, institutional ownership, the interaction of institutional ownership and financial slack, and the "activism" of the institutions holding the firm's shares. As discussed above, to the extent that institutions reduce agency costs and/or mitigate information asymmetries, we expect firm investment to (1) increase in the level of institutional ownership, (2) decrease in the interaction between institutional ownership and financial slack (which becomes less important with institutional ownership), and (3) increase in institutional activism. We next discuss the data and variables, and then present the regression models.

To construct the sample, we merge data from three sources: Accounting (financial statement) numbers are derived from the COMPUSTAT industrial, full coverage, and research files; stock returns and listing data are obtained from the Center for Research in Securities Prices (CRSP) monthly files; and institutional 13(f) common stock holding data from Thomson Financial Securities Data. Because institutional holding data are available only for the end-of-calendar quarters, we restrict the sample to firm-year observations with December fiscal year-end.

Firms increase or maintain operating capacity by acquiring fixed assets (capital expenditures), or by purchasing other companies (business acquisitions). For many companies,

operating capacity is also acquired by investing in intangible assets, typically reported as research and development (R&D) expenditures in the financial statements. Accordingly, we measure the dependent variable (rate of total investment) as the sum of capital expenditures, business acquisitions, and research and development during the year, divided by total assets at the beginning of the year. As the three investment types may have different sensitivities to institutional ownership, we also estimate regressions focusing on each type of investment separately.⁸

Institutional ownership (IO) is measured as the fraction of shares outstanding held by “large” institutional investors (institutions with more than \$100 million of securities under discretionary management, which are subject to the 13(f) disclosure requirements).⁹ Institutional holding data are available from the first quarter of 1980 through the fourth quarter of 2000. As we measure institutional ownership at the beginning of the year, our sample period is therefore 1981 through 2001.

Following previous studies (see the literature reviews in Hubbard (1998) and Stein (2001)), we control for investment opportunities using Tobin’s q (Q), measured as the ratio of the market value of equity plus the book value of debt to the sum of their book values. Investment opportunities are also related to the average stage in the life cycle of the firm’s products: All else equal, mature companies are expected to have lower investment opportunities,

⁸ Examining business acquisitions and research and development separately is important also because of the following measurement issue. Research and development expenditures are extracted from the income statement and many times include purchased in-process R&D (i.e., the amount allocated to the value of in-process R&D purchased in business acquisitions). Business acquisitions are extracted from the cash flow statement and include the amount of cash paid for in-process R&D. Consequently, the measure of total firm investment double-counts investments in in-process R&D for some firms.

⁹ When the number of outstanding shares was missing in Thomson (either due to missing data or to absence of institutional ownership), we extracted the information from CRSP. For shares not included in Thomson, we assumed zero institutional ownership.

and hence lower rates of investment. We use the log of total assets (LOGTA) and the number of years since the start of coverage period by CRSP (AGE) as proxies for firm maturity.

Firms invest to exploit new investment opportunities, and also to maintain physical capital. We control for capital maintenance investment using the ratio of depreciation and amortization to total assets (DEP). We measure financial slack using the ratio of cash plus marketable securities to total assets (CASH), and we also control for the ratio of debt to the sum of debt and equity (LEV). Leverage reduces the amount of cash available for investment (due to debt servicing costs) and it restricts the ability to borrow additional funds.

Institutional investors differ in their intensity of trading on fundamental information and in their involvement in corporate governance activities. Accordingly, the effect of institutional ownership on agency costs, information asymmetry, and hence on firm investment is likely to vary across institution type. Bushee (1998) classifies institutional investors into three groups: Institutions that hold large positions for a long period of time (“dedicated institutions”), institutions that follow indexing strategies (“quasi-indexers”), and institutions that trade frequently in stocks attempting to profit from short term price changes (“transient institutions”).¹⁰ Ownership by dedicated institutions may mitigate the concerns of other investors and creditors that management may waste their funds, and is therefore expected to reduce the wedge between the costs of internal and external capital and increase firm investment. Transient institutions trade quickly upon valuation-relevant information, and are therefore expected to improve price accuracy and mitigate information asymmetries more than other institutions (e.g., Collins et al. (2003), Lev and Nissim (2003)). We therefore construct two variables in order to capture the “activism” of institutions in reducing capital market frictions: The ratio of ownership

¹⁰ Bushee’s (1998) classification of institutional investors is based on their past investment patterns, as reflected in portfolio turnover, diversification, and momentum trading.

by dedicated institutions to total institutional ownership (IO_DED), and the ratio of ownership by transient institutions to total institutional ownership (IO_TRA).¹¹

Our proxies for investment opportunities, financial slack and institutional ownership are not likely to fully capture the time series and cross-sectional variation in the factors influencing corporate investments. To mitigate the effect of correlated omitted variables and to reduce potential overstatement of *t*-statistics due to autocorrelation in the disturbance, we include fixed year (α_y) and industry (α_{ind}) effects in the regressions. The regression model we use is:

$$\begin{aligned}
 INV_{ij} = & \alpha_y + \alpha_{ind} + \beta_1 IO_{t-1j} + \beta_2 Q_{t-1j} + \beta_3 LOGTA_{t-1j} + \beta_4 AGE_{t-1j} \\
 & + \beta_5 DEP_{t-1j} + \beta_6 LEV_{t-1j} + \beta_7 CASH_{t-1j} + \beta_8 IO_{t-1j} \times CASH_{t-1j} \\
 & + \beta_9 IO_DED_{t-1j} + \beta_{10} IO_TRA_{t-1j} + \varepsilon_{ij}
 \end{aligned} \tag{1}$$

where INV_t is firm's investment in year *t* (as discussed above, we use several measures of investment), divided by total assets at *t*-1. All other variables are as defined above.

