

Cella, Cristina

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Abstract

Using investors' trading horizons to capture their incentives to collect information and monitor management's decisions, this paper shows that an increase in the ownership stake held by long-term institutional investors is associated with a subsequent decrease in real investment precisely in firms that invest too much. In support of the monitoring hypothesis, we show that results are driven by the purchases of long-term investors, while quasi-indexers and short-term investors have no influence on investment. We address the potential problem of endogeneity using the inclusion of a firm to the S&P 500 Index as an exogenous shock to institutional holdings.

Keywords: Institutional ownership, investors' investment horizons, over-investment, under-investment, management monitoring'

JEL Classification: B2, G31, G32

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Address for correspondence: Research Division, Sverige Riksbank, Brunkebergstorg 11, 103 37 Stockholm, Sverige. E-mail: cristina.cella@riksbank.se, telephone: +46 76 725 67 54

Introduction

This paper offers new insights into institutional investors' monitoring by testing whether in firms that invest too much, an increase in the stake held by long-term institutional investors is associated with subsequently lower investment.

Existing empirical literature shows that investment impacts firm performance (Fama and French (2006a)) and, in particular, that firms that invest too much have lower stock returns (Titman, Wei, and Xie (2004)). Institutional investors holding stocks in firms that invest too much can then benefit by monitoring the firms' investment policies. Nevertheless, changes in investment may not bring short-term gains for investors but may get reflected in stock prices over the *long-term* (Bushee (2001) and Chen et al. (2007)). Thus, not all institutional investors can be expected to monitor *long-term* investment.

Following the existing literature (see for example Chen et al. (2007)), we postulate that only institutional investors with a long-term investment in a firm may have incentives to monitor the firm's investment. Using investor trading horizon, we distinguish between long-term institutional investors and short-term institutional investors and document that in firms that invest too much, an increase in the stake held by long-term institutional investors is associated with subsequently lower investment.

II. Sample and Variables Construction

The data include all firms in COMPUSTAT, excluding those in regulated industries and financial institutions, with at least 4 years of accounting data (following Titman et al. (2004)). To construct the ownership variables, we use data on the quarterly holdings of institutional investors from Thomson Financial. Data on number of shares outstanding and stock characteristics are from

CRSP. The final sample is composed 6,913 firms for a total of 40,155 firm-year observations over the period 1980 to 2006 (to avoid the effects of the financial crisis).

To test the monitoring hypothesis, we follow Chen et al. (2007) and identify institutional investors that have a long- term relationship with the firms in their portfolios and thus may have the potential to influence managers. We define as long-term (short-term) investors those that hold their ownership stakes in a firm for at least (for less than) four consecutive quarters. Then, in each firm, we obtain the ownership stake of long-term (short-term) investors dividing the number of shares they own by the number of shares outstanding.

To test our maintained hypothesis, we use a firm's investment in real asset at time (t) normalized by expenditure in PP&E at time ($t-1$) (henceforth Investment). Following Richardson (2006), for each firm, we compute a firm's investment in real asset as the sum of all outlays on capital expenditure, acquisitions and R&D investment less receipts from the sale of PP&E and depreciation and amortization.

To capture deviations in a firm's investment policies, we use three proxies proposed by the existing literature. First, a measure of firm-specific adjusted investment that compares a firm's *current capital investment* (CI) with its average investment in the previous three years (Titman et al. (2004)). Then, following Harvey et al. (2004), we calculate a firm's *industry-adjusted investment* by comparing a firm's current investment with the firm's industry median investment. Finally, following Richardson (2006), we calculate a *firm-specific adjusted investment* as the unexplained portion (or residual) obtained by the following panel regression:

$$\text{Investment}_{(i;t)} = \beta_0 + \beta_1 \text{Market-to-Book}_{(i;t-1)} + \beta_2 \text{Cash flows}_{(i;t-1)} + \beta_3 \text{Leverage}_{(i;t-1)} + \beta_4 \text{Size}_{(i;t-1)} + \beta_5 \text{Past Returns}_{(i;t-1)} + \beta_6 \text{Z-score}_{(i;t-1)} + \beta_7 \sum_{t=1}^T t + \alpha_i + \varepsilon_{(i;t)} \quad (1)$$

