Governance by Constraint:

The Corporate Governance Implications of an Anomaly

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Abstract

We study the corporate governance implication of the "beta anomaly", generated by the fact that most equity investors – mutual fund, pension funds, individuals – cannot lever up and therefore have to tilt their portfolios towards a more concentrated allocation. We hypothesize that the resulting higher portfolio concentration will increase the incentives of "leverage-constrained" investors to monitor and reduce the agency cost of the firms they own. We test this hypothesis by quantifying a measure of leverage constraints of mutual funds and relate it to their monitoring behavior as well as to the governance quality of portfolio firms. We document that leverage-constrained funds monitor more effectively – vote more often against the management in contentious votes and are more likely to force the turnover of the CEO. This results in lower agency cost of equity: greater value of cash holdings, higher investment efficiency, and lower need to signal through payout. We identify a causal effect from fund leverage constraints to the quality of governance using an exogenous shock related to mutual fund fire sales. These effects are more pronounced when the funding constraints in the market are tighter – i.e., the security market line gets flattened.

JEL Classification: G12, G3, G32

Keywords: betting-against-beta, leverage constraint, corporate governance, security market line

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Introduction

Over the recent years, finance has discovered several pricing "anomalies" – e.g., momentum, idiosyncratic volatility, distress, beta, etc. All these anomalies have been shown to affect the cross-section of stock returns. While a lot of research has focused on the asset pricing implications of them, scarce is the analysis of their corporate finance implications, even if anomalies can in fact cause material real inefficiencies and misallocation of capital (e.g., van Bingsbergen and Opp, 2018).

In this paper, we focus on a different and till now unexplored channel: the link with corporate governance. We argue that stock anomalies may change the behavior of the providers of capital, by affecting their portfolio allocations. This modifies the need to monitor the firm in which they invest. We consider a typical anomaly: the "betting-against-the-beta" anomaly. The standard premise of the traditional capital asset pricing models is that all agents invest in the portfolio with the highest expected excess return per unit of risk and lever it up or down depending on their risk profile. However, this cannot happen when the investors cannot lever up. In fact, most of the assets in the market are managed by investors that face leverage constraints – e.g., mutual funds, individuals, pension funds, and university endowments. The only solution for these "leverage-constrained" investors is to over-weight risky securities in their portfolios. This behavior makes high-beta assets require lower risk-adjusted returns than low-beta assets. The phenomenon has been termed – after the trading strategy meant to capture the return arising from it – "Betting Against the Beta" (BAB) (Frazzini and Pedersen, 2014).

The direct stock market implication is a flattened security market line. The tighter the leverage constraint, the flatter the security market line (Jylha, 2018). The leverage-constrained investors, because they are not able to lever up, will tilt their portfolios towards a riskier portfolio allocation. This will take the form of investing in fewer high beta firms, resulting in a higher degree of portfolio concentration.

We hypothesize that the higher amount of commitment to fewer and more risky stocks will increase the incentives for the investors to monitor. Indeed, not being able to diversify away the risk, they will try to reduce the investment risk by directly affecting the quality of the companies they own by more actively monitoring the management. In other words, investors, not being able to freely choose between "voice" and "exit" (e.g., Kahn and Winton, 1998, Maug, 1998), given their need to load on riskier assets, will develop a higher commitment to the firm that will induce better governance. This will make leverage-constrained investment reduce the agency cost of equity of the firm.

We test this hypothesis by focusing on the US mutual funds and US corporations over the period 1982-2016. We follow the literature (e.g., Boguth and Simutin, 2018) and create a measure of leverage constrains for the mutual funds. Then, we relate it to fund portfolio allocation and monitoring behavior as well as to the quality of governance of the portfolio firms.

In particular, we lay out three testable hypotheses. The first hypothesis posits that leverage-constrained funds tend to concentrate on fewer stocks. The second hypothesis posits that leverage-constrained funds are more active in monitoring and sanctioning the management of the firm by actively voting and inducing CEO turnover. The third hypothesis posits that the presence of more leverage-constrained funds, by inducing active governance, translates into lower agency cost of equity – i.e., higher value of cash, more cash holdings, lower required payout and higher investment efficiency.