If institutional ownership mitigates market frictions caused by agency costs and/or information asymmetries, we expect a positive coefficient on institutional ownership (β_1) and a negative coefficient on the interaction between institutional ownership and financial slack (β_8). If institutional ownership reduces agency costs, we expect a positive coefficient on IO_DED (β_9), and if institutional ownership mitigates information asymmetries, we expect a positive coefficient for IO_TRA (β_{10}).

We then conduct a more direct test of whether the relationship between firm investment and institutional ownership is due to the effect of institutions on information asymmetry. Prior

¹¹ Classification data are available for the years 1981–1999 and are missing only for a relatively few observations. For the year 2000, we used the 1999 classification. The measurement error due to this assumption is likely to be small because the time-series correlation in the classification scheme exceeds 80%. However, the frequency of missing classifications is larger for 2000 due to the unavailability of classification data for institutions that were added in 2000. We obtained similar results to those reported when excluding the year 2000 data.

research has shown that capital expenditures and business acquisitions are associated with negative subsequent abnormal returns (mispricing).¹² If institutional investors reduce information asymmetry, the abnormal returns following capital expenditures and business acquisitions should be less negative for firms with high levels of institutional ownership than with low levels. To examine this hypothesis, each year we identify firms with high levels of capital expenditures or business acquisitions (the top quintile of the empirical cross-sectional distribution), partition these firms based on the level of institutional ownership into two equal-size groups, and examine the subsequent abnormal returns for each group. We expect that the abnormal returns for the high institutional ownership group will be lower in absolute value (i.e., less negative) than the abnormal returns for the low institutional ownership group.

We perform the same test for research and developments expenditures. Unlike capital expenditures and business acquisitions, R&D is associated with *positive* subsequent abnormal returns (e.g., Lev and Sougiannis (1996)), although the pervasiveness of these returns has been questioned (e.g., Chan et al. (2001)). If institutional ownership reduces information asymmetry, the abnormal returns following the R&D investment should be smaller for high institutional ownership firms. However, to the extent that institutional investors are better than other investors in identifying firms with profitable R&D projects, the abnormal returns may actually be positively related to the level of institutional ownership. Hence, unlike for capital expenditures and business acquisitions, in the R&D case, the implications of the information advantage of institutional investors for subsequent stock returns are not clear.

¹² For evidence on the negative association between capital expenditures and subsequent stock returns, see, for example, Abarbanell and Bushee (1998), Titman et al. (2001), and Beneish et al. (2001). The research on the (negative) relationship between business acquisitions and subsequent stock returns is voluminous (see Stein (2001) for review).

3. Empirical Results

3.1 Institutional Ownership and Firm Investment

Table 1 presents the estimates of Equation (1) with total firm investment (fixed assets, acquisitions, and R&D) as the dependent variable, for four five-year periods: 1982–1986, 1987–1991, 1992–1996, and 1997–2001.¹³ It is evident that the estimated coefficient on institutional ownership (IO) is positive and significant (see *t*-values below the coefficients) in all four periods, consistent with the hypothesis that institutional investors mitigate the effects of capital market imperfections on firms' investments, namely reduce the cost of external capital. The magnitude and significance of the IO coefficient are larger in the last two periods (the 1990s) relative to the first two periods (the 1980s), consistent with evidence that the capital markets impact of institutions has increased considerably during the 1990s (e.g., Gompers and Metrick (2001)). We further examine this trend in the IO coefficient in subsequent analyses.

The sign and significance of the coefficients on the control variables are generally consistent with expectations. Specifically, in each of the four time periods, investment is positively and strongly related to Tobin's *q* (*Q*), and to depreciation (*DEP*), and negatively related to firm's age (*AGE*) and leverage (*LEV*). In addition, the relationship of investment with the level of cash (*CASH*) is positive and significant in three of the four periods, and the relationship with firm size (*LOGTA*) is negative and significant in two periods.

The coefficient on the interaction variable (between institutional ownership and financial slack) is negative and at least marginally significant in each of the four periods. This result supports the hypothesis that the effect of financial slack in mitigating underinvestment is smaller for firms with high levels of institutional ownership, which in turn implies that institutional

¹³ We delete all observations for which any of the variables used in the regressions lies outside the 0.5% to 99.5% range of its empirical distribution.

investors reduce the negative effect of capital market imperfections on corporate investments. Again, this effect is larger and more significant in the 1990s. We are not the first to document this relationship. Richardson (2002) reports a similar result and interprets it as evidence that institutional ownership reduces firm overinvestment. As discussed in Section 4, based on evidence from several different tests, we suggest an alternative interpretation: Institutional investors mitigate underinvestment by reducing firms' dependence on financial slack.

The results for institutional activism are somewhat mixed. In each of the four periods, the coefficient on the intensity of ownership by transient institutions (IO_TRA) is positive and highly significant, indicating that institutions that trade frequently in stocks attempting to profit from short term price changes mitigate information asymmetries more than other institutions. However, the coefficient on the intensity of ownership by dedicated (long-term) institutions (IO_DED) is generally insignificant, suggesting that corporate governance activities by institutional investors have a limited impact on firms' investment.