We assume that a firm invests too much (too little) only if *all three measures* of investment deviations are positive (negative). Hence, a firm invests too much if: (1) it invests more than its

average investment in the previous three years, (2) it invests more than its industry peers, and (3) it invests more than its specific benchmark given its growth opportunities, cash flows, leverage, firm and industry time-invariant characteristics, and trend in investment. A firm invests too little if it invests below all of its proxies of investment.

In untabulated results, using Fama and French 30 industries classification, we document that firms that invest too much (too little) are not concentrated in any specific industry, and that the same is true for both long-term (short-term) institutional investors.

III. Empirical Methodology

In our empirical analysis we employ a first difference regressions approach with robust standard errors clustered either at the firm or industry level. All regressions use as dependent variable changes in investment (Investment) or changes in investment deviations from the firms' industry median (Investment Deviations). Change in investment is calculated between year $(t-1)$ and (t) . The independent variable of interest is changes in the stake held by long-term (short-term) and is calculated between year $(t-2)$ and $(t-1)$.

To capture the evolution of a firm's investment across-firms and within a firm across-time, we use the panel structure of the dataset and use a methodology based on dummy variables. At the end of each year, we create an over-investment dummy variable that is equal to one if a firm invests too much and takes the value of zero if a firm invests too little or if the firm can be classified as a non-deviation firm (i.e. a firm that neither invest too much nor too little).

To allow the effect of institutional ownership to vary by type of firm (i.e. firms that invest too much, firms that invest too little, non-deviation firms) and to directly compare long-term investors' influence across firms and across time in the same firm, we interact the over-investment dummy with the change in long-term (short-term) ownership.

Table I: Descriptive Statistics

	Firms that Invest too Much				Firms that Invest too Little			
	N	Mean	Median	SD	N	Mean	Median	SD
Investment	8,793	0.39	0.36	0.16	14,546	0.06	0.06	0.10
<i>Investment Deviations</i>								
Adjusted capital investment	8,793	1.14	0.59	1.68	14,546	-0.86	-0.65	1.04
Industry-adjusted Investment	8,793	0.18	0.15	0.15	14,546	-0.13	-0.12	0.10
Firm-specific adjusted investment	8,793	0.18	0.15	0.14	14,546	-0.12	-0.10	0.11
<i>Ownership Characteristics</i>								
LT Investors	8,770	30.53%	26.27%	22.06%	14,471	23.85%	18.37%	19.84%
ST Investors	7,531	3.91%	2.08%	5.03%	11,164	2.62%	1.21%	3.70%
Own. Concentration LT	8,793	0.06	0.02	0.14	14,546	0.09	0.03	0.18
Own. Concentration ST	8,793	0.00	0.00	0.05	14,546	0.01	0.00	0.08
<i>Stock Characteristics</i>								
Market-to-Book	8,793	2.42	1.76	2.64	14,546	1.96	1.38	2.27
Share Turnover	8,793	0.08%	0.06%	0.08%	14,535	0.07%	0.04%	0.07%
Return Variability	8,793	13.51%	11.82%	8.18%	14,535	13.90%	11.98%	9.48%
Past Returns	8,793	1.85%	1.69%	9.55%	14,535	2.22%	1.86%	9.23%
<i>Firm Characteristics</i>								
Cash-flows	8,793	0.11	0.13	0.15	14,546	0.09	0.11	0.13
Leverage	8,793	0.22	0.20	0.18	14,546	0.26	0.25	0.17
Total Assets (Million of \$)	8,792	569	193	1,007	14,544	493	126	1,120
Return on Assets	8,769	3.38%	5.54%	15.75%	14,534	0.00	0.02	0.13

