INSTITUTIONAL INVESTMENT, FIRM PORTFOLIO IMPORTANCE, AND PAYOUT POLICY

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We acknowledge that portions of this study were completed while Kenneth Roskelley was with the University of Arizona. We would also like to thank Brian Bushee for sharing his institutional investor classification, and Min Maung, Randy Campbell and Mike Highfield for valuable feedback and comments.

Abstract

We argue that institutional investors are more likely to monitor firms when the firm represents a relatively large portion of the institutional investor's portfolio. As evidence, we first show that a firm's total payout is positively related to the firm's portfolio importance to institutional investors, measured as the average portfolio weight among the top five institutional investors in that firm. Next we show that monitoring, as measured by the marginal effect of this portfolio importance, is substantially larger among firms with more agency conflicts as indicated by free cash flow, capital expenditures, leverage, and growth opportunities. Our results are robust after controlling for a wide variety of variables that measure institutional investor impact on firms. Finally, we find no evidence that the relation between payout and the firm's portfolio importance is endogenous, and we address standard econometric concerns. Overall, our results suggest that institutional investors are more effective monitors when the firm represents a larger portion of the institutional investor's portfolio.

I. Introduction

Corporate theory suggests that when ownership and control are separate, managers may use firm resources for their private benefit at the expense of shareholders. These agency problems serve to reduce the total cash flow (total payout) to shareholders. Whether these agency problems can be solved through monitoring, even partially, is an important issue for shareholders since they ultimately bear the cost in the form of reduced payout. Agency models typically imply monitoring increases payout (Grinstein and Michaely, 2005). To establish this connection researchers have focused on institutional investors as they are more likely to monitor due to the size of their investments (Grossman and Hart, 1980), greater efficiency at monitoring (Jensen and Meckling, 1976), and access to information not readily available to individual investors (Michaely and Shaw, 1994). However, to our knowledge, prior research has found no evidence that institutional investors affect total payout (See Grinstein and Michaely, 2005 and Gaspar et al., 2013).[1]

Still, there is substantial evidence that institutional investors impact firm's actions.[2] To explain the lack of impact on total payout Grinstein and Michaely (2005) note that contracting (i.e. debt and executive compensation contracts) may be used to address agency conflicts involving payout, making institutional monitoring relatively unimportant. We observe that prior

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[1] The role institutional investor monitoring plays in payout policy has been widely investigated. Though Grinstein and Michaely (2005) find no significant impact on *total* payout, others have found impact on the *type* of payout (see Gaspar et al., 2013; Michaely et al., 1995; Barclay and Smith, 1988; Renneboog and Trojanowski, 2007). Gaspar et al. (2013) find institutional investor turnover has a positive relationship to total repurchases and a negative relationship to total dividend payout. Other research investigates the role taxes and institutional investment play in the chosen payout method (see Brown, Liang, and Weisbenner, 2007; Desai and Jin, 2011; Perez-Gonzalez, 2000).

[2] Hartzell and Starks (2003) report that the use of performance-based executive compensation is positively related to the total shares held by the top five institutional investors in a firm. Gillan and Starks (2000) show that shareholder proposals from institutional investors receive significantly more votes than those of individual investors. Chen, Harford, and Li (2007) show that long-term institutional investors positively impact post-merger firm performance, while Amihud and Li (2006) attribute the reduction in the signaling value of dividends due to an increase in institutional holdings.

research on total payout has focused on the effect of institutional investors' control rights (shares owned and concentration of shares) on payout, which may not adequately characterize institutions likely to monitor payout (See Shliefer and Vishny, 1986; Demsetz, 1983; Shleifer and Vishny, 1989). Our purpose is to broaden this research beyond institutional characteristics related to control rights.

The insight for our research comes from Shliefer and Vishny's (1986) observation that monitoring is a costly public good. Although institutional investors may be in a position to exert control over a firm, for cost reasons they may choose to monitor only those firms that are a large percentage of their portfolio. On the other hand, though an institutional investor may have a large percent of their portfolio in a firm, they may lack the control rights to function as an effective monitor. Thus a combination of high control rights *and* high portfolio importance to institutional investors may be required before they find it economically optimal to actively monitor a firm to obtain increased payout.

Building on the above economic insight we measure a firm's importance to institutional investors by calculating the average portfolio weight that the firm represents to the top five institutional investors in the firm. This measure of portfolio importance has the attractive feature that the portfolio importance is measured using the institutional investors that exert the most control. To identify the effect of portfolio importance on payout our analysis provides extensive controls for the institutional investor characteristics known to impact firms' actions, such as long-term investing and shareholder concentration. Our analysis also controls for time effects, industry effects, firm fixed effects, and firm characteristics. Due to the payouts clustering at zero, in robustness tests we document our results hold using Tobit models. Finally, we account for the possibly endogeneity of the payout decision by investigating the relationship between changes in portfolio importance and future changes in payout.

Using data from 1981 to 2006, we show that the average portfolio weight (i.e., portfolio importance) a firm represents to the top five institutional investors is positively related to firm total payout. This relationship is both economically and statistically significant. We also show that the relation between payout and portfolio importance is stronger among firms more likely to have agency conflicts. In particular, the correlation between a firm's portfolio importance and payout is stronger for firms with higher free cash flow, lower leverage, and fewer growth options relative to their industry. Furthermore, firms that have high portfolio importance to institutions are less likely to simultaneously have capital expenditures above their industry-adjusted median despite price to earnings (growth options) below the median. Finally, we find no evidence that the relation between payout and the firm's portfolio importance is endogenous: changes in the firm's portfolio importance are positively related to future changes in payout, but not the other way around.

To verify the information in our portfolio importance variable is incremental to previous findings, we also include other institutional variables shown to proxy for monitoring and control. First, affecting change within a firm may be less costly for large shareholders who hold more influence with management. Chen, Harford, and Li (2007) note that if monitoring includes a fixed cost, then the average total cost of monitoring may decrease with the size of the holding. Hartzell and Starks (2003) document that larger concentration of shares in the hands of fewer institutional investors leads to better monitoring (but not payout). We follow Grinstein and Michaely (2005) and include as our first proxy for institutional control the percent of shares outstanding held by the five institutional investors with the largest holdings in the firm.[3] Since our definition of portfolio importance relies on the portfolio weights the firm represents to these investors, our portfolio importance variable may simply pick up the control of the firm that these five institutional investors exert. Nevertheless, when we include the percent of shares owned by the top five institutional investors in the analysis, we find no evidence that the percent of shares held by these five institutional investors is related to the firm's chosen payout level. Our finding of positive correlation between payout and portfolio importance is robust to the new specification.

The second way in which we differentiate our portfolio importance variable from institutional investment is by measuring the concentration of the firm's shares amongst institutional investors. Shliefer and Vishny (1986) point out that monitoring is a public good, so the more concentrated a firm's shares are in the hands of an investor, the more incentive the investor will have to monitor the firm. In order to broadly measure the concentration of shares amongst institutional investors, we follow Hartzell & Starks (2003) and construct a Herfindahl Index of share concentration. While portfolio importance remains positively related to payout, we find no evidence that more concentrated institutional investor holdings are related to higher current or future payout.

Next, we consider the time an institutional investor has held shares in a firm. Gaspar et al. (2013) show that the churn rate of institutional investors is related to payout policy, while Chen, Harford, and Li (2007) posit that the longer an institutional investor has owned shares in a firm, the more information and influence the institutional investor will have with the firm's

[3] Grinstein and Michaely (2005) focus on total institutional investment, not top five investment. We focus instead on top five investment due to our definition of a firm's portfolio importance. Using total institutional investment does not change our conclusions.

management team. This information and influence help to reduce the monitoring cost and encourage the institutional investor to monitor. Chen, Harford and Li (2007) show that long-term institutional investors influence takeovers, while Shin (2008) finds that they influence CEO compensation. Like Chen, Harford and Li (2007), we measure long-term investment in a firm by calculating the percent of shares that have been owned by institutional investors for at least one year. Our evidence suggests that the presence of long-term institutional holdings is postively related to total payout. Nevertheless, our portfolio importance variable still provides significant incremental information to the regression equation and appears largely unrelated to the amount of long-term institutional invesmtent.

Finally, rather than classify the institution's *position* in the firm as long-term or concentrated, we follow Bushee (1998) who classifies the institutional *investors*. Bushee's (1998) classification has the attractive feature that it identifies institutional investors with long investment horizons as well as concentrated holdings. Bushee (1998) classifies these institutional investors as dedicated, and finds that dedicated institutional investors are involved in monitoring. We measure the presence of dedicated institutional investors using Bushee's (2001) classification, and we proxy for institutional investment with the percent of a firm's shares held by dedicated institutions. Once again, we find a positive and significant impact for the firm's portfolio importance on total payout, but we find no evidence that dedicated institutional investment is correlated with current or future firm payout.

Our research builds on a long literature theorizing that institutional investors monitor firms to affect total payout. While prior research focuses on control rights, we argue that institutional investors consider economic importance in combination with control rights when deciding whether to monitor a firm. Our contribution is to provide evidence of a robust relationship between institutional investors and total payout. Specifically, we suggest institutional investors monitor a firm if they have the necessary control rights to affect payout *and* it has economic importance in their portfolios.