We next examine whether the effects of institutional ownership, financial slack and institutional activism in mitigating market frictions vary by the type of corporate investment. Table 2 presents estimation results for capital expenditures (Panel A), business acquisitions (Panel B), and R&D (Panel C). For capital expenditures, all the results are similar to those reported in Table 1 for total firm investments, except that now there are no apparent time trends in the IO and IO_TRA coefficients.

The results for business acquisitions (in Panel B of Table 2) differ in various respects from those of fixed assets (Panel A): The average R-squared for the business acquisitions regressions is about 10 percent compared with 55 percent for capital expenditures. This is not surprising, given the lump sum nature of business acquisitions. Accordingly, the t -statistics for

the coefficients are generally smaller than for the corresponding coefficients in the capital expenditures regressions. However, for the variables of interest, the coefficients have the same signs as in the capital expenditures regressions and are generally significant. In particular, institutional ownership and the intensity of ownership by transient institutions are both positively related to business acquisitions, and the interaction term (institutional ownership and cash) is negative. The only major difference with fixed assets is that the IO coefficient in the business acquisitions regressions has a strong positive time trend: The coefficient is about three times larger in the 1990s relative to the 1980s.

The results for research and development investments in Panel C are generally similar to those for capital expenditures. In particular, the sign and significance of the coefficients on institutional ownership, the interaction term and the control variables, as well as the regressions R-squared, are all similar to the corresponding statistics in Panel A. There are three differences, however. First, similar to business acquisitions, the sign and significance of the IO coefficients have increased during the 1990s. Second, unlike the results for capital expenditure and business acquisitions, the intensity of ownership by dedicated (long term) institutions is positively and significantly related to R&D investment in three of the four periods. Finally, the coefficient on the intensity of ownership by transient institutions, although positive and generally significant, is less significant than for business acquisitions and (especially) for capital expenditures.

The larger impact of ownership by dedicated institutions and the lower importance of ownership by transient institutions on R&D investment relative to capital expenditures and business acquisitions are consistent with the findings of Bushee (1998). Unlike investments in fixed assets and businesses, which are capitalized on the balance sheet (do not affect reported earnings), R&D expenditures are expensed as incurred, thereby reducing current earnings.

Bushee (1998) demonstrates that ownership by dedicated (transient) institutions decreases (increases) the probability that managers reduce R&D when earnings are expected to decline. We focus on all firms (not just those that are expected to report earnings declines), and hence this effect is likely to be smaller for our sample. Nevertheless, consistent with the findings of Bushee (1998), our results suggest that the short-term focus of transient institutions reduces their effectiveness in mitigating firm underinvestment in R&D.

Searching for an explanation to the distinct trends over the sample period in the IO coefficients documented in Table 2 (strong positive trends for business acquisitions and R&D versus no trend for capital expenditures), we report in Table 3 the mean values of each type of investment (deflated by total assets at the beginning of the year), for each of the four sample periods. It is evident that the intensity of business acquisitions and R&D has increased substantially during the 1990s, while the intensity of capital expenditures has slightly declined. These results suggest that the strengthening of the association of institutional ownership with business acquisitions and R&D during the 1990s is at least in part due to the increase in the importance of these investment forms.

Equation (1) simultaneously tests three different hypotheses using four terms that are all calculated based on the level of institutional ownership (IO, IO×CASH, IO_DED, IO_TRA). This raises the concern that some of the results may be spurious. For example, the coefficient on IO may be non-zero because it is affected by non-linearity in the relationship between firm investment and IO×CASH. We therefore re-estimate equation (1) using subsets of the four IO terms to check the robustness of the results. We obtain similar results to those reported above in all cases. For example, when we exclude the interaction term, we find that the coefficients on IO

and IO_TRA are positive and highly significant in each of the four periods, and the coefficient on IO_DED is generally insignificant.

Summarizing, we document that institutional investors, particularly the active ones, enhance the rate of corporate investment, likely because they alleviate market imperfections. Consistent with this we find that the role of internal funds in firms' investment decreases with institutional ownership. For investments in R&D and business acquisitions, which increased significantly in the 1990s, we document a similar enhanced effect of institutional investors on corporate investment.

3.2 Future Returns

In this section we present direct evidence on the contribution of institutions to share price accuracy and in turn to the reduction of capital market frictions. Specifically, we examine the association between future abnormal stock returns and the level of institutional ownership for firms with high levels of capital investments. Prior research has demonstrated that capital investments are on average followed by negative abnormal stock returns, implying investors' mispricing of securities around corporate investments. Hence, to the extent that institutions are relatively sophisticated investors, capital investments by firms with high levels of institutional ownership should be followed by less negative abnormal returns than investments by firms with lower institutional ownership.

To examine this prediction, we perform the following analysis. In each of the 20 years between 1980 and 1999 (referred to as year t), we select the 20 percent of firms with the largest ratio of capital expenditures to total assets and, for these observations, construct two equal-size

portfolios based on the level of institutional ownership (IO).¹⁴ We then examine the annual return from May 1 of year $t+1$ through April 30 of year $t+2$ for each portfolio, and test the significance of the difference in abnormal returns between the two portfolios.