This table presents descriptive statistics for the main ownership, stock, and firm characteristics for firms that invest too much and firms that invest too little. Descriptive statistics span over the period 1982-2006. Investment is given by the sum of all outlays on capital expenditure, acquisitions and *R&D* less receipts from the sale of PP&E and investment to maintain assets in place (depreciation and amortization). Investment is normalized by expenditure in property plants and equipment. All variables are from COMPUSTAT. Capital expenditure is item 128. *R&D* expenditure is item 46. Acquisition expenditure is item 129. Cash receipts from sale of PP&E is item 107. Maintenance is construct using reported depreciation and amortization, item 125. Property, plants and equipment is item 8. Adjusted capital investment measures how much a firm invests each year with respect to its average investment in the previous three years. Industry-adjusted Investment (Investment Deviation) is the difference between a firm actual investment and the median investment in its industry in any given year. Firm-specific adjusted investment is measured as the difference between firms' actual investment and its expected level of investment. Long-term Institutional Ownership (LT Investors) is the percentage of the shares held by long-term institutional investors. Short-term Institutional Ownership (ST Investors) is the percentage of the shares held by short-term institutional investors. Long-term Ownership Concentration (Own. Concentration LT) is the Herfindal index of the stake held by the long-term institutional investors in the top 25th percentile in each firm. Short-term Ownership Concentration (Own. Concentration ST) is the Herfindal index of the stake held by the short-term institutional investors in the top 25th percentile in each firm. Market-to-Book is the market value of equity divided by the book value of common equity. Share Turnover is the monthly volume of shares transacted divided by the number of shares outstanding. Past Returns is the stock returns a firm would have made by buying the stock at the end of the year $t-1$ and holding it until the end of the year t . Return Variability is the standard deviation of daily stock returns over the preceding one year. Cash-flows is calculated as earnings before interest depreciation and amortization divided by total assets. Leverage is the book value of debt divided by the book value of total assets. Return on Assets is net income at time t divided by total assets at time $t-1$. All variables are winsorized at the 5th and 95th percentiles. The complete Table is available in the Internet Appendix.

For firms that invest too little and/or non-deviation firms, the coefficient of the long-term (short-term) ownership variable alone captures the association between long-term (short-term) ownership and *subsequent* investment. For firms that invest too much, the effect of long-term investors on investment is captured by the sum of the coefficients of the interaction between the change in the stake held by the long-term investors with the over-investment dummy and the coefficient of the long-term ownership variable alone.

Table I shows descriptive statistics for sub-samples of firms that invest too much and firms that invest too little, respectively. In firms that invest too much both long-term and short-term institutional investors have a significantly larger stake than in firms that invest too little. Importantly, there is a large variation in the stake held by long-term and short-term investors (the standard deviations are 21.02% and 4.75% respectively) and in the change in their ownership stake. In the multivariate analysis, we control extensively for firm and stock's characteristics. Table I also provides descriptive statistics for the main control variables.

IV. Results and Discussion

We investigate the impact that long-term and short-term institutional investors have on investment and investment deviations in Table II.

In Table II, columns from (1) to (4) show results obtained comparing firms that invest too much with firms that invest too little. In column (1), the coefficient of the long-term ownership variable alone is 3.8%, statistically significant at the 10% level, while the coefficient of the interaction between the change in the stake held by long-term investors and the over-investment dummy is -8.3%, significant at the 1% level. A Wald test used to check whether the sum of the coefficients is statistically different from zero, shows that in firms that invest too much the influence that long-term investors have on investment is -4.5% statistically significant at the 10%

level. Column (2) shows that results hold after controlling for stock liquidity and past returns, which could have an indirect effect on investment through the trading activity of institutional investors. The results are also economically significant. The coefficients of the ownership variables imply that given the average stake held by long-term investors, a one standard deviation *increase* in their stake is followed by about 4 percentage points *decrease* in investment in firms that invest too much, and 3 percentage points *increase* in investment in firms that invest too little.

If long-term institutional investors influence investment in firms that invest too much (too little), then we should observe that after an increase in the stake held by long-term investors not only investment changes in the appropriate direction, but also that investment deviations consistently decrease. We investigate this issue, in columns (3) and (4) of Table II.