We start by providing evidence on whether the leverage-constrained funds behave as expected: they are less diversified in their portfolio holdings. We document that more leverage-constrained funds tend to concentrate on fewer stocks. One standard deviation higher degree of leverage constraints is related to 5.0% higher portfolio concentration. Also, we find that the more leverage-constrained funds tend to invest in less "diversified" firms – i.e., are present in different business segments. One standard deviation higher degree of leverage constraints is

related to 4.2% lower number of business. Overall, these results suggest that more leverage-constrained funds tend to concentrate in fewer stocks as well as stocks of firms less diversified. These results are in line with our expectations on the behavior of the funds and with the existing literature.

Next, we focus on the impact of the behavior of leverage-constrained funds on the quality of governance of the firm. As we argued, the higher exposure will induce them to better monitor and this should reduce the agency cost of equity. We investigate this hypothesis in several steps.

First, we look at whether such funds are more "governance-active". We therefore focus on two key measures: voting and impact on forced CEO turnover. We start by focusing on mutual fund voting and investigate the relationship between mutual fund proxy voting and their degree of leverage constraints. Following Dimmock et. al (2018), we focus on all the "contentious" votes in the mutual fund holding–Voting Analytics data set covering the period from 2003 to 2016 – i.e., the ones in which the ISS recommendation for a proposal does not equal the management recommendation. We document that the leverage-constrained funds are more likely to vote against the management by 6.7%. This difference is statistically significant. More specifically, one standard deviation higher degree of leverage constraints is related to 4.1% higher probability that the funds vote against the management. This result is robust across specifications and alternative ways of sampling: at the fund-vote – i.e., event based –, at the fund-year – i.e., calendar based at the year frequency – at the firm-year level. One standard deviation higher degree of leverage constraints is related to between 4.6% and 5.4% higher probability that the funds vote against the management, depending on the specification and sampling.

Next, we focus on the degree of "discipline" imposed on the CEO by relating the degree of leverage constraints of the funds holding the stocks of the firm to the forced CEO turnover. We define forced CEO turnover events following Peters and Wagner (2014) and Jenter and Kanaan

(2015)[1]. We document a strong positive correlation between forced CEO turnover and mutual funds' leverage constraints. One standard deviation higher degree of leverage constraints is related to 12.5% higher probability of CEO turnover. Overall, these results provide evidence that the leverage-constrained mutual funds tend to more forcefully monitor the managers of the firms in which they invest.

The next question is the link to the quality of governance of the firm and agency cost of equity. The better quality of governance should translate in better appreciation by the market – i.e., higher Tobin's Q – as well as lower perception of agency cost of equity. A typical proxy for agency cost of equity is the market assessment of the value of cash. Cash signals higher agency cost of equity in bad governance firms (e.g., Dittmar and Marth-Smith, 2007). This implies that we expect leverage-constrained mutual funds to improve the market valuation of firms holding cash and therefore to increase the holding of cash (and reduce the payout) by such firms.

We find that an increase in holdings is related to an increase in Tobin's Q. If we compare firms owned by mutuals fund with zero *VW leverage constraint*, we find that each standard-deviation increase in *VW leverage constraint* for the fund-holders adds to the marginal value of an extra dollar of cash holding by about 22%. This translates in an overall positive relationship between mutual funds' leverage constraints and firm Tobin's Q. One standard deviation higher degree of leverage constraints is related to 3.8% increase in firm's Tobin's Q.

The positive signaling role of cash increases the amount of cash holdings. Indeed, there is a strong positive correlation between the degree of leverage constraints of the funds holding

[1] We thank Dirk Jenter and Florian Peters for providing forced CEO turnover data from 1993 to 2001 and from 1993 to 2009, respectively. Following Denis, Denis, and Sarin (1997), Parrino (1997), Peters and Wagner (2014) and Jenter and Kanaan (2015), we classify turnover events as forced turnovers if 1) the press reports that the CEO has been fired, has been forced to step down from the position or has departed due to unspecified policy differences; 2) the departing CEO is under the age of 60 and the stated reason for the departure is not death, poor health, or acceptance of another position (outside or within the firm); or 3) the departing CEO is under the age of 60 and the stated reason for the departure is retirement but the firm does not announce the departure at least six months in advance.

the firm and its cash holding. One standard deviation higher degree of leverage constraints is related to between 4.0% and 4.1% higher cash holdings. Moreover, higher financial constraints of the funds holding the firm translate in less dividend payment and less share repurchases. In particular, one standard deviation higher degree of leverage constraints is related to 3.9% (=0.002*0.193/0.010) lower amount of dividend payment and 14.5%(=0.006*0.193/ 0.008) less share repurchases.

Overall, these results support our working hypotheses and display a positive correlation between the degree of leverage constraints of the funds and governance. This translates into lower agency cost of equity and higher firm value.