This paper is organized as follows: Section II discusses the construction of our firm payout data and the institutional investment variables we analyze as proxies for shareholder monitoring. Section III presents our methodology and quantitative results, while Section IV summarizes our conclusions.

II. Data

The data consists of institutional holdings for publicly traded U.S. firms from 1981 to 2006, excluding financial firms (SIC codes 6000-6999) and utilities (SIC codes 4900-4999). We collect payout policy data from COMPUSTAT and institutional investment data from Thomson Financial. Our institutional-holdings and payout data is matched to other firm variables from CRSP and COMPUSTAT.

A. Payout Policy

We follow Grinstein and Michaely (2005) in defining dividends, repurchases, and total payout. Dividend is defined as four times the last quarterly dividend paid in year *t* or annualized dividend as defined by the COMPUSTAT database.[4] Repurchases are reported on the statement of cash flow and include the dollar amount of both common and preferred stock repurchased by

[4] The quarterly dividend in COMPUSTAT has missing values. Dividends are sometimes recorded in Compustat as twice the true amount. This doubling is done to compensate for omission of the dividend in the adjacent quarter. This double counting and omission creates a noise in the data so we use Grinstein and Michaely (2005) and Benartzi, Michaely and Thaler (1997) to calculate our dividend payout and total payout for a given firm.

the firm[5]. Repurchases are also normalized by book value of assets. The total payout is thus the sum of the dividend payments and stock repurchases normalized by book value of assets.

B. Institutional Investor Classification and Characteristics

The institutional investment data is obtained from 13F filings that are collected by Thomson Financial, who classify institutions into five types: banks, insurance companies, investment companies and their managers, investment advisors and others (pension funds, university endowment).[6] Institutions that hold more than $100 million in U.S. public stocks must file a 13F report each quarter for each stock where their holdings are either greater than $200,000 or more than 10,000 shares. The final sample has institutional variables for 91,740 firm years.

We use the average portfolio weight a firm represents to the top five institutional investors in the firm to proxy for the institutional investors' propensity to monitor the firm. We calculate *Portfolio Importance* for firm *i* as:

$$Portfolio\ Importance_i = \sum_{j=1}^{N=Min(J_i,5)} \frac{W_{ij}}{N}$$

$W_{i,j}$ is the weight of firm i in institution j's portfolio based on the percentage market value of the institution's portfolio invested in that firm, J_i is the total number of institutional investors in firm i, and j indexes institutional investors in firm i from largest to smallest based on total shares held in firm i. [7]

We also include other common proxies for institutional monitoring. First, as in Grinstein and Michaely (2005), we calculate the percentage of shares held by all institutional investors, as

[5] Stephenson and Weisbach (1998) note that preferred stock repurchases account for only a small percentage of total repurchases.
[6] Thomson reports that after 1998 classifications are not reported correctly.
[7] 13(f) data do not contain the institutional investor's complete portfolio. Long positions…

well as those held by the top five institutional investors.[8] Next, we follow Hartzell and Starks (2003) who measure the concentration of shares by using a Hirfindahl Index: the sum of the square institutional holdings for the institutional investors in that firm. Specifically, we calculate *Institutional Ownership Concentration* as:

$$Institutional\ Ownership\ Concentration_i$$

$$= \sum_{j=1}^{N=Min(J_i,5)} \left(\frac{Shares\ Institution\ j\ Holds\ in\ Firm\ i}{Firm\ i's\ Total\ Shares\ Outstanding}\right)^2$$

where J_i is the number of institutional investors in firm i, and j indexes institutional investors in firm i from largest to smallest based on total shares held in firm i. Note the higher the index is, the more concentrated the shares are amongst institutional investors, and the more incentive investors have to invest in the public good (i.e. monitor). Since the largest investors benefit the most from monitoring, we construct this index using only the five largest institutional investors as defined by the number of shares held in the firm.

Next, we follow Chen et al. (2007) and define long-term holdings as those held for four or more consecutive quarters. Accordingly, we construct *Long-term Institutional Ownership* as the percent of the firm's shares outstanding held by institutional investors by four or more quarters. In addition, we use Bushee's (2001) institutional classification based on investment horizon and portfolio concentration. Bushee (2001) uses factor analysis to identify dedicated institutional investors with long-term and concentrated holdings. We obtain the institutional

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[8] We use both total institutional holding and top five institutional holding in our analysis. Our results are consistent with both total and top five institutional holding. Since the portfolio importance variable is defined for the top five institutional investors, we include only top five institutional holdings in the regression tables. We also note that there are firms with fewer than 5 institutional investors (23,114 firm years with 5,841 firms).

classification data for dedicated institutions from Brian Bushee's website[9] and calculate *Dedicated Institutional Ownership*, the percent of a firm's shares outstanding held be dedicated institutional investors.

Table 1 presents summary statistics for payout as a percent of total assets, average firm portfolio importance, and the other institutional investment characteristics. Panel A reports the 5, 25, 50, 75, and 95 percentiles for each variable using only observations where payout in a given year is zero. Panel B repeats the analysis but for firm-years with strictly positive payout. Roughly 49% of all firm-year observations have no payout. It is the case, nevertheless, that positive payout observations in Panel B are associated with higher levels of institutional investment than the zero payout sample in Panel A. The median percent of shares owned by the top five institutional investors in firms with positive payout is 18.28%, but only 10.1% for those firms with zero payout. While this indicates the top five institutional investors own an important fraction of the firm's stock, our contribution is to also analyze these control rights in the context of the firm's portfolio importance to the institutional investors. The median portfolio weight a firm with positive payout represents to the top five institutional investors is 0.28%, or more than five times that of firms with no payout. The fact the median portfolio weight is below 1% is consistent with institutional investors holding over 100 different stocks, limiting their ability to effectively monitor all firms. These portfolio weights, nevertheless, can represent a substantial dollar investment. The median portfolio dollar investment by the top five institutional investors in firms with positive payout is roughly $59 million, while the 95th percentile represents a $2.97 billion investment.

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[9] http://acct3.wharton.upenn.edu/faculty/bushee/

Table 1 Panel C reports average firm payout broken down by quartile for the portfolio importance and other institutional investment characteristics. Firm payout is concave in Top 5 *Institutional Ownership, Dedicated Institutional Ownership*, and *Institutional Ownership Concentration*. This is similar to Grinstein and Michaely (2005) who find that total institutional investment is larger in dividend paying firms than non-payers on average, but that institutional investment is concave in the level of the dividend. Firm payout, on the other hand, is strictly increasing in both portfolio importance and long-term institutional investment across all quartiles. Panel D reports the overall sample mean of each variable, as well as the mean of each variable by year. On average over the sample, firms payout 1.98% annually of their total assets. The average percent of shares outstanding held by the top five institutional investors is 16.48%, which represents an average portfolio weight of 0.56%.

III. Methodology & Quantitative Results

A. Determinants of Total Payout

We now turn to multivariate regression analysis to investigate the relation between a firm's portfolio importance to large institutional investors and total firm payout. To control for firm characteristics thought to influence payout policy and agency problems, we include several control variables.

Firms with poor access to capital markets may optimally choose to hold earnings as cash instead of paying them out. We control for access to capital markets using the log of firm size (Holder et al., 1998; Grinstein and Michaely, 2005) where size is measured as sales revenue. In addition, systematic risk is related to a firm's cash needs and access to capital. We control for systematic risk using beta (Grinstein and Michaely, 2005), where beta is calculated with a five year window using monthly stock returns and the Fama-French value-weighted index.[10] Since abnormal firm performance may signal changing investment opportunities, we also control for firm performance using the firm's beta-adjusted annual returns (Grinstein and Michaely, 2005). In addition, firms with greater growth oportunities are more likely to optimally reinvest profits than payout cash. We control for growth opportunities using the price to earnings ratio (Fairfield, 1994), calculated as share price divided by earning per share. In addition, Fama and French (2001) show that more profitable firms are more likely to pay dividends. We control for firm profitability using the net profit margin, defined as net income to sales. We also follow Yan and Zhang (2009) and Gompers and Metrick (2001) and control for the firm life cycle using firm age, defined as the number of months since the firm's first return is reported in the CRSP database.

In addition, higher levels of free cash flow and lower levels of debt should be related to greater agency problems. As in Farinha (2003) and Renneboog & Trojanowski (2007), we control for leverage in a firm using the debt to equity ratio. Specifically we divide long-term debt by total equity. We control for free cash flow as in Holder et al. (1998) and measure free cash flow as net income plus depreciation minus both the change in working capital and new capital expenditures. We divide free cash flow by the market capitalization of the firm for comparability across firms.[11]

Equation (1) shows the conditional mean equation defined by our regression model to explain the level of firm payout[12].

$$(1) \quad E[Payout_{i,t} \mid X_{i,t}\beta] = b_{0,i} + b_{1,t} + b_2\, Portfolio\ Importance_{i,t-1} + b_3\, Institutional\ Ownership_{i,t-1} + b_4\, Log\ Sales_{i,t} + b_5\, Risk\ Adjusted\ Return_{i,t}$$

[10] The market returns are taken from Fama and French website.
[11] We use market capitalization because total assets are also in the denominator in our dependent variable.
[12] Although not reported in the tables, we also run the regressions using industry fixed effects where industry is defined by 2-digit SIC codes. We find no qualitative difference in the results.

$$+ b_6 \, Beta_{i,t} + b_7 \, Age_{i,t} + b_8 \, Price\ to\ Earnings_{i,t} + b_9 \, Profit\ Margin_{i,t}$$
$$+ b_{10} \, Debt\ to\ Equity_{i,t} + b_{11} \, Free\ Cash\ Flow_{i,t}$$

Firm fixed-effects are denoted with $b_{0,i}$, while $b_{1,t}$ represents year fixed-effects. Firm total payout is regressed onto the firm's portfolio importance to institutional investors, as well as onto the four proxies of institutional investment and control of a firm. Since changes in payout may induce institutional investors to rebalance their portfolio, we use lagged values for the institutional investment variables, though there is no substantive difference in results when contemporaneous values are used. As a control, we also include the firm characteristics discussed above. Results from the regression are reported in Table 2 using firm clustered standard errors. Firm and year fixed-effects are not reported in the table for brevity.