Column (3) shows that in firms that invest too much, an increase in the stake held by long-term investors is associated to a *subsequent* decrease in the investment deviations from its industry median. The interaction between the over-investment dummy variable and the change in the stake held by long-term investors is -7.3%, statistically significant at the 10% level. The economic meaning of these results is striking: Given the average stake held by long-term investors, in firms that invest too much a one standard deviation increase in the stake held by long-term investors is associated with a *subsequent* decrease in investment deviations from industry median of almost 10 percentage points. However, long-term investors seem not to be as effective in firms that invest too little: the coefficient of the change in the stake held by long-term investors has a positive sign but lacks statistical significance.

Table II: Firms' Investment and Institutional Investors Holdings

	Firms that Invest too Much vs Firms that Invest too Little				Firms that Invest too Much vs Non-deviation Firms			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Investment		Investment Deviation		Investment		Investment Deviation	
Over-investment	0.176*** (0.000)	0.176*** (0.000)	0.165*** (0.000)	0.165*** (0.000)	0.123*** (0.000)	0.122*** (0.000)	0.114*** (0.000)	0.114*** (0.000)
LT Investors* Over-investment	-0.083*** (0.003)	-0.083*** (0.008)	-0.073* (0.058)	-0.072* (0.065)	-0.062** (0.019)	-0.061** (0.026)	-0.061* (0.059)	-0.061* (0.080)
LT Investors	0.038* (0.078)	0.038** (0.044)	0.023 (0.323)	0.023 (0.301)	0.016 (0.369)	0.015 (0.411)	0.010 (0.537)	0.010 (0.579)
ST Investors * Over-investment	-0.114 (0.175)	-0.111 (0.184)	-0.066 (0.383)	-0.063 (0.470)	-0.028 (0.766)	-0.030 (0.694)	0.013 (0.876)	0.011 (0.929)
ST Investors	0.110* (0.089)	0.105 (0.124)	0.073 (0.124)	0.068 (0.182)	0.041 (0.452)	0.040 (0.470)	0.002 (0.970)	0.003 (0.968)
Own. Concentration LT	-0.116 (0.220)	-0.115 (0.242)	-0.169** (0.041)	-0.169** (0.029)	0.013 (0.859)	0.013 (0.818)	-0.047 (0.546)	-0.045 (0.485)
Own. Concentration ST	0.031 (0.933)	0.030 (0.936)	0.113 (0.320)	0.112 (0.637)	0.252 (0.726)	0.303 (0.595)	0.172 (0.848)	0.209 (0.804)
Control Variables	YES	YES	YES	YES	YES	YES	YES	YES
Cluster at the Firm Level	YES	YES	NO	NO	YES	YES	NO	NO
Cluster at the Industry Level	NO	NO	YES	YES	NO	NO	YES	YES
Observations	5,804	5,803	5,804	5,803	7,510	7,510	7,510	7,510
R-squared	0.430	0.431	0.361	0.362	0.302	0.303	0.238	0.238