Does it also translate in more effective and better corporate actions on the side of the CEO? To address this issue, we focus on R&D investment. We expect that, in the presence of good governance, the firm will engage in efficient and successful R&D investment. And indeed, we document a strong and statistically significant positive correlation between R&D effectiveness and fund leverage constraint. In particular, one standard deviation higher degree of fund leverage constraints is related to between 4.5% and 4.9% (6.0% and 6.3%) higher R&D effectiveness in the case of ownership-weighted (equal-weighted) fund leverage constraint.

Overall, these results document a positive relationship between a specific type of ownership and the quality of governance of the firm. The next step is to assess whether we can identify causality – i.e., ownership does in fact drive governance. We proceed in two steps. First, we investigate how exogenous shifts in the cost of funding in the market change the impact of our proxy on governance. This analysis relies on previous findings (e.g., Black, 1972, Julha, 2018) that when the cost of financing increases, the security market line gets flattened as investors in the market resort to load even more on high beta stocks as the cost of levering increases. In our context, this implies a further tightening of the impact on the firm as it will be more difficult for the firm not following the good governance instructions of the constrained investors to

replace them with previously unconstrained investors. And indeed, we find that the impact of having financially constrained investors is significantly stronger when the financing conditions are tighter. These results not only confirm our intuition, but also provide a first test of causality in which the degree of tightness of financing plays the role of identifying restriction.

Next, we estimate an instrumental variable specification. We follow Edmans, Goldstein and Jiang (2012) and instrument the degree of leverage constraints of the funds holding the firm with mutual funds fire sales. The intuition is that fire sales induce an exogenous reshuffling of mutual fund ownership and this should reduce average holding by funds subject to leverage constraints. We then use fire sales to identify the exogenous component of the leverage-constrained fund ownership. We then repeat all our main tests using as explanatory variable the exogenous component of leverage-constrained ownership. The results are consistent with the previously described ones: the more leverage-constrained the mutual funds are, the more they discipline the management by either voting against it or even inducing forced CEO turnover. This leads to higher value of cash, higher cash holdings, lower payout and in general higher Tobin's Q.

Overall, these results have important normative and policy implications. Indeed, over the last years, corporate America has been giving back to shareholders ever increasing amounts of cash by buying back shares. The total amount of share repurchases in 2018 reached 1 trillion dollars. The press has pointed to this phenomenon as a waste of resources that could have been more usefully invested and linked it to the "greed" of institutional investors who pursue short-term gains and to the need of corporations to cater to them. The underlying assumption is that the ever-increasing exposure to investors targeting short-term goals has deprived corporate America of cash. Our results show that in fact, institutional investors targeting anomalies do help to improve governance and this reduces the need to pay out cash.

In other words, the "trust" by the market allows the firm to hold cash and does not require it to distribute it. The question, however, is whether this cash is properly employed. To address this question, we focus on the efficiency of the allocation of cash. We borrow from Knott (2008) the measure of R&D efficiency and we relate it to our proxy of governance. We find a positive correlation between the degree of leverage constraints of the funds holding the firm and investment efficiency. This suggests that firms with higher degree of leverage constraints for its investors not only are able to hold more cash without paying a price in terms of value, but their usage of such cash is more efficient.

Our paper contributes to many strands of literature. First, we contribute to the literature on the behavior of leverage-constrained investors (e.g., Brunnermeir and Pedersen, 2009, Doshi, Elkhami, and Simutin, 2015, Frazzini and Pedersen, 2014, He, Kelly, and Manela, 2016, He, and Krishnamurthy, 2013, Christoffersen, and Simutin, 2017, Boguth and Simutin, 2015 and 2018). We contribute by relating this behavior to corporate finance and governance and drawing implication for the agency cost of the firm.

Second, we contribute to the new literature on the implications of mispricing based on the use of the wrong asset pricing model. It has been recently argued that the discrepancy between CAPM-implied and realized returns has important implications for the firm's capital budgeting decisions. Low beta projects are expected to be valued more by CAPM-using managers than by the market. (Dessaint, Olivier, Otto and Thesmar, 2017). We contribute by showing how the behavior of the CEO facing a mispriced model is affected by the pressure of fund ownership.

Finally, we contribute to the literature on governance. It has been traditionally argued that investors can either walk the Wall Street way ("exit") or monitor ("voice"). We show what happens when the exogenous leverage constraints make the investors constrained in their choice of exit and the governance implications of it.