While not all the control variables are statistically significant in Table 2, their interpretation is consistent with theory. Larger firms, firms with more cash flow net of investment, lower systematic risk, and less debt tend to have higher payout ratios. In addition, Column 1 of the table reports that a firm's portfolio importance to the top five institutional investors (*Portfolio Importance*) is positively related to payout and significant at the one percent level. In terms of economic significance, a one standard deviation increase in *Portfolio Importance* would indicate a 6.85% increase in the firm's total payout. In comparison, the percent of shares owned by the top five institutional investors is not significantly related to a firm's total payout.

Nevertheless, our portfolio importance variable is based on the top five institutional holdings and may simply pick-up the control exerted by these top five institutional investors. We re-run the regression using alternative definitions of institutional holdings to verify the portfolio importance variable is not simply picking up institutional control. We do so by replacing the institutional control variable *Top 5 Institutional Ownership* with variables less likely related to the portfolio importance variable. For instance, Table 2 Column 2 repeats the analysis with the percent of shares held for more than one year (*Long-term Institutional Ownership*) by institutional investors, while Column 3 uses the percent of shares held by institutions defined by Bushee (2001) as dedicated long-term investors (*Dedicated Institutional Ownership*). Column 4 uses the Herfindahl index of share concentration among institutional investors (*Institutional Ownership Concentration*). Column 5 repeats the analysis with all four measures of institutional investor control in addition to the portfolio importance variable. In all four additional regressions, the portfolio importance variable is significant at the one percent level. In addition, there is little variation in the coefficient estimate. Though not reported in the tables, this is also true if we use industry fixed effects as opposed to firm fixed effects, where industry is defined using the two digit SIC code. Since using industry fixed effects roughly doubles the economic importance of the variable *Portfolio Importance*, we report only the more conservative firm fixed-effect model.

These results in Table 2 are consistent with the idea that institutional ownership is not a perfect proxy for institutional monitoring, and that institutions are more likely to monitor effectively when they have both more control and a larger economic stake in a firm. Nevertheless, if our portfolio importance variable truly proxies for monitoring, then the impact should be larger for firms with greater potential for agency problems. Jensen (1986) notes that firms with high free cash flow in excess of their growth options, ceteris paribus, are likely to experience greater agency costs. Jensen (1986) also notes that debt may be used to offset these agency costs, reducing the importance of shareholder monitoring. Therefore, we use a dummy variable, *Agency Dummy*, to identify firms likely to have high agency costs as those with high free cash flow, low growth options, and a low debt to equity ratio. Specifically, we compute the two-digit SIC industry median free-cash flow, price to earnings ratio, and debt to equity ratio for each firm. We label as high agency cost any firm with free cash flow above the industry median while simultaneously having price to earnings and debt to equity ratios below the industry median. We find 11,805 such observations, meaning roughly 12.87% of the total observations are labeled as high agency cost. We then test if the coefficient on portfolio importance is the same for these high agency cost firms as for the rest of the sample. This is done by inter-acting the variable *Portfolio Importance* with the variable *Agency Dummy* and repeating the regression analysis from Table 2.

Regression coefficients for the variables *Portfolio Importance*, *Portfolio Importance*Agency Dummy*, as well as the other institutional investment variables are reported in Table 3. We find that the effect of portfolio focus is significantly larger for these firms identified as having greater potential for agency problems. The t-statistic on the difference in the coefficients is significant at the 0.1% level regardless of which institutional investment variable is included, or if all are included simultaneously (Column 5). In addition, by comparing each column in both Table 2 and Table 3, we see that the marginal effect of the portfolio importance variable falls by roughly 10% for firms not labeled as having high potential for agency problems, while the marginal effect increases by over 50% for the high agency cost sample. In terms of economic significance, a one standard deviation increase in portfolio importance for a firm with high potential agency costs is associated with roughly a 9% increase in total payout. In addition, the reduction in the Bayesian Information Criterion as compared to 0 indicates a superior fit when we interact the portfolio importance with the agency dummy.

It is important to note that free cash flow in the context of agency costs is typically defined as cash flow in excess of funding for positive net present value investments. Our accounting definition of free cash flow, however, does not distinguish negative versus positive net present value investments. Jensen (1986) notes that agency costs include over-investment, or the funding of negative net present value projects. If our portfolio importance variable is an adequate proxy for monitoring, it should be negatively related to over-investment. Since we can't observe over-investment directly, we identify firms likely to experience agency costs in the form of over-investment. We do so by redefining *Agency Dummy* as those firms that overinvest relative to their perceived growth options. Specifically, we calculate the two-digit SIC industry median for capital expenditures and the price to earnings ratio. We identify firms as high risk for overinvestment (*Agency Dummy=1*) as those that have price to earnings ratios below their industry median, but that have capital expenditures in excess of their industry median. We use a probit regression to model the likelihood a firm belongs to this over-investment group. Since monitoring and debt reduce agency costs, we include *Portfolio Importance* and *Debt to Equity* as explanatory variables. In addition, since over-investment is more likely among firms with large amounts of cash, we also include *Free Cash Flow* as a control variable.[13]

$$(2) \qquad Prob[Agency\ Dummy_{i,t} > 0 |\ X_{i,t}\beta] = (2\pi)^{0.5} exp[0.5(b_0 + b_{1,t} + b_2\ Portfolio\ Importance_{i,t-1} + b_{10}\ Debt\ to\ Equity_{i,t} + b_{11}\ Free\ Cash\ Flow_{i,t}]$$

Regression results for the probit model defined in Equation (2) are reported in Table 4, and reported inference is with firm clustered standard errors. Table 4 Column 1 reports the estimated coefficient, while Column 2 reports the estimated marginal effect. While neither the

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[13] We also estimate the probit model with total cash holdings instead of free cash flow, and then with year fixed effects, and then also with firm random effects. We find no qualitative difference in the results. We report the parsimonious model since these variables do not improve the model's goodness of fit.

debt to equity ratio or free cash flow are significant in explaining the probability of belonging to the over-investment group, portfolio importance once again plays a significant role. In particular, the greater the firm's portfolio importance to the top five institutional investors, the less likely the firm is to be above the industry median for capital expenditures while having fewer growth options than the industry median (as measured by the price to earnings ratio). The average marginal effect implies that an increase of ten percentage points in the average portfolio holding of the top five investors reduces the probability of belonging to this over-investment group by 5.9%.

B. No Payout as a Corner Solution

One potential criticism of our analysis in Table 2 and Table 3 is that the left hand side variable, payout, has point mass at zero. Growing firms and financially distressed firms may be well monitored and still choose not to payout to shareholders. Ignoring this point mass in payout at zero may result in misleading parameter estimates and inference. Indeed, close to half of all firm observations are clustered at zero, and as can be seen in Table 1, investment in these firms can be substantial. We repeat the regression analysis using an Exponential Type 2 Tobit (ET2T) model. Like sample selection models, ET2T models adjust the parameter estimates by modeling the outcome in two stages. First, in the participation stage we model the firm's decision to payout or not payout using a Probit regression:

$$(3) \quad Prob[Payout_{i,t} > 0 | X_{i,t}\beta] = (2\pi)^{0.5} exp[0.5(b_0 + b_{1,t} + b_2\, Portfolio\ Importance_{i,t-1} + b_3\, Institutional\ Ownership_{i,t-1} + b_4\, Log\ Sales_{i,t} + b_5\, Risk\ Adjusted\ Return_{i,t} + b_6\, Beta_{i,t} + b_7\, Age_{i,t} + b_8\, Price\ to\ Earnings_{i,t} + b_9\, Profit\ Margin_{i,t} + b_{10}\, Debt\ to\ Equity_{i,t} + b_{11}\, Free\ Cash\ Flow_{i,t} + b_{12}\, Market\ to\ Book_{i,t})]$$

Second, in the amount stage we model the conditional expectation of the log payout for those firms that choose to payout:[14]

(4) $E[ln(Payout_{i,t})| X_{i,t}\beta, Payout>0] = \beta_0 + \beta_{1,t} + \beta_2 \, Portfolio\ Importance_{i,t-1}$
$+ \beta_3 \, Institutional\ Ownership_{i,t-1} + \beta_4 \, Log\ Sales_{i,t} + \beta_5 \, Risk\ Adjusted\ Return_{i,t}$
$+ \beta_6 \, Beta_{i,t} + \beta_7 \, Age_{i,t} + \beta_8 \, Price\ to\ Earnings_{i,t} + \beta_9 \, Profit\ Margin_{i,t}$
$+ \beta_{10} \, Debt\ to\ Equity_{i,t} + \beta_{11} \, Free\ Cash\ Flow_{i,t} + (\sigma\rho)\lambda_{i,t}$

The last term in the second stage, $(\sigma\rho)\lambda_{i,t}$, provides a correction for the bias created by the corner solution observations. σ represents the standard deviation of the second stage error term, while ρ represents the correlation between the stage one and stage two errors. $\lambda_{i,t}$ is the inverse Mills ratio for firm *i* in year *t* defined by the stage one Probit model.