The results of this analysis are reported in Panel A of Table 4. Panels B and C report the results of similar analyses for investments in business acquisitions and R&D, respectively. For each portfolio (low IO, high IO), we report the time-series mean of each year's cross-sectional mean for investment (INV), institutional ownership (IO), three measures of subsequent portfolio returns (raw returns, and two measures of abnormal, risk-adjusted returns: size-adjusted returns, and returns adjusted for both size and book-to-market), and four firm and stock return characteristics (SIZE, B/M, BETA, and VOLAT). For the three portfolio return measures, we also report the t -statistics associated with the time-series distribution of the cross-sectional means. At the bottom of each panel we report the time-series means and t -statistics for the differences in the mean portfolio returns and the various characteristics between the high and low IO portfolios.

The first measure of subsequent returns in Table 4 (Raw Returns) is the one-year ahead (subsequent to investment) buy-and-hold return. The second measure (SIZE Adjusted Returns) is calculated by deducting the contemporaneous size-decile return from the firm's raw return. The third measure (SIZE & B/M Adjusted Returns) is calculated as the difference between the firm's return and the contemporaneous return on a matched portfolio based on size (five quintiles) and book-to-market (five quintiles for each size quintile). In effect, we construct 25 benchmark

¹⁴ We cannot use fiscal years after 1999 for this analysis, since the CRSP files we use contain data through December, 2001. As discussed below, we measure abnormal returns from the beginning of May of the subsequent year, and cumulate returns until April of the following year.

portfolios, and subtract the return of the corresponding benchmark portfolio from the firm's raw return.¹⁵

The benchmark size and book-to-market returns are calculated using all firms with available data on CRSP. SIZE is measured as the log of the market value of equity at the end of April in year $t+1$. The book-to-market ratio (B/M) is calculated using the market and book values of common equity at the end of the year t . The returns include all distributions to shareholders. For securities that delist during the one-year holding period, proceeds from the issue are invested in the NYSE, AMEX, and NASDAQ value-weighted index until the end of the holding period.

Consistent with prior evidence (see footnote 12), the estimates in Panel A of Table 4 indicate that capital expenditures are associated with negative subsequent abnormal returns (e.g., -4% size-adjusted return for low IO firms). However, these negative returns are large and significant only for firms with low levels of institutional ownership, and, as predicted, are insignificant for the high IO portfolio. More importantly, the differences in returns between the high and low IO portfolios are positive and significant for all three measures of returns (raw, size-adjusted, and size and book-to-market adjusted). The mean SIZE (B/M) for the high institutional ownership group is larger (smaller) than that of the low IO firms, indicating that mismeasurement of risk related to size and book-to-market is unlikely to induce a spurious positive relation between IO and abnormal returns. Accordingly, these results suggest that institutional investors price the stocks of firms with high levels of capital expenditures more accurately than other investors, which is consistent with our hypothesis that institutional ownership reduces firm underinvestment by decreasing information asymmetry.

¹⁵ We obtained similar results to those reported below when controlling for size and book-to-market using 100 (=10×10) portfolios.

The two columns on the right of Table 4 report two additional characteristics that may be related to risk: BETA and stock volatility (VOLAT). BETA is estimated using monthly stock returns and the CRSP value-weighted returns (including all distributions) during the five years that end in April of year $t+1$ (at least 30 observations are required). VOLAT, which reflects idiosyncratic risk, is the root mean squared error from the BETA regression. As shown, the mean value of VOLAT for the high IO portfolio is significantly smaller than that for the low IO portfolio. Thus, differences in idiosyncratic risk cannot explain the differences in returns between high and low IO portfolios (firms with low levels of institutional ownership have more idiosyncratic risk and still generate smaller returns). However, consistent with prior evidence (e.g., O'Brien and Bhushan, 1990), the relationship between BETA and institutional ownership is positive and significant, which is consistent with a mismeasured risk explanation for our results. Fama and French (1992) show that after controlling for SIZE and B/M (as we do in the SIZE & B/M adjusted returns), BETA becomes insignificant, implying that differences in BETA cannot explain our results. In any case, we show below using cross-sectional regressions that IO is positively related to abnormal returns even after controlling for all the firm and stock characteristics from Table 4, including BETA.

Panel B of Table 4 presents the results for business acquisitions. Consistent with prior research (see footnote 12), we find that business acquisitions are associated with negative subsequent abnormal returns (i.e., mispricing at time of acquisition), but, similar to the capital expenditures results, the negative returns are significant only for firms with low levels of institutional ownership. Also similar to the capital expenditures results, the differences in returns between the two IO groups are significant for all three measures of returns, and the signs of the differences in the firm and stock characteristics are positive for SIZE and BETA and negative for

B/M and VOLAT. Thus, this analysis provides further support for the hypothesis that institutional ownership leads to more accurate securities' pricing and in turn to lower levels of firm underinvestment.

The results of the R&D analysis are presented in Panel C of Table 4. Unlike capital expenditures and business acquisitions, R&D expenditures are followed by positive abnormal returns of approximately five percent for each of the IO groups. These abnormal returns appear inconsistent with the hypothesis that institutional ownership reduces information asymmetry and increases price accuracy. However, the causal effect of institutional ownership in improving price accuracy may be offset in the cross section by the following association effect: if institutional investors are better than other investors in identifying profitable R&D projects, firms with high levels of institutional ownership may be more likely to outperform other firms. Moreover, as none of the abnormal return measures are statistically significant, they may simply reflect the high stock price volatility associated with R&D activities.