II. Data and Main Variables

To construct the degree of leverage constraints of the mutual fund, our sample starts with the universe of all actively managed equity funds covered in Thomson Reuters and CRSP during the period of 1982-2016, following Boguth and Simutin (2017). We then omit firms with missing stock return data in the Center for Research in Security Prices (CRSP) and firms with missing financial data in Compustat. The final sample for the above tests comprises 107,012 firm-year observations.

Our sample of forced CEO turnover events comes from Peters and Wagner (2014) and Jenter and Kanaan (2015). Our final sample consists of 2,247 firms (14,216 firm-year observations). Using the date that a CEO turnover first appears on Factiva as the announcement date, we 415 identify CEO turnover announcements. To ensure that confounding corporate events (e.g., mergers and acquisitions, dividend payments, earnings announcements, security issuance, company name changes, and de-listings) do not affect our results, we search Factiva and exclude news associated with such events within one trading day before and after the turnover announcement.

We obtain proxy voting records of mutual funds from the Institutional Shareholder Services (ISS) Voting Analytics database. This sample covers the period from 2003 to 2016.[2] Our sample consists of 1,411,081 fund voting records (12,031 fund-vote level observations) over 2003 the 2016 period.

We focus on the US mutual funds and US corporations over the period 1982-2016. We follow the literature (e.g., Boguth and Simutin, 2018) and create a measure of leverage constrains for the mutual funds. They calculate the value-weighted average beta of the aggregate stock holdings of all actively managed equity funds and show that this measure of leverage constraint tightness correlates with existing proxies of funding conditions and is

[2] The sample starts from 2003 as this is the first year mutual funds were required to file Form N-PX, which contains their proxy voting records for each year.

directly related to the loading of the fund's performance to the betting-against-beta (BAB) factor.

The ownership-weighted loading on negative BAB factor for all mutual fund shareholders aggregated at the firm level. We obtain loadings β^{NBAB} as our proxy for leverage constraint tightness from rolling specifications. In particular, for each month t and for each fund i, we estimate $R_{i,\tau} = \alpha_{i,t} + \beta MKT_{i,t} R_{MKT,\tau} + \beta^{NBAB}_{i,t} NBAB_{\tau} + \varepsilon_{i,\tau}$. $\tau \in \{t\text{-}23, t\}$. $R_{i,\tau}$ is the excess return of fund i. $R_{MKT,\tau}$ is the monthly return in month τ. To obtain meaningful risk loadings, we require each fund to have non-missing returns in the least 12 months of the 24-months estimation period. *NBAB* is the monthly negative BAB factors from Frazzini and Pedersen (2014).

Table I provides summary characteristics for our leverage constraints measures as well as for the samples of firms and funds. The main message of these statistics is that the sample does not differ from the standard ones used in the literature. The mean turnover of top 10 institutions' turnover and their mean quarterly buy-and-hold value-weighed portfolio return are 0.102 and 0.007, respectively. The mean market value of portfolios managed by the fund is $1471 million. The mean book leverage ratio and market leverage ratio are 0.165 and 0.128, respectively. Tangible assets (PPE) and free cash flow account on average for 27.0% and -4.1% of total assets, respectively. The sample firms have a mean Tobin's q of 1.831 and a mean ROA of 0.079.

Also, the sample firms used in the analysis of forced CEO turnover-performance sensitivity have a mean firm age of 23.6 years, a mean standard deviation of the previous one-year daily stock return of 2.9%, and a mean market-adjusted stock return of 7.4%. The Appendix provides detailed descriptions of the variables reported in Table I.

III. Main Results

A. Leverage Constraints and Fund Portfolio

We start by investigating the behavior of the funds that are financially constrained. As we argued, we expect them to concentrate on fewer stocks and less diversified. We test it by regressing mutual fund portfolio concentration on a variable that proxies for the degree of leverage constraints of the mutual fund as well as a set of other control variables as defined before. The degree of mutual fund portfolio concentration is the holding Herfindahl index of the mutual fund portfolio. The proxy for the degree of leverage constraints of the mutual fund is the loading on the NBAB factor (*fund leverage constraint*) in the quarter before. All the independent variables are lagged one quarter. The analysis is a panel estimate with firm and year-quarter fixed effects fixed effects. The standard errors have been clustered at the fund level.