We use the ET2T model as opposed to the more commonly used Type 1 Tobit model since the latter is designed for censoring, not corner solutions (see Wooldridge, 2010). In addition, corner solution models allow a variable's impact in the selection equation to be opposite in sign to the coefficient in the amount equation. This could be important since Grinstein and Michaely (2005) find that firms with higher institutional investment are more likely to pay a dividend, but that higher institutional investment amongst dividend paying firms is negatively related to the dividend level.

It is important to note that, similar to sample selection models, the ET2T models are identified through the Probit model's non-linearity. Unless there are several observations in the tail of the non-linear selection model, the model's parameters can be poorly identified. To improve identification, it is common to include variables in the selection equation that are not included in the amount equation (often referred to as an exclusion restriction). Because of this, the selection model given by Equation (3) contains the firm's market to book ratio in addition to

[14] The log level is used in these models to avoid negative predicted values. See Wooldridge (2010).

the control variables from Equation 1. Firms with greater growth options, ceteris paribus, will payout less cash while optimally reinvesting in positive net present value projects. For instance, Kale et al. (2012) show that market to book, their proxy for growth opportunities, is negatively associated with the decision to initiate a dividend. We leave market to book out of the intensity equation, Equation (4), since it has a mechanical relation to the level of payout (total assets are in the denominator of both variables). Table 5 contains the results from the corner solution model defined by Equations (3) and (4) which we simultaneously estimate using maximum likelihood. For brevity, and because the results are qualitatively the same, we report only the coefficients on the portfolio importance and institutional investment variables. Panel A presents the results from the selection equation, while Panel B contains the results from the amount equation.

In four of the five alternative models in Table 5 Panel A, a firm's decision to payout is positively related to the firm's portfolio importance to the top five institutional investors. This positive relation is statistically significant at the 1% level in all cases except column one, when *Top 5 Institutional Ownership* is the only other included institutional variable. Note, however, that in this case the percent of shares owned by the top five institutional investors is significant and positively related to the likelihood of positive payout. Turning to Panel B, the coefficient on *Portfolio Importance* is positive and significant at the 1% level in all five columns. Since the ET2T model, like the closely related Heckman sample selection model, is sensitive to specification and identification problems, we also run a log hurdle model for robustness. Though not reported in a table, the results are qualitatively the same as for the ET2T model. Overall, the evidence suggests that firms that are more important to institutional investors are not only more likely to payout, but tend to have higher payout rates.

The marginal effects of the other institutional variables in the ET2T model are difficult to interpret. Columns one through four in Table 5 Panel A (selection equation) show that each institutional variable, when included in the regression separately, has a positive and significant effect on the choice to payout. In Column One and Column Four in Panel B (amount equation), the coefficients on *Top 5 Ownership* and *Institutional Ownership Concentration* are both negative and significant in terms of explaining payout level. This is reminiscent to Grinstein and Michaely's (2005) finding that firms that pay dividends have higher levels of institutional ownership, even though institutional investors prefer low to high-dividend firms. The positive and significant coefficient on *Long-term Institutional Ownership* in column two of both panels may suggest that institutional investors are better at forcing payout when they own and monitor a company over longer time horizons.

It should be noted that the interpretation of the institutional variables' marginal effects on the choice to payout, however, are not robust. In Column Five of Table 5 Panel A, when all four institutional variables are included in the Probit model, only the coefficient on *Long-Term Institutional Ownership* remains positive. The coefficients on *Top 5 Ownership* and *Institutional Ownership Concentration* are both negative and significant. Some of this ambiguity may be due to the overlap of the definitions. For instance, the Bayes Information Criterion, BIC, reported at the bottom of Table 5 indicates that the model in Column Five is the least preferred of the model specifications. In looking at the variance inflation factors, however, we find none greater than 4.8, suggesting that severe multi-collinearity is not present. Nevertheless, interpreting marginal effects is still problematic when all the institutional variables are included in the regression.[15] For instance, it is mechanically impossible for *Top 5 Ownership* to increase without a corresponding increase in *Institutional Ownership Concentration.* Though interpreting the exact marginal effects of the institutional control variables is problematic, it is still the case that the firm's portfolio importance is positively related to the probability a firm chooses to payout as well as the payout level chosen.

C. Evidence of Institutional Monitoring: Changes in Total Payout

Our results in Table 2, Table 3 and Table 5 show that a firm's portfolio importance to institutional investors in year *t* is positively associated with the firm's payout level in year *t+1*. Because payout and institutional ownership tend to be persistent series, this empirical relation between the two sets of variables may be spurious. To analyze this possibility, we now look at using changes in our institutional investment variables to explain future changes in a firm's payout level. Estimating the model in changes also has the advantage that it permits partial adjustment of payout policy to an equilibrium level.

We regress the change in payout from time *t* to *t+1* onto the contemporaneous levels and changes of the control variables, as well as lagged changes in the institutional ownership variables[16]. Once again we control for firm fixed effects, year fixed effects, and standard errors are clustered by firm. Regression results are reported in Table 6. For brevity, we exclude from

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[15] Since *Portfolio Importance* is defined using the portfolio weights and not the percent of shares outstanding, interpreting the marginal effects is more straightforward. The variable's definition has little over-lap with the institutional investment variables, with a variance inflation factor of only 1.07, which is about one-third the size of the next smallest.

[16] In the event institutional investors are attracted to changes in payout, changes in the institutional variables are calculated between time *t-2* and time *t-1*. Also, we do not include the change in *Age* in the regressions since we include time fixed effects.

Table 6 the fixed-effects' coefficients and statistically insignificant coefficients at the 10% level. Because of this, only the coefficients on log sales and the change in log sales, our proxy for firm size, are included along with the institutional investment variables. The change in log sales is negatively related to the change in payout, while the level of log sales is positive. This may mean that firms experiencing (sales) growth have lower payouts as a percent of assets, while firms with high sales levels payout more, possibly due to fewer growth options.

Looking at Table 6, once again we see evidence that a firm's portfolio importance to institutional investors is positively related to the firm's total payout. Larger increases in the firm's portfolio importance are associated with larger increases in subsequent firm payout. This correlation is independent of other firm characteristics such as profitability and debt utilization, as well as changes in those characteristics. Regardless of the regression specification, the coefficient on the change in portfolio importance hovers around 0.09. In terms of economic importance, this suggests that a one standard deviation increase in *Portfolio Importance* increases the firm's total payout the following year by 5.39%. On the other hand, an increase in the percent of shares outstanding held by dedicated, long-term institutional investors is negatively related to the size of the payout change.

D. Institutional Attraction to the Type of Payout: Repurchases versus Dividends

In the previous two sections, we regress payout policy onto lagged values of portfolio importance and the institutional ownership variables since changes in payout may induce institutional investors to rebalance their portfolio. Such a model would result in a contemporaneous relation between variables, though the causation would be from a firm's payout choice to institutional ownership. In fact, the positive relation between changes in portfolio importance and future payout we find may be due to endogeneity. To see if institutional investors do react to payout policy, we next run regressions where changes in the institutional holding variables are regressed onto lagged changes in the firm's payout. We include the same control variables as in previous regressions, while again controlling for firm and year-fixed effects. Inference is similarly done using firm-clustered standard errors.

For brevity Table 7 reports only the coefficients on payout and risk-adjusted return.[17] The coefficient on payout change is actually negative, though statistically insignificant, for future changes in *Portfolio Importance* and the four proxies for institutional investors' control of the firm. While these results suggest that institutional investors are not attracted to a firm due to past changes in payout, institutional investors may be attracted to firms based on changes in the type of payout. For instance, institutional investors may prefer to invest in dividend-paying firms due to the prudent man rule (Del Guerico, 1996; Allen et al., 2000). In addition, Brennan and Thakor (1990) and Barclay and Smith (1988) argue that informed investors may prefer investing in firms that use repurchases, tendering shares when the stock is overvalued. In Table 7 Panel B we repeat the regression, but here we break total payout into total dividends and total repurchases. In neither case do we find evidence that changes in dividends or repurchases are related to future changes in institutional ownership. This finding is similar to Gaspar et al. (2013) who argue that causality is from institutional investment to payout policy, not vice versa.