Table 5 presents summary statistics from cross-sectional regressions of the following equation:

$$R_{t+1j} = \beta_0 + \beta_1 IO_{tj} + \beta_2 SIZE_{tj} + \beta_3 B/M_{tj} + \beta_4 BETA_{tj} + \beta_5 VOLAT_{tj} + \beta_6 INV_{tj} + \varepsilon_{t+1j}, \quad (2)$$

where all variables are as defined above (R_{t+1} is the "Raw Returns" measure from Table 4).¹⁶ The statistics reported are the time series means of the annual cross-sectional coefficients and the associated t -statistics (the ratio of the mean of the cross-sectional coefficients to its standard error). The advantage of this approach relative to the portfolio analysis reported in Table 4 is that it allows us to explicitly and simultaneously control for all the firm and stock characteristics in

¹⁶ To mitigate the effects of outliers (see Knez and Ready, 1997), we delete observations with values outside the 0.5%-99.5% range of the pooled empirical distribution of any of the explanatory variables.

Table 4. This is important because institutional ownership is positively related to BETA and negatively related to investment. (Although we focus on high investment firms, the difference in investment between the high and low IO groups is negative and significant for each of the three investment types.) The regression results in table 5 are consistent with those of the portfolio analysis: Institutional ownership significantly reduces the magnitude of the (negative) abnormal returns associated with capital expenditures and business acquisitions, but it does not affect the returns associated with R&D.

Summarizing, we documented here that institutional investors alleviate the widespread mispricing of securities associated with corporate investment. This provides direct support for our hypothesis that the positive impact of institutional investors on the rate of corporate investment documented in Section 3.1 is mainly due to improved price efficiency brought about by the activities of institutions.

4. Less Underinvestment or More Overinvestment?

While we focus in this study on firm underinvestment, prior research suggests that many firms invest in negative present value projects and label this phenomenon as “overinvestment” (e.g., Shleifer and Vishny, 1997). Examples include investments in corporate jets and other “perks,” diversification activities that reduce shareholders value (shareholders are typically less concerned about idiosyncratic risk than managers), and empire building activities. This evidence implies an alternative explanation for the positive relationship we document between firm investment and institutional ownership: Firms with high levels of institutional ownership are more likely to overinvest (rather than being less likely to underinvest). In this section we examine and provide evidence contradicting this explanation.

First, the overinvestment literature typically associates overinvestment with the availability of surplus cash (e.g., Richardson, 2002). This suggests that investments by firms that are prone to overinvest should be more sensitive to surplus cash. But the evidence in Richardson (2002) and in Tables 1 and 2 of this study indicates that investment by firms with high institutional ownership is less sensitive to financial slack, which implies that these firms are less likely to overinvest.

Second, to the extent that investors do not fully recognize in a timely manner the value implications of overinvestment, corporate investments should be negatively related to subsequent stock returns, as investors realize over time the negative consequences of overinvestment. Yet, we document in Tables 4 and 5 that the magnitude of negative stock returns following large investments is substantially smaller for high institutional ownership firms, which suggests that these firms are less likely to overinvest. However, our future stock returns results cannot rule out the possibility that the negative value implications of overinvestment are immediately impounded in the stock prices of high institutional ownership firms, but are reflected in the prices of low institutional ownership firms with a lag. We next examine this possibility.

To compare the market reaction to corporate investments for firms with high versus low institutional ownership, we rerun equation (2) measuring investment (INV) during year $t+1$ (i.e., the stock return period) instead of year t . That is, each year, we estimate the following equation:

$$R_{t+1j} = \beta_0 + \beta_1 IO_{tj} + \beta_2 SIZE_{tj} + \beta_3 B/M_{tj} + \beta_4 BETA_{tj} + \beta_5 VOLAT_{tj} + \beta_6 INV_{t+1j} + \varepsilon_{t+1j}, \quad (3)$$

focusing on firms with values for INV_{t+1} (capital expenditures, business acquisitions or R&D) in the upper quintile of the cross-sectional distribution.¹⁷ If firms with high levels of institutional ownership overinvest, and if market prices of such firms are more accurate than those of low institutional ownership firms (i.e., investors react in a more timely manner to overinvestment by high institutional ownership firms than to overinvestment by low institutional ownership firms), the coefficient on IO should be negative. Table 6 reports summary statistics from the cross-sectional regressions. As shown, for each of the three investment types, the coefficient on IO is insignificant, indicating that the market reaction to corporate investments is not stronger for high institutional ownership firms.

Thus, the evidence in Tables 4, 5, and 6 indicates that the contemporaneous market reaction to investments by high institutional ownership firms is similar to that for investments by low institutional ownership firms, while the subsequent year returns are larger for high institutional ownership firms. These results, in turn, suggest that firms with high levels of institutional ownership are less likely to overinvest relative to other firms (overall, the market reacts less negatively to investments by high institutional ownership firms). The positive relationship between corporate investments and institutional ownership (Tables 1 and 2) suggests that high institutional ownership firms are also less likely to underinvest, and that the reduction in firm underinvestment due to institutional ownership is greater than the reduction in firm overinvestment (hence the positive association between firm investment and institutional ownership).

¹⁷ As discussed in Section 3.2, we include INV as an explanatory variable because, although we focus on high INV firms, there are still cross-sectional differences in INV , which may be correlated with IO . However, we obtain very similar results (in terms of the IO coefficient) when excluding INV .