This table presents first differences OLS regressions that take care of any time-invariant firm component. Investment is given by the sum of all outlays on capital expenditure, acquisitions and R&D less receipts from the sale of PP&E and investment to maintain assets in place (depreciation and amortization). Investment is normalized by expenditure in property plants and equipment. Industry-adjusted Investment (Investment Deviation) is the difference between a firm actual investment and the median investment in its industry in any given year. In the first four columns of the table, the over-investment dummy is equal to one if a firm invests too much and zero if it invests too little. In columns from (5) to (8), the over-investment dummy is equal to one if a firm invest too much and zero if the firm is classified as non-deviation firm. A firm invests too much if: (1) it invests more than its average investment in the previous 3 years (Titman et al. (2004)), and (2) it invests too much with respect to its industry peers (Harvey et al. (2004)), and (3) it invests too much given its growth opportunities, cash-flows, leverage, firm and industry time-invariant characteristics, and trend in investment (Richardson (2006)). Otherwise the firm invests too little. A firm is defined as a non-deviation firm when it cannot be clearly classified neither as a firm that invests too much nor as a firm that invests too little. Long-term Institutional Ownership (LT Investors) is the percentage of the shares held by long-term institutional investors. Short-term Institutional Ownership (ST Investors) is the percentage of the shares held by short-term institutional investors. The following control variables are included in the analysis: Long-term Ownership Concentration (Own. Concentration LT), Short-term Ownership Concentration (Own. Concentration ST, Market-to-Book, Cash-flows, Leverage, Size (the natural log of Total Assets), Return on Assets (ROA), Share Turnover, Past Returns, S&P 500 Dummy and the Entrenchment Index. S&P500 is a dummy variable taking the value of 1 if the firm in a given year is included in the S&P500 index and zero otherwise. The ownership variables and control variables are measured as the change between time ($t-2$) and time ($t-1$). Change in Past Returns and change in Share Turnover are measured between time ($t-1$) and time (t). The Entrenchment Index measures how entrenched a manager is (Bebchuk et al. (2009)). Its value ranges from zero to six, with six indicating the highest managerial entrenchment. Data has been obtained from the Lucian Bebchuk's website: <http://www.law.harvard.edu/faculty/bebchuk/data.shtml>. If the entrenchment index is missing in year (t), but available for year ($t-1$), since governance tends to be sticky, we assume that in year (t) the entrenchment index is the same than in year ($t-1$). For robustness checks we also use the GIM (Gompers et al. (2003)) index as a measure of corporate governance and results are qualitatively unchanged. The data is obtained from Andrew Metrick's website: <http://faculty.som.yale.edu/andrewmetrick/data.html>. The complete Table is available in the Internet Appendix. All variables are winsorized at the 5th and 95th percentiles. All regressions include the constant term, but the coefficient is not reported. Standard errors are clustered at the firm level when the dependent variable is investment and at the industry level when the dependent variable is Investment Deviation. In robustness tests, errors are also bootstrapped. Standard errors are White-corrected for heteroskedasticity. P-values are in parentheses. * indicates significance at 1% (***), 5% (**), 10% (*). The complete Table is available in the Internet Appendix.

We next compare firms that invest too much with non-deviation firms. In columns (5) to (8) the over-investment dummy variable takes the value of one if a firm invests too much and the value of zero if the firms are classified as non-deviation firms. Since firms that do not deviate from their benchmark investment should employ investment policies that are more aligned with the interests of shareholders, in these firms we expect no association between the stake held by long-term investors and investment. The findings in columns from (5) to (8) confirm this hypothesis. Overall, results in Table II also show that short-term investors have mostly no influence on investment.

Table II shows that the over-investment dummy variable has a positive coefficient and it is highly statistically significant at the 1% level. This provides comfort about the reliability of the proxies used to capture a firm's investment deviations from its benchmark level. Nevertheless, we only have incomplete information about firms' investment choices and the proxies for investment deviations used in this study could still fail to capture the firms that invest too much. We then follow Jensen (1986) and further restrict the definition of a firm that invests too much by singling out firms that invest too much, have lower investment opportunities and hold significantly more cash on hand than their industry peers. Using this finer definition of firms that invest too much (circa 65% of those classified with the other proxies), we find strong support for the results in Table II.

We next provide further support to the monitoring hypothesis. We begin with considering that some long-term investors might behave as indexers. To approach this issue, we combine the measure of horizon of Chen et al. (2007) with the investor predetermined portfolio's churn ratio (Gaspar et al. (2005) and Cella et al. (2013)) and classify institutional investors into four groups:

transient, short-term, quasi-indexer and long-term investors.¹ A quasi-indexer investor is more likely to engage in a buy-and-hold strategy on all of the stocks in her portfolio, while a long-term investor trades more frequently than a quasi-indexers investor. On the other hand, a transient investor trades more than a short-term institutional investor.