It should be noted in Table 7 the coefficient on risk-adjusted returns in year *t* is significant on four of the regressions. Two of those regressions, for dedicated institutional ownership and long-term institutional holdings, have high R^2. For these two institutional

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[17] Other than year fixed-effects, *Risk Adjusted Return* is the only control variable significant at the 10% level in all the four regressions.

investment variables the risk-adjusted return is positively related to the change in institutional holdings between *t* and *t+1*. This may simply be mechanical and suggest that institutional investors hold on to “hot” stocks.[18] The fact that the relation to risk-adjusted return is negative for portfolio importance but positive for top five institutional investment is more difficult to explain. The average portfolio weight of stocks that outperform the market drops for the five largest institutional investors, though the percent of shares owned by the five largest institutional investors goes up. Note, however, that these are marginal effects and don’t indicate that changes in the two variables, *Portfolio Importance* and *Top 5 Institutional Investment*, are negatively correlated. The raw correlation for the changes in the two variables is positive, and if the change in the holdings of the top five investors is included in the regression for the change in portfolio importance, the marginal effect is positive and significant. The different sign in the coefficient on risk-adjusted return in Column 1 and Column 2 may reflect that institutions subsequently sell shares of past winners, and those past winners tend to subsequently repurchase shares. Overall, however, we find no evidence that endogeneity between total payout and institutional investment or portfolio importance is a concern for our analysis.

IV. Conclusions

Ultimately, theory suggests that monitoring is more likely when the investor has both control and a large investment in the firm. Control is increasing in the percent of total shares outstanding held by the investor, whereas the investor’s likelihood of monitoring is increasing in the portfolio weight the firm represents to the investor. We revisit Grinstein and Michaely’s

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[18] The fact the stock is “hot” may be in part due to the monitoring of the firm. This would be consistent with long-term institutional investment being positively related to firm payout.

(2005) work on the relation between firm total payouts and institutional investment in the firm. Whereas Grinstein and Michaely's (2005) find no causation between total institutional investment to payout, we find that institutional investment does impact firm payout. Our marginal contribution is to document that payout is higher when institutional investors have a greater incentive to monitor the firm.

As evidence, we show that a firm's payout is positively related to the firm's average portfolio weight among the top five institutional investors in that firm. The marginal effect of the firm's portfolio importance is 50% larger among firms with more agency problems: i.e. firms that are above their industry median in terms of free cash flow, but below in terms of their leverage and growth opportunities. In addition, the higher the firm's portfolio importance to institutional investors, the less likely the firm is to have capital expenditures above the industry median and despite having fewer industry-adjusted growth options. We also show that these results are robust to using Tobit models, and both firm and year fixed effects. In addition, we find that future changes in payout are positively related to current changes in portfolio importance, but not the other way around.

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Table 1. Payout and Institutional Investment Characteristics (1981-2006)

This table displays information about publicly held U.S firms from 1981 to 2006. This information includes institutional holdings information obtained from Thomson CDA Spectrum database, and payout data obtained from COMPUSTAT. *Payout* is defined as the sum of dividend payments and stock repurchases. Dividend payout is the last quarterly dividend multiplied by 4 and divided by book value of total assets at the end of year. Repurchase payout is defined as the total dollar amount spent to repurchase common and preferred shares divided by the book value of total assets at the end of year. *Portfolio Importance* is the mean portfolio weight a firm represents to the top five institutional investors as measured by shares owned in the firm, and represents the firm's importance to institutional investors. Institutional ownership in the firm is measured four ways. *Top 5 Institutional Ownership* is the percent of shares held by the top five institutional investors, and *$ Investment by Top 5 Institutions* is the total dollar amount the *Top 5 Institutional Ownership* represents. *Long-term Institutional Ownership* is the percent of shares held by institutional investors for four consecutive quarters, while *Dedicated Institutional Ownership* is the percent of shares owned by institutional investors classified by Bushee (2001) as long-term and concentrated investors. *Institutional Ownership Concentration* is a Hirfindahl Index, calculated for each firm as the sum (over the top five institutional investors) of the squared percentage owned of the firm's shares outstanding..

Panel A: Institutional Investment Characteristics by Percentiles (Firms with no payout)

Percentile	Portfolio Importance	Top 5 Institutional Ownership	Long-term Institutional Ownership	Dedicated Institutional Ownership	Institutional Ownership Concentration	$ Investment by Top 5 Institutions
5%	0.000%	0.000%	0.000%	0.000%	0.000	$0
25%	0.001%	1.538%	0.353%	0.000%	0.000	$351,389
50%	0.042%	10.100%	6.897%	0.304%	0.004	$5,852,878
75%	0.284%	22.007%	22.006%	6.780%	0.016	$40,900,000
95%	1.412%	37.753%	54.983%	22.361%	0.045	$345,000,000

N=44,814

Panel B: Institutional Investment Characteristics by Percentiles (Firms with positive payout)

Percentile	Portfolio Importance	Top 5 Institutional Ownership	Long-term Institutional Ownership	Dedicated Institutional Ownership	Institutional Ownership Concentration	$ Investment by Top 5 Institutions
5%	0.000%	0.209%	0.000%	0.000%	0.000	$37,782
25%	0.052%	9.709%	7.992%	0.009%	0.003	$8,469,755
50%	0.280%	18.282%	25.581%	4.024%	0.011	$58,900,000
75%	0.788%	27.131%	46.472%	11.105%	0.023	$303,000,000
95%	2.530%	42.024%	70.492%	25.797%	0.056	$2,970,000,00

N=46,926

Panel C: Average Firm Payout by Institutional Investment Characteristic Quartiles (All firms)

Quartile	Portfolio Importance	Top 5 Institutional Ownership	Long-term Institutional Ownership	Dedicated Institutional Ownership	Institutional Ownership Concentration
Smallest	1.019%	1.135%	1.124%	1.409%	1.173%
Second	1.565%	2.000%	1.416%	2.102%	1.950%
Third	2.251%	2.425%	2.062%	2.342%	2.421%
Largest	3.100%	2.369%	3.328%	2.324%	2.386%

N=91,740

Panel D: Average Firm Payout & Average Institutional Investment Characteristics (by year)

Year	Payout	Portfolio Importance	Top 5 Institutional Ownership	Long-term Institutional Ownership	Dedicated Institutional Ownership	Institutional Ownership Concentration	Total Obs.	Obs. w/ Positiv e
1981	1.894	0.647%	8.777%	10.067%	2.632%	0.008	2,945	1941
1982	1.925	0.591%	9.254%	10.084%	2.561%	0.008	3,151	1902
1983	1.757	0.617%	10.466%	10.682%	3.285%	0.008	3,235	1876
1984	2.201	0.602%	11.131%	12.977%	3.451%	0.009	3,348	1846
1985	1.944	0.577%	11.726%	13.022%	4.061%	0.009	3,437	1865
1986	1.847	0.576%	12.443%	14.513%	4.882%	0.010	3,378	1743
1987	2.133	0.505%	12.170%	15.132%	4.306%	0.010	3,483	1824
1988	2.033	0.498%	12.360%	16.236%	5.560%	0.010	3,553	1851
1989	1.778	0.486%	12.722%	16.649%	5.984%	0.011	3,507	1685
1990	1.811	0.504%	13.137%	17.116%	6.357%	0.011	3,448	1713
1991	1.617	0.484%	14.313%	18.380%	7.243%	0.013	3,446	1668
1992	1.528	0.486%	15.287%	20.462%	7.769%	0.013	3,471	1592
1993	1.477	0.483%	16.556%	21.320%	8.907%	0.015	3,715	1691
1994	1.528	0.484%	17.294%	22.105%	10.880%	0.016	4,038	1759
1995	1.561	0.493%	18.105%	22.848%	10.201%	0.017	4,168	1826
1996	1.667	0.481%	18.644%	22.332%	12.779%	0.017	4,187	1857
1997	2.094	0.508%	19.112%	24.105%	13.738%	0.018	4,303	1972
1998	2.531	0.479%	19.398%	26.139%	1.532%	0.019	4,218	2182
1999	2.472	0.507%	19.278%	25.081%	4.998%	0.019	4,022	2218
2000	2.309	0.534%	19.479%	25.601%	5.368%	0.020	3,822	2013
2001	1.851	0.592%	20.461%	28.760%	5.495%	0.021	3,630	1948
2002	1.760	0.608%	21.252%	31.095%	7.084%	0.022	3,421	1820
2003	2.000	0.669%	22.376%	34.186%	7.075%	0.024	3,211	1692
2004	2.204	0.655%	21.440%	34.992%	1.624%	0.020	2,993	1515
2005	2.758	0.756%	24.824%	35.227%	2.220%	0.027	2,882	1486
2006	3.264	0.870%	25.413%	39.991%	2.266%	0.027	2,728	1441
Mean	1.982	0.557%	16.480%	21.813%	6.122%	0.016	91,74	46,92
Samp	5.705	1.616	13.616	22.026	8.960	0.034		

Table 2. Effect of portfolio importance and institutional holdings on a firm's total payout policy

This table reports fixed-effect estimates from regressing firm payout policy onto the firm's portfolio importance and institutional ownership. The regression is based on the following conditional mean:

$$E[Payout_{i,t} \mid X_{i,t}\beta] = b_{0,i} + b_{1,i} + b_2\, Portfolio\ Importance_{i,t-1} + b_3\, Institutional\ Ownership_{i,t-1} + b_4\, Log\ Sales_{i,t} + b_5\, Risk\ Adjusted\ Return_{i,t} + b_6\, Beta_{i,t} + b_7\, Age_{i,t} + b_8\, Price\ to\ Earnings_{i,t} + b_9\, Profit\ Margin_{i,t} + b_{10}\, Debt\ to\ Equity_{i,t} + b_{11}\, Free\ Cash\ Flow_{i,t}$$