5. Conclusion

This study examines whether stock ownership by institutional investors mitigates the detrimental effects of capital market imperfections on firms' investments. Stated differently, we examine whether institutions reduce the cost of external capital by processing information efficiently and monitoring managers' activities. In particular, the study examines whether, controlling for investment opportunities and financial slack, firm investment is (1) positively related to the level of institutional ownership, (2) negatively related to the interaction between financial slack and institutional ownership, and (3) positively related to the degree of activism of the institutions holding the firms' shares. As a direct test of the effect of institutional investors on information asymmetry, we also examine whether stock price efficiency with respect to firm capital investments is increasing in the level of institutional ownership.

We find that stock ownership by institutional investors, especially active ones, mitigates firm underinvestment by lowering market frictions. The lower level of market frictions, in turn, decreases the effect of financial slack on firm investment, a result also documented by Richardson (2002). These findings hold for each of the three types of investments examined: capital expenditures, business acquisitions, and research and development. The institutions that contribute most to the reduction in firm underinvestment are those that invest for the short term, attempting to profit from securities' mispricing. We find that the effect of "dedicated (long term) institutions" (which are more likely to engage in corporate governance activities) on corporate investment is rather limited. Moreover, we provide direct evidence that institutional ownership mitigates information asymmetries, by showing that it alleviates documented mispricings associated with corporate investments. These findings suggest that institutional investors

mitigate firm underinvestment, primarily by reducing information asymmetries, which in turn reduce the wedge between the cost of internal and external funds.

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Table 1
Fixed Effect (Year and Industry) Regressions of Firm Investment
on the Previous Year Values of Institutional Ownership and Control Variables

	Exp. Sign	1982-1986	1987-1991	1992-1996	1997-2001
<i>IO</i>	+	0.072 4.046	0.039 4.318	0.097 10.833	0.118 13.722
<i>Q</i>	+	0.031 9.339	0.015 9.303	0.015 13.571	0.015 19.058
<i>LOGTA</i>	-	-0.002 -1.483	-0.001 -0.867	-0.006 -7.564	-0.011 -12.435
<i>AGE</i>	-	-0.001 -5.841	-0.001 -10.853	-0.001 -13.561	-0.001 -12.616
<i>DEP</i>	+	0.920 8.410	0.923 12.748	0.999 14.067	0.836 12.999
<i>LEV</i>	-	-0.035 -3.711	-0.043 -7.977	-0.035 -6.578	-0.010 -1.887
<i>CASH</i>	+	-0.001 -0.033	0.045 4.523	0.096 10.523	0.114 13.210
<i>IO × CASH</i>	-	-0.110 -1.555	-0.055 -2.292	-0.112 -5.360	-0.176 -8.887
<i>IO_DED</i>	+	0.007 0.913	-0.014 -2.178	0.006 0.985	0.013 1.741
<i>IO_TRA</i>	+	0.036 4.169	0.034 4.139	0.062 7.559	0.037 5.455
<i>R</i> ²		0.549	0.552	0.582	0.573
<i>N</i>		6208	9031	13668	17305

Notes:

For each variable, the first row reports the coefficient and the second row reports White's (1980) *t*-statistic. The dependent variable, firm investment, is measured as the total of capital expenditures, business acquisitions and research and development expenditure during the year, deflated by the book value of total assets at the beginning of the year. All the explanatory variables are measured as of the end of the previous year. *IO* is the fraction of outstanding shares held by institutional investors. Tobin's *q* (*Q*) is the ratio of the market value of equity plus the book value of debt to the sum of their book values. *LOGTA* is the log of total assets. *AGE* is the number of years since the start of coverage period by CRSP. *DEP* is the ratio of depreciation and amortization to total assets. *LEV* is the ratio of debt to the sum of debt and equity. *CASH* is the ratio of cash plus marketable securities to total assets. *IO_DED* (*IO_TRA*) is the ratio of ownership by transient (dedicated) institutions to total institutional ownership.

Table 2
Fixed Effect (Year and Industry) Regressions of Different Types of Firm Investment
on the Previous Year Values of Institutional Ownership and Control Variables

Panel A: Capital expenditures					
	Exp. Sign	1982-1986	1987-1991	1992-1996	1997-2001
<i>IO</i>	+	0.038 4.436	0.028 5.354	0.036 8.140	0.032 8.523
<i>Q</i>	+	0.015 8.721	0.006 8.248	0.005 9.982	0.005 15.826
<i>LOGTA</i>	-	-0.001 -1.394	0.001 1.194	-0.001 -1.450	-0.002 -4.714
<i>AGE</i>	-	0.000 -5.860	-0.001 -9.624	-0.001 -13.640	0.000 -11.224
<i>DEP</i>	+	0.652 10.664	0.629 13.266	0.691 16.435	0.463 14.596
<i>LEV</i>	-	-0.023 -4.519	-0.027 -8.182	-0.029 -10.548	-0.010 -4.418
<i>CASH</i>	+	-0.033 -3.885	-0.017 -3.667	-0.004 -0.932	-0.005 -1.534
<i>IO × CASH</i>	-	-0.020 -0.948	-0.023 -1.962	-0.023 -2.505	-0.020 -2.822
<i>IO_DED</i>	+	0.002 0.523	-0.013 -3.954	-0.002 -0.701	-0.003 -1.004
<i>IO_TRA</i>	+	0.022 4.816	0.020 3.913	0.035 8.272	0.014 5.061
<i>R</i> ²		0.621	0.574	0.572	0.566
<i>N</i>		6210	9040	13692	17405