A priori it is uncertain whether quasi-indexers would attempt to perform any monitoring functions, but transient institutions and short-term investors should not engage in any monitoring. On the contrary, consistent with the paper maintained hypothesis, we expect long-term investors to be associated with changes in investment policies. We find that in firms that invest too much only long-term investors have an influence on investment.

We continue by investigating the idea that institutions with large stakes should have the largest incentives to monitor (Chen et al. (2007) and Giannetti and Laeven (2009), among others) and so should investors for which a company represents a large portfolio's exposure (Fich et al. (2015)).

We begin by studying whether the influence of investors on investment increases with the size of their stakes. In each firm, we focus respectively on long-term (short-term) investors with stakes above the median stake held by their peers and the largest investors in the ownership distribution. Consistent with the monitoring hypothesis, we find that long-term institutional investors' monitoring incentives indeed increase in the stake they own. In particular, results

¹ The churn ratio formalized by Gaspar et al (2005) captures trading unrelated to inflows or outflows and helps us further refine the *investment style* of the institutions above and beyond the trading due to the inflow and outflow they experience. Our approach is similar to that of Bushee (2001) who classifies investors using several characteristics of their portfolios including their investment style and their portfolio turnover. Importantly, even directly using the classification of Bushee (2001) the main results remain unchanged.

become economically and statistically much stronger when we look at the largest long-term institutional investors (the top 95th of their peers' distribution).

Next, we investigate the idea that institutional investors may exert more monitoring in firms that represent a large investment for them. Using investors' portfolios data at the end of each year, we measure how important is each firm in the investor's portfolio with respect to the largest investment reported. We then transform this portfolio measure at the firm level using a weighted average in which the weights are given by each investor's ownership stake in the firm. Consistent with the monitoring hypothesis, we document that the larger the weight that a firm that over-invest (under-invest) has in the portfolio of long-term investors the lower (larger) investment is.

Having established the robustness of our results, we next investigate whether the results documented in this paper are more consistent with the direct monitoring (voice) of long-term investors and/or with their indirect monitoring (exit) by selling their shares (Gillan and Starks (1998) and Parrino et al. (2003) among others). To do so, we distinguish between the purchases and sales made by long-term institutional investors and study whether these are associated with subsequent changes in investment. We show that *only* the purchases made by long-term investors are associated with subsequent changes in investment consistent with the idea that a larger stake gives to institutional investors more voice within the company. Hence, results suggest that long-term institutional investors monitor investment using voice rather than exit.

Finally, one may argue that the association between long-term institutional ownership and investment is driven by selection. The evidence in the previous sections suggests that this is not likely to be the case as the pattern of results is consistent with respect to several alternative tests. Nevertheless, we consider an instrumental variable strategy using the firms' addition to the S&P 500 index as in Aghion, Van Reenen, and Zingales (2013).

The additions to the S&P 500 are likely to increase institutional ownership because fund managers are typically benchmarked against this index, but are unlikely to have a direct impact on future investment and performance. We use the inclusion in the S&P as an instrument for the purchases of long-term investors in firms that invest too much and investigate again the paper's maintained hypothesis. This analysis yields highly economically and statistically significant results in support of our maintained hypothesis. Finally, we also verify that mean reversion in real investments is not driving the results documented in this paper.

Complete tables for all of the results discussed in the paper and additional results can be found in the Internet Appendix.

V. Conclusions

This paper contributes to the literature showing that investors heterogeneity, as captured by their investment horizon, has important implications for firms' policies, and suggests that long-term institutional investors play a key role in monitoring firms' investment decisions.

Recent papers by Derrien et al. (2013) and Kisin (2011) also offer insights on the monitoring role of institutional investors but this paper differs from them by directly investigating the impact of institutional investors and, importantly, their horizons on firms' investment deviations which have a first-order effect on firm valuations.

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Sveriges Riksbank
Visiting address: Brunkebergs torg 11
Mail address: se-103 37 Stockholm

Website: www.riksbank.se
Telephone: +46 8 787 00 00, Fax: +46 8 21 05 31
E-mail: registratorn@riksbank.se