$Payout_{i,t}$ is defined as the sum of dividend payments and stock repurchases for firm *i* in year *t*. Dividend payout is the last quarterly dividend in year *t* multiplied by 4 and divided by book value of total assets at the end of year *t*. Repurchase payout is defined as the total dollar amount spent in year *t* to repurchase common and preferred shares divided by the book value of total assets at the end of year *t*. Fixed-effects are included for each firm, $b_{0,i}$, and each year, $b_{1,t}$. *Portfolio Importance* is the mean portfolio weight a firm represents to the top five institutional investors as measured by shares owned in the firm, and represents the firm's importance to institutional investors. Institutional ownership in the firm is measured four ways. *Top 5 Institutional Ownership* is the percent of shares held by the top five institutional investors. *Long-term Institutional Ownership* is the percent of shares held by institutional investors for four consecutive quarters, while *Dedicated Institutional Ownership* is the percent of shares owned by institutional investors classified by Bushee (2001) as long-term and concentrated investors. *Institutional Ownership Concentration* is a Hirfindahl Index, calculated for each firm as the sum (over institutional investors) of the squared percentage owned of the firm's shares outstanding. In addition to institutional ownership variables, we include other firm characteristics. *Log Sales* is the natural log of sales. *Risk Adjusted Return* is the annual stock return adjusted with the CAPM. We use the 10-year treasury yield and the S&P 500 annual return when using the CAPM, while *Beta* is calculated using monthly returns over a prior five year window. *Age* is the number of months since the firm's first return is reported in CRSP. *Price to Earnings* is the price per share divided by earning per share, while *Profit Margin* is net income divided by sales. *Debt to Equity* is long-term debt divided by total equity. *Free Cash Flow* is calculated as net income plus depreciation minus the change in working capital and capital expenditures, divided by the market cap of the firm. T-statistics are calculated with firm clustered standard errors and are reported in parentheses below the coefficient.

	Dependent Variable: Total Payout				
	(1)	(2)	(3)	(4)	(5)
Portfolio Importance (t-1)	0.084***	0.073***	0.085***	0.084***	0.093***
	(0.0264)	(0.0265)	(0.0262)	(0.0263)	(0.0265)
Top 5 Institutional Ownership (t-1)	-0.00169				-0.020***
	(0.00332)				(0.00551)
Long-term Institutional Ownership (t-1)		0.0186***			0.028***
		(0.00196)			(0.00228)
Dedicated Institutional Ownership (t-1)			-0.00556		-0.012***
			(0.00354)		(0.00407)
Institutional Ownership Concentration (t-1)				-0.669	0.670
				(0.996)	(1.377)
Log Sales	0.162***	0.0909	0.164***	0.160***	0.090
	(0.0579)	(0.0575)	(0.0568)	(0.0567)	(0.0580)
Risk Adjusted Return	-0.0802	-0.0575	-0.0781	-0.0795	-0.047
	(0.0931)	(0.0931)	(0.0931)	(0.0932)	(0.0929)
Beta	-0.148***	-0.144***	-0.148***	-0.148***	-0.142***
	(0.0389)	(0.0386)	(0.0389)	(0.0389)	(0.0386)
Age	0.0538	0.0508	0.0536	0.0538	0.051
	(0.0382)	(0.0376)	(0.0383)	(0.0382)	(0.0376)
Profit Margin	0.000	0.000	0.000	0.000	0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Price to Earnings	0.000	0.000	0.000	0.000	0.000
	(0.000107)	(0.000106)	(0.000)	(0.000)	(0.000)
Debt to Equity	-0.040*	-0.041**	-0.040*	-0.040*	-0.039*
	(0.021)	(0.019)	(0.022)	(0.021)	(0.021)
Free Cash Flow	0.039***	0.037***	0.038***	0.039***	0.032***
	(0.011)	(0.012)	(0.011)	(0.011)	(0.011)
Observations	77,972	77,972	77,972	77,972	77,972
ρ	0.812	0.800	0.811	0.812	0.800
BIC	446,707	446,545	446,703	446,707	446,482
R^2 (with-in)	0.0123	0.0144	0.0124	0.0123	0.0156
F-stat	13.09***	14.89***	13.32***	13.09***	15.23***
Firms	10,799	10,799	10,799	10,799	10,799

ρ is the fraction of variation due to fixed-effects. *F-stat F.E* is the F-test that the fixed effects are jointly zero. *BIC* is the Bayesian Information Criterion, and R^2 *within* is the R^2 from the within fixed-effect regression of deviations from means, $(y - \bar{y}) = (x - \bar{x})\hat{b} + (\epsilon - \bar{\epsilon})$. *F-stat* is for the hypothesis that all slope coefficients are jointly equal to zero.

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Table 3. Effect of portfolio importance on firms with free cash flow above the industry median, but growth options and leverage below the industry median.

This table reports fixed-effect estimates from regressing firm payout policy onto the firm's portfolio importance and institutional ownership. The regression is based on the following conditional mean:

$$E[Payout_{i,t} \mid X_{i,t}\beta] = b_{0,i} + b_{1,i} + b_2\, Portfolio\ Importance_{i,t-1} + b_2\, Portfolio\ Importance_{i,t-1} * Agency\ Dummy_t + b_3\, Institutional\ Ownership_{i,t-1} + b_4\, Log\ Sales_{i,t} + b_5\, Risk\ Adjusted\ Return_{i,t} + b_6\, Beta_{i,t} + b_7\, Age_{i,t} + b_8\, Price\ to\ Earnings_{i,t} + b_9\, Profit\ Margin_{i,t} + b_{10}\, Debt\ to\ Equity_{i,t} + b_{11}\, Free\ Cash\ Flow_{i,t}$$

Agency Dummy is an indicator variable for firms that are relatively more likely to have agency problems. *Agency Dummy* assumes a value of one for any firm that has free cash flow above the two-digit industry SIC code median, and both a debt-to-equity ratio and a price-to-earnings ratio below the industry median. The remaining variable definitions are the same as in 0. T-statistics are calculated with firm clustered standard errors and are reported in parentheses below the coefficient.

	(1) Total Payout	(2) Total Payout	(3) Total Payout	(4) Total Payout	(5) Total Payout
Portfolio Importance (t-1)	0.0743***	0.0633**	0.0740***	0.0752***	0.0828***
	(0.0273)	(0.0273)	(0.0272)	(0.0271)	(0.0274)
Portfolio Importance (t-1) Agency Dummy*	0.139***	0.137***	0.139***	0.140***	0.142***
	(0.0530)	(0.0524)	(0.0530)	(0.0532)	(0.0530)
Top 5 Institutional Ownership (t-1)	-0.00180				-0.0205***
	(0.00332)				(0.00551)
Long-term Ownership (t-1)		0.0186***			0.0278***
		(0.00196)			(0.00228)
Institutional Ownership Concentration (t-1)			-0.683		0.700
			(0.996)		(1.376)
Dedicated Institutional Ownership (t-1)				-0.00568	-0.0122***
				(0.00354)	(0.00407)
Observations	77,972	77,972	77,972	77,972	77,972
ρ	0.814	0.802	0.814	0.813	0.802
BIC	446,703.5	446,541.7	446,703.3	446699.6	446,478.3
R^2 (with-in)	0.0125	0.0146	0.0125	0.0126	0.0158
F-stat	12.90***	14.62***	12.91***	13.15***	15.03***
Firms	10,799	10,799	10,799	10,799	10,799

ρ is the fraction of variation due to fixed-effects. *BIC* is the Bayesian Information Criterion, and R^2 *within* is the R^2 from the within fixed-effect regression of deviations from means, $(y - \bar{y}) = (x - \bar{x})\hat{b} + (\epsilon - \bar{\epsilon})$. *F-stat* is for the hypothesis that all slope coefficients are jointly equal to zero.

$^{*}\ p < 0.1$, $^{**}\ p < 0.05$, $^{***}\ p < 0.01$

Table 4. Effect of portfolio importance on the likelihood a firm has growth options below the industry median but capital expenditures above the industry median

This table reports probit estimation of the probability that a firm invests more in capital expenditures than the corresponding two-digit SIC code median despite having a price-to-earnings ratio below the industry median. The regression is based on the following conditional mean:

$$Prob[Agency\ Dummy_{i,t} > 0 |\ X_{i,t}\beta] = (2\pi)^{0.5} exp[0.5(b_0 + b_{1,t} + b_2\ Portfolio\ Importance_{i,t-1} + b_{10}\ Debt\ to\ Equity_{i,t} + b_{11}\ Free\ Cash\ Flow_{i,t}]$$

Agency Dummy$_{i,t}$ assumes a value of one when firm *i* in time *t* incurs capital expenditures in excess of the corresponding two-digit industry SIC code median while having a price-to-earnings ratio below the industry median. *Portfolio Importance* is the mean portfolio weight a firm represents to the top five institutional investors as measured by shares owned in the firm, and represents the firm's importance to institutional investors. *Debt to Equity* is long-term debt divided by total equity. *Free Cash Flow* is calculated as net income plus depreciation minus the change in working capital and capital expenditures, divided by the market cap of the firm. T-statistics are calculated with firm clustered standard errors and are reported in parentheses below the coefficient. Column one reports the estimated regression coefficient, while column two reports the estimated average marginal effect.