Panel B: Business acquisitions

	Exp. Sign	1982-1986	1987-1991	1992-1996	1997-2001
<i>IO</i>	+	0.018 1.863	0.008 1.480	0.040 7.099	0.051 9.452
<i>Q</i>	+	0.000 0.041	-0.001 -1.396	0.000 0.686	0.001 2.326
<i>LOGTA</i>	-	0.001 1.169	0.000 -0.402	-0.001 -2.756	0.000 -0.607
<i>AGE</i>	-	0.000 -2.714	0.000 -4.403	0.000 -5.436	-0.001 -7.578
<i>DEP</i>	+	0.037 0.723	-0.038 -1.288	-0.068 -2.576	-0.127 -4.467
<i>LEV</i>	-	-0.009 -1.935	-0.001 -0.349	-0.001 -0.519	-0.004 -1.402
<i>CASH</i>	+	0.019 1.816	0.005 1.020	-0.002 -0.650	-0.016 -3.881
<i>IO × CASH</i>	-	-0.050 -2.110	0.002 0.148	-0.046 -4.446	-0.062 -6.245
<i>IO_DED</i>	+	0.001 0.177	0.000 0.089	-0.001 -0.190	-0.001 -0.259
<i>IO_TRA</i>	+	0.008 1.863	0.011 2.525	0.016 3.793	0.012 3.676
<i>R</i> ²		0.100	0.086	0.127	0.142
<i>N</i>		6204	9014	13651	17242

Panel C: Research and development

	Exp. Sign	1982-1986	1987-1991	1992-1996	1997-2001
<i>IO</i>	+	0.006 1.857	0.009 3.151	0.009 3.390	0.015 5.912
<i>Q</i>	+	0.008 7.332	0.007 6.967	0.007 12.247	0.008 16.713
<i>LOGTA</i>	-	0.001 1.987	-0.001 -3.515	-0.002 -6.340	-0.006 -15.332
<i>AGE</i>	-	0.000 -0.097	0.000 -3.784	0.000 -4.594	0.000 -3.137
<i>DEP</i>	+	0.132 5.990	0.277 9.457	0.305 10.190	0.334 11.696
<i>LEV</i>	-	-0.010 -5.035	-0.010 -4.342	-0.008 -4.330	-0.005 -2.100
<i>CASH</i>	+	0.022 4.138	0.050 9.459	0.097 17.523	0.120 24.132
<i>IO × CASH</i>	-	-0.044 -3.863	-0.032 -2.796	-0.031 -2.694	-0.056 -5.431
<i>IO_DED</i>	+	0.004 2.046	-0.002 -0.755	0.011 3.929	0.014 4.120
<i>IO_TRA</i>	+	0.004 1.741	0.006 1.953	0.007 2.050	0.003 1.070
<i>R</i> ²		0.568	0.532	0.597	0.612
<i>N</i>		6241	9054	13721	17382

Notes:

For each variable, the first row reports the coefficient and the second row reports White's (1980) *t*-statistic. The dependent variables in Panels A, B and C are capital expenditures, business acquisitions and research and development expenditure during the year, respectively, deflated by the book value of total assets at the beginning of the year. All the explanatory variables are measured as of the end of the previous year. *IO* is the fraction of outstanding shares held by institutional investors. Tobin's *q* (*Q*) is the ratio of the market value of equity plus the book value of debt to the sum of their book values. *LOGTA* is the log of total assets. *AGE* is the number of years since the start of coverage period by CRSP. *DEP* is the ratio of depreciation and amortization to total assets. *LEV* is the ratio of debt to the sum of debt and equity. *CASH* is the ratio of cash plus marketable securities to total assets. *IO_DED* (*IO_TRA*) is the ratio of ownership by transient (dedicated) institutions to total institutional ownership.

Table 3
Mean Firm Investment Over Time

Investment Type	1982-1986	1987-1991	1992-1996	1997-2001
Capital expenditure	0.079	0.066	0.065	0.061
Business acquisitions	0.017	0.016	0.021	0.029
Research & Development	0.020	0.025	0.036	0.046
Total investment	0.117	0.107	0.122	0.135
<i>N</i>	7721	10013	14106	17825

The table reports the mean values of different types of annual investments during four sub-periods. All variables are deflated by total assets. Total investment is the sum of capital expenditures, business acquisitions and research and development expenditures.

Table 4
Future Annual Buy-and-hold Portfolio Returns and Other Characteristics for Firm with High Levels of Capital Investment and Different Levels of Institutional Ownership

Panel A: Capital expenditures

Port.	INV	IO	Raw Returns	Adjusted Returns		SIZE	B/M	BETA	VOLAT
				SIZE	SIZE &B/M				
Low IO	0.166	0.089	0.098	-0.040	-0.037	11.229	0.685	0.989	0.141
			2.444	-2.499	-2.206				
High IO	0.156	0.468	0.143	-0.008	-0.010	13.218	0.584	1.135	0.097
			4.184	-0.543	-0.683				
Difference (High – Low)	-0.009 -4.754	0.379 37.770	0.045	0.032	0.027	1.989 26.683	-0.102 -8.702	0.146 4.744	-0.043 -19.419
			2.507	2.847	2.375				