	(1) Coefficient	(2) Marginal Effect
Portfolio Importance (t-1)	-0.0343***	-0.0059***
	(0.0094)	(0.0016)
Debt to Equity	0.0004	0.0001
	(0.0003)	(0.0000)
Free Cash Flow	-0.0324	-0.0055
	(0.0222)	(0.0038)
Constant	-1.2547***	
	(0.0143)	
Observations	81,141	
Pseudo R^2	0.0005	
BIC	85,247.71	
Log Likelihood	-42601.25	
χ^2	17.98***	
Firms	11,076	

BIC is the Bayesian Information Criterion, and χ^2 is the likelihood ratio test that the slope coefficients are equal to zero.
* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Table 5. Corner solution models for the effect of portfolio importance and institutional holdings on a firm's payout policy

This table reports regression estimates for a two-stage corner solution model relating firm payout policy to the firm's portfolio importance and institutional ownership. The two stages are as follows:

(1) Selection Stage:

$$Prob[Payout_{i,t} > 0 | X_{i,t}\beta] = (2\pi)^{0.5} exp[0.5(b_0 + b_{1,t} + b_2\ Portfolio\ Importance_{i,t-1} + b_3\ Institutional\ Ownership_{i,t-1} + b_4\ Log\ Sales_{i,t} + b_5\ Risk\ Adjusted\ Return_{i,t} + b_6\ Beta_{i,t} + b_7\ Age_{i,t} + b_8\ Price\ to\ Earnings_{i,t} + b_9\ Profit\ Margin_{i,t} + b_{10}\ Debt\ to\ Equity_{i,t} + b_{11}\ Free\ Cash\ Flow_{i,t} + b_{12}\ Market\ to\ Book_{i,t})]$$

(2) Amount/Intensity Stage:

$$E[ln(Payout_{i,t}) | X_{i,t}\beta, Payout>0] = \beta_0 + \beta_{1,t} + \beta_2\ Portfolio\ Importance_{i,t-1} + \beta_3\ Institutional\ Ownership_{i,t-1} + \beta_4\ Log\ Sales_{i,t} + \beta_5\ Risk\ Adjusted\ Return_{i,t} + \beta_6\ Beta_{i,t} + \beta_7\ Age_{i,t} + \beta_8\ Price\ to\ Earnings_{i,t} + \beta_9\ Profit\ Margin_{i,t} + \beta_{10}\ Debt\ to\ Equity_{i,t} + \beta_{11}\ Free\ Cash\ Flow_{i,t} + (\sigma\rho)\lambda_{i,t}$$

$Payout_{i,t}$ is defined as the sum of dividend payments and stock repurchases for firm *i* in year *t*, while $ln(Payout_{i,t})$ is the natural log of payout. Dividend payout is the last quarterly dividend in year t multiplied by 4 and divided by book value of total assets at the end of year *t*. Repurchase payout is defined as the total dollar amount spent in year t to repurchase common and preferred shares divided by the book value of total assets at the end of year *t*. $b_{1,t}$ and $\beta_{1,t}$ represent year fixed effects. *Portfolio Importance* is the mean portfolio weight a firm represents to the top five institutional investors as measured by shares owned in the firm, and represents the firm's importance to institutional investors. Institutional ownership in the firm is measured four ways. *Top 5 Institutional Ownership* is the percent of shares held by the top five institutional investors. *Long-term Institutional Ownership* is the percent of shares held by institutional investors for four consecutive quarters, while *Dedicated Institutional Ownership* is the percent of shares owned by institutional investors classified by Bushee (2001) as long-term and concentrated investors. *Institutional Ownership Concentration* is a Hirfindahl Index, calculated for each firm as the sum (over institutional investors) of the squared percentage owned of the firm's shares outstanding. In addition to institutional ownership variables, we include other firm characteristics. *Log Sales* is the natural log of sales. *Risk Adjusted Return* is the annual stock return adjusted with the CAPM. We use the 10-year treasury yield and the S&P 500 annual return when using the CAPM, while *Beta* is calculated using monthly returns over a prior five year window. *Age* is the number of months since the firm's first return is reported in CRSP. *Price to Earnings* is the price per share divided by earning per share, while *Profit Margin* is net income divided by sales. *Debt to Equity* is long-term debt divided by total equity. *Free Cash Flow* is calculated as net income plus depreciation minus the change in working capital and capital expenditures, divided by the market cap of the firm. *Market to Book* is the market value of equity and the book value of liabilities divided by the book value of assets, and is included in the first stage as an exclusion restriction for identification. The last term in the second stage, $(\sigma\rho)\lambda_{i,t}$, provides a correction for the bias created by the corner solution observations. σ represents the standard deviation of the second stage error term, while ρ represents the correlation between the stage one and stage two errors. $\lambda_{i,t}$ is the inverse Mills ratio for firm *i* in year *t* defined by the stage one Probit model. The corner solution model is estimated in one stage using maximum likelihood. T-stats are calculated with firm clustered standard errors and reported in parentheses below the coefficient.

Panel A: Stage One Selection Model

	Dependent Variable: Payout Dummy				
	(1)	(2)	(3)	(4)	(5)
Portfolio Importance (t-1)	0.00681	0.0162***	0.0125**	0.0133**	0.0231***
	(0.00576)	(0.00564)	(0.00573)	(0.00606)	(0.00580)
Top 5 Institutional Ownership (t-1)	0.00673***				-0.00136
	(0.000802)				(0.00136)
Long-term Institutional Ownership (t-1)		0.00776***			0.0105***
		(0.000584)			(0.000723)
Dedicated Institutional Ownership (t-1)			0.00350***		-0.00587***
			(0.00107)		(0.00120)
Institutional Ownership Concentration (t-1)				1.483***	-0.902**
				(0.332)	(0.408)
$\sigma\rho$	-1.796***	0.0286	-1.795***	-1.756***	-1.799***
	(0.0581)	(0.0399)	(0.0604)	(0.0605)	(0.0610)

Panel B: Stage Two Amount/Intensity Model

	Dependent Variable: Log Payout				
	(1)	(2)	(3)	(4)	(5)
Portfolio Importance (t-1)	0.0751***	0.0475***	0.0670***	0.0754***	0.0580***
	(0.00915)	(0.00703)	(0.00884)	(0.00924)	(0.00745)
Top 5 Institutional Ownership (t-1)	-0.0140***				-0.0211***
	(0.00171)				(0.00245)
Long-term Institutional Ownership (t-1)		0.0144***			0.0259***
		(0.000962)			(0.00120)
Dedicated Institutional Ownership (t-1)			-0.00347		0.00188
			(0.00222)		(0.00230)
Institutional Ownership Concentration (t-1)				-5.942***	-5.261***
				(0.733)	(1.014)
Observations	75,397	75,397	75,397	75,397	75,397
ρ	-0.874	0.0178	-0.872	-0.864	-0.873
χ^2_ρ	689.7***	0.512	635.8***	594.3***	628.1***
BIC	235,890	235,881	236,221	235,818	236,358
Log Likelihood	-117,518	-117,514	-117,684	-117,482	-117,764
χ^2	532.8***	934.4***	513.7***	533.5***	492.4***
Observations Payout = 0	35,240	35,240	35,240	35,240	35,240

ρ is the correlation between the first and second stage errors, and χ^2_ρ is the likelihood ratio test that ρ is zero. BIC is the Bayesian Information Criterion, and χ^2 is the Wald test that all slope coefficients in the regression model are jointly equal to zero. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Table 6. Effect of the change in portfolio importance and institutional investment on the firm's future payout

This table reports fixed-effect estimates from regressing the change in firm payout policy onto the firm's portfolio importance and institutional ownership. The regression is based on the following conditional mean:

$$E[\Delta Payout_{i,t} \mid X_{i,t}\beta] = b_{0,i} + b_{1,i} + b_2\,\Delta Portfolio\ Importance_{i,t-1} + b_3\,\Delta Institutional\ Ownership_{i,t-1}$$
$$+ b_4\,Log\ Sales_{i,t} + b_5\,Risk\ Adjusted\ Return_{i,t} + b_6\,Beta_{i,t} + b_7\,Age_{i,t} + b_8\,Price\ to\ Earnings_{i,t}$$
$$+ b_9\,Profit\ Margin_{i,t} + b_{10}\,Debt\ to\ Equity_{i,t} + b_{11}\,Free\ Cash\ Flow_{i,t}$$
$$+ b_{12}\Delta Log\ Sales_{i,t} + b_{13}\Delta Risk\ Adjusted\ Return_{i,t} + b_{14}\Delta Beta_{i,t} + b_{15}\Delta Price\ to\ Earnings_{i,t}$$
$$+ b_{16}\,\Delta Profit\ Margin_{i,t} + b_{17}\,\Delta Debt\ to\ Equity_{i,t} + b_{18}\,\Delta Free\ Cash\ Flow_{i,t}$$

$\Delta Payout_{i,t}$ is defined as the change in the sum of dividend payments and stock repurchases for firm *i* between year *t* and *t-1*. Dividend payout is the last quarterly dividend in year *t* multiplied by 4 and divided by book value of total assets at the end of year *t*. Repurchase payout is defined as the total dollar amount spent in year *t* to repurchase common and preferred shares divided by the book value of total assets at the end of year *t*. Fixed-effects are included for each firm, $b_{0,i}$, and each year, $b_{1,t}$. *Portfolio Importance* is the mean portfolio weight a firm represents to the top five institutional investors as measured by shares owned in the firm, and represents the firm's importance to institutional investors. Institutional ownership in the firm is measured four ways. *Top 5 Institutional Ownership* is the percent of shares held by the top five institutional investors. *Long-term Institutional Ownership* is the percent of shares held by institutional investors for four consecutive quarters, while *Dedicated Institutional Ownership* is the percent of shares owned by institutional investors classified by Bushee (2001) as long-term and concentrated investors. *Institutional Ownership Concentration* is a Hirfindahl Index, calculated for each firm as the sum (over institutional investors) of the squared percentage owned of the firm's shares outstanding. In addition to institutional ownership variables, we include other firm characteristics. *Log Sales* is the natural log of sales. Other control variables (and their changes, Δ) included in the regression but not reported in the table are: risk adjusted return, beta, age, price to earnings, profit margin, debt to equity, and free cash flow. We also include in the regression, but do not report in the table, firm age. T-stats are calculated with firm clustered standard errors and reported in parentheses below the coefficient.