Panel B: Business acquisitions

Port.	INV	IO	Raw Returns	Adjusted Returns		SIZE	B/M	BETA	VOLAT
				SIZE	SIZE &B/M				
Low IO	0.068	0.137	0.115	-0.028	-0.039	11.555	0.738	1.037	0.126
			2.619	-2.836	-4.223				
High IO	0.058	0.536	0.154	-0.001	-0.004	13.489	0.597	1.132	0.087
			4.011	-0.097	-0.333				
Difference (High – Low)	-0.009 -3.982	0.399 49.760	0.039	0.027	0.035	1.934 41.460	-0.141 -7.230	0.095 3.103	-0.039 -25.521
			1.961	1.784	2.420				

Panel C: Research and development

Port.	INV	IO	Raw Returns	Adjusted Returns		SIZE	B/M	BETA	VOLAT
				SIZE	SIZE & B/M				
Low IO	0.123	0.079	0.177 2.287	0.037 0.802	0.051 1.287	10.603	0.611	1.212	0.170
High IO	0.092	0.477	0.206 3.006	0.056 1.206	0.057 1.352	13.004	0.571	1.286	0.111
Difference (High – Low)	-0.031 -9.205	0.398 74.561	0.029 1.309	0.019 0.986	0.006 0.337	2.401 30.758	-0.040 -2.123	0.075 2.461	-0.060 -17.947

Notes:

The numbers reported in each cell are the time-series mean of the cross sectional means of those variables for each quintile. For the three return measures, we also report the *t*-statistic associated with the time-series distribution of the cross-sectional means. The number of cross-sections (i.e., years) is 20, from 1980 through 1999. The annual returns are measured from May 1 of year *t*+1 through April 30 of year *t*+2. INV is investment (capital expenditures in Panel A, business acquisitions in Panel B, and research and development expenditure in Panel C) in year *t*, deflated by the book value of total assets. IO is the fraction of outstanding shares held by institutional investors at the end of year *t*. SIZE (log of market value of equity) is measured at the end of April in year *t*+1. B/M is the book-to-market ratio at the end of year *t*. BETA is estimated using monthly stock returns and the CRSP value-weighted returns including all distributions during the five years that end in April of year *t*+1 (at least 30 observations are required). VOLAT is the root mean squared error from the BETA regression.

Table 5
Cross-sectional Regressions of Future Annual Stock Returns on
Corporate Investment, Institutional Ownership and Risk Factors,
Focusing on Firms with High Levels of Investments

Investment Type	Int.	IO	SIZE	B/M	BETA	VOLAT	INV	R ²	N
Capital expenditure	0.238	0.068	-0.004	0.041	-0.028	-0.181	-0.345	0.079	453
	2.138	1.764	-0.516	2.341	-0.855	-0.478	-2.382		
Business acquisitions	0.302	0.058	-0.008	0.023	-0.001	-0.865	-0.240	0.076	434
	2.483	2.092	-1.108	1.101	-0.050	-3.443	-2.205		
Research & Development	0.226	0.018	-0.005	0.114	0.004	-0.755	0.388	0.064	453
	2.421	0.411	-0.815	5.525	0.146	-2.988	1.672		

Notes:

The first row reports the time-series mean of each statistic (coefficients, R² and N). The second row reports the *t*-statistic for the time series distribution of each coefficient (mean coefficient divided by its standard error). The number of regressions (i.e., years) is 20, from 1980 (i.e., returns from May 1981 through April 1982) through 1999 (returns from May 2000 through April 2001). The dependent variable in all regressions is the annual buy-and-hold stock return, measured from May 1 of year *t*+1 through April 30 of year *t*+2. INV is investment (capital expenditures, business acquisitions, and research and development expenditure) in year *t*, deflated by the book value of total assets. IO is the fraction of outstanding shares held by institutional investors at the end of year *t*. SIZE (log of market value of equity) is measured at the end of April in year *t*+1. B/M is the book-to-market ratio at the end of year *t*. BETA is estimated using monthly stock returns and the CRSP value-weighted returns including all distributions during the five years that end in April of year *t*+1 (at least 30 observations are required). VOLAT is the root mean squared error from the BETA regression.

Table 6
Cross-sectional Regressions of Annual Stock Returns on Corporate Investment
and the Previous Year Levels of Institutional Ownership and Risk Factors,
Focusing on Firms with High Levels of Investments

Investment Type	Int.	IO	SIZE	B/M	BETA	VOLAT	INV	R ²	N
Capital expenditure	0.204 2.142	0.024 0.580	-0.005 -0.893	0.080 3.200	-0.020 -0.509	-0.121 -0.335	-0.191 -1.154	0.084	418
Business acquisitions	0.371 1.894	0.001 0.051	-0.013 -1.065	0.039 1.549	-0.030 -1.159	-0.650 -2.585	0.181 1.869	0.078	404
Research & Development	0.274 3.267	0.009 0.247	-0.008 -1.236	0.065 4.284	0.012 0.377	-0.486 -1.778	-0.060 -0.301	0.065	419

Notes:

The first row reports the time-series mean of each statistic (coefficients, R² and N). The second row reports the *t*-statistic for the time series distribution of each coefficient (mean coefficient divided by its standard error). All variables are as defined in Table 5, except that investment is measured concurrent with the stock return period (rather than in the prior year).