	Dependent Variable: Change in Payout at Time t				
	(1)	(2)	(3)	(4)	(5)
Δ Portfolio Importance (t-1)	0.0949**	0.0896**	0.0936**	0.0918**	0.0967**
	(0.0420)	(0.0416)	(0.0416)	(0.0417)	(0.0420)
Δ Top 5 Institutional Ownership (t-1)	-0.00586				-0.00686
	(0.00638)				(0.0117)
Δ Long-term Institutional Ownership (t-1)		0.00386			0.00683**
		(0.00273)			(0.00302)
Δ Dedicated Institutional Ownership (t-1)			-0.0117***		-0.0121**
			(0.00426)		(0.00521)
Δ Institutional Ownership Concentration (t-1)				-0.965	0.698
				(1.392)	(2.385)
Δ Log Sales	-0.493***	-0.493***	-0.493***	-0.493***	-0.493***
	(0.154)	(0.154)	(0.154)	(0.154)	(0.155)
Log Sales	0.215***	0.214***	0.215***	0.215***	0.213***
	(0.0519)	(0.0517)	(0.0518)	(0.0518)	(0.0518)
Observations	64,114	64,114	64,114	64,114	64,114
ρ	0.273	0.262	0.271	0.270	0.266
BIC	410,337	410,336	410,330	410,339	410,357
R^2 (with-in)	0.004	0.004	0.004	0.004	0.004
F-stat	7.338	7.223	7.430	7.222	7.149
Firms	9,072	9,072	9,072	9,072	9,072

ρ is the fraction of variation due to fixed-effects. *BIC* is the Bayesian Information Criterion, and R^2 *within* is the R^2 from the within fixed-effect regression of deviations from means, $(y - \bar{y}) = (x - \bar{x})\hat{b} + (\epsilon - \bar{\epsilon})$. *F-stat* is for the hypothesis that all slope coefficients are jointly equal to zero.

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Table 7. Effect of change in firm payout policy on characteristics of institutional investment in a firm

This table reports fixed-effect estimates of regressing portfolio importance and institutional holdings onto firm payout policy and other characteristics. The regression is based on the following conditional mean:

$$
\begin{aligned}
E[\Delta \mathit{Portfolio\ Importance}_{i,t-1} | X_{i,t}\beta] = {} & b_{0,i} + b_{1,i} + b_2\,\Delta \mathit{Dividend\ Payout}_{i,t} + b_3\,\Delta \mathit{Repurchases}_{i,t-1} \\
& + b_4\,\mathit{Log\ Sales}_{i,t} + b_5\,\mathit{Risk\ Adjusted\ Return}_{i,t} + b_6\,\mathit{Beta}_{i,t} + b_7\,\mathit{Age}_{i,t} + b_8\,\mathit{Price\ to\ Earnings}_{i,t} \\
& + b_9\,\mathit{Profit\ Margin}_{i,t} + b_{10}\,\mathit{Debt\ to\ Equity}_{i,t} + b_{11}\,\mathit{Free\ Cash\ Flow}_{i,t} \\
& + b_{12}\Delta \mathit{Log\ Sales}_{i,t} + b_{13}\Delta \mathit{Risk\ Adjusted\ Return}_{i,t} + b_{14}\Delta \mathit{Beta}_{i,t} + b_{15}\Delta \mathit{Price\ to\ Earnings}_{i,t} \\
& + b_{16}\,\Delta \mathit{Profit\ Margin}_{i,t} + b_{17}\,\Delta \mathit{Debt\ to\ Equity}_{i,t} + b_{18}\,\Delta \mathit{Free\ Cash\ Flow}_{i,t}
\end{aligned}
$$

Dividend payout is the last quarterly dividend in year *t* multiplied by 4 and divided by book value of total assets at the end of year *t*. Repurchase payout is defined as the total dollar amount spent in year *t* to repurchase common and preferred shares divided by the book value of total assets at the end of year *t*. Δ represents the change in a variable over the year, and *t-1* represents a lagged value from the prior year. Fixed-effects are included for each firm, $b_{0,i}$, and each year, $b_{1,t}$. *Portfolio Importance* is the mean portfolio weight a firm represents to the top five institutional investors as measured by shares owned in the firm, and represents the firm's importance to institutional investors. Institutional ownership in the firm is measured four ways. *Top 5 Institutional Ownership* is the percent of shares held by the top five institutional investors. *Long-term Institutional Ownership* is the percent of shares held by institutional investors for four consecutive quarters, while *Dedicated Institutional Ownership* is the percent of shares owned by institutional investors classified by Bushee (2001) as long-term and concentrated investors. *Institutional Ownership Concentration* is a Hirfindahl Index, calculated for each firm as the sum (over institutional investors) of the squared percentage owned of the firm's shares outstanding. In addition to institutional ownership variables, we include other firm characteristics. *Risk Adjusted Return* is the annual stock return adjusted with the CAPM. We use the 10-year treasury yield and the S&P 500 annual return when using the CAPM, while beta is calculated using monthly returns over a prior five year window. Control variables (and their changes) included but not reported in the table are: log of sales, beta, price to earnings, profit margin, debt to equity, and free cash flow. Firm age is also included in the regression but not reported in the table. Panel A reports the regression when the coefficient on the change in dividend payout is restricted to equal the coefficient on the change in repurchases, $b_2 = b_3$. Panel B records the unrestricted model. T-stats are calculated with firm clustered standard errors and reported in parentheses below the coefficient.

Panel A: Impact of the Change in Dividends and Repurchases on Future Institutional Ownership

	(1) Δ Portfolio Importance	(2) Δ Top 5 Institutional Ownership	(3) Δ Long-term Institutional Ownership	(4) Δ Dedicated Institutional Ownership	(5) Δ Institutional Ownership Concentration
Δ Payout (t-1)	-0.000367	-0.00598	-0.000814	-0.00650	-0.0000369
	(0.00169)	(0.00586)	(0.00834)	(0.00473)	(0.0000275)
Risk Adjusted Return	-0.203***	0.575**	4.790***	0.810***	-0.000983
	(0.0477)	(0.290)	(0.435)	(0.239)	(0.000832)
Observations	59,608	59,608	59,608	59,608	59,608
ρ	0.565	0.562	0.418	0.520	0.435
R^2 (with-in)	0.00163	0.00752	0.338	0.246	0.00387
F-test	2.898***	9.799***	156.900***	140.900***	2.350***
Firms	8,363	8,363	8,363	8,363	8,363

Panel B: The impact of changes in dividends and repurchases on future institutional ownership

	(1) Δ Portfolio Importance	(2) Δ Top 5 Institutional Ownership	(3) Δ Long-term Institutional Ownership	(4) Δ Dedicated Institutional Ownership	(5) Δ Institutional Ownership Concentration
Δ Dividend (t-1)	0.00723	0.00471	0.00253	-0.00802	-0.000118
	(0.00733)	(0.0276)	(0.0322)	(0.0340)	(0.000175)
Δ Repurchases (t-1)	-0.00111	-0.00702	-0.00114	-0.00635	-0.0000290
	(0.00175)	(0.00593)	(0.00870)	(0.00436)	(0.0000283)
Risk Adjusted Return	-0.203***	0.575**	4.790***	0.810***	-0.000983
	(0.0477)	(0.290)	(0.435)	(0.239)	(0.000832)
Observations	59,608	59,608	59,608	59,608	59,608
ρ	0.561	0.563	0.418	0.520	0.435
R^2 (with-in)	0.00178	0.00753	0.338	0.246	0.00392
F-stat	2.852***	9.585***	153.2***	137.6***	2.329***
Firms	8,363	8,363	8,363	8,363	8,363

ρ is the fraction of variation due to fixed-effects. *R^2 within* is the R^2 from the within fixed-effect regression of deviations from means, $(y - \bar{y}) = (x - \bar{x})\hat{b} + (\epsilon - \bar{\epsilon})$. *F-stat* is for the hypothesis that all slope coefficients are jointly equal to zero.

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$