We report the results in Table II. We measure portfolio concentration at the fund level, estimated as the holding Hirfindahl index of mutual fund portfolio in columns (1) to (2), and the number of industries in the portfolio in columns (3) to (4). We document a strong positive correlation between the degree of leverage constraints of the mutual fund and its portfolio concentration (columns (1) and (2)) and negative correlations between the degree of leverage constraints of the mutual fund and the number of stocks in the portfolio of the funds (columns (3) and (4)): funds that have higher loadings on NBAB – i.e., are more constrained – have a higher degree of portfolio concentration. One standard deviation higher degree of leverage constraints is related to 5.0% (=0.005*0.218/0.538) higher portfolio concentration and 3.3% (=0.218*3.893/25.47) lower number of stocks in the portfolio.

Overall, these results suggest that more leverage-constrained funds tend to concentrate in fewer stocks. Of course, this behavior, while allowing the funds to load on more on risk, also exposes them to potential moral hazard on the side of the firm's managers. Indeed, the quest for risk may induce them to go for highly risky and value-destroying projects. Therefore, we

expect that the leverage-constrained funds, exactly because more exposed, should monitor better and provide better governance. This is the topic of the next section.

B. Fund Leverage Constraints and Governance

We now investigate the link between the degree of leverage constraints of the funds and their monitoring of the firms. We consider both the voting against the management and the forced termination of the CEO.

B.1 Fund Leverage Constraints and Voting

We start by focusing on mutual fund voting and investigate the relationship between mutual fund proxy voting and their degree of financial constraints.

We focus on all the contentious votes in the mutual fund holding–Voting Analytics data set covering the period from 2003 to 2016. Contentious votes are the votes in which the ISS recommendation for a proposal does not equal the management recommendation. Then, we ask whether the more constrained funds are also the ones that are more likely to vote against the management. We then define a variable ("*Against Management"*) that is set to one if the mutual fund does not follow the management recommendation (either by voting against management or by withholding its vote from a management-sponsored proposal) and set to zero if the mutual fund votes to support the management recommendation. We start by providing univariate statistics for the ratio of mutual funds voting against management for contentious votes. We conduct *T*-test of differences between the means of votes for *Against Management* of funds with low *fund leverage constraint* and funds with high *fund leverage constraint*. We separate the sample by the median of *fund leverage constraint*. We report the result in Table III, Panel A. We find that on average *funds with low leverage constraint* are around 7% less likely to vote against the management than funds with high *fund leverage constraint*. The difference is statistically significant.

Next, we estimate a linear probability model in which we regress the *Against Management* variable aggregated for each fund-year on the yearly average loading on the NBAB factor (*fund leverage constraint*) for the voting fund. We control for fund fixed effects and year fixed effects in all specifications. We report the results in Panel B. We find a strong positive correlation between the fund leverage constraint and the decision to vote against the management. In particular, one standard deviation higher degree of leverage constraints is related to a 5.1% (=0.128*0.218/0.538) higher probability that the funds vote against the management (column 2). As a robustness check, in Panel C, we also consider a linear probability define at the fund-proposal level. The dependent variable is an indicator variable *Against Management,* while the explanatory main variable is the loading on NBAB factor (*fund leverage constraint*) for the voting fund at the quarter before shareholder meeting. We include fund fixed effects, firm fixed effects and year fixed effects in all specifications. In column (2), we control for fund characteristics. In column (3), we add in firm characteristics.

Also in this case, the results display a strong positive correlation between the fund leverage constraint and the decision to vote against the management. One standard deviation higher degree of leverage constraints is related to between 4.8% (=0.218*0.118/0.538) and 4.7%(=0.218*0.116/0.538) higher probability that the funds vote against the management (columns 2 and 3 respectively).

Finally, in panel D, we perform the analysis at the firm level instead of at the fund level. The dependent variable is now an indicator variable *Against Management* aggregated at the firm level of the individual fund decision to vote *Against Management.* In particular, we aggregate the individual decisions to vote against the management in the following way: In each firm year, we aggregate all the mutual funds votes and calculate the overall ratio of voting against management at the firm-year level. We consider alternative definitions of the main variables In specifications (1) and (3), the independent variable is the ownership-weighted

loading on NBAB factor (*VW leverage constraint*) for all mutual funds aggregated at the firm level, while in specifications (2) and (4), the independent variable is the equal weighted loading on NBAB factor (*EW leverage constraint*) for all mutual funds aggregated at the firm level. Firm and year fixed effects are included in all tests, and standard errors are clustered at the firm level. We lag all the independent variables by one year and cluster the standard errors at the firm level. Again, we find that a higher degree of leverage constraints for mutual funds is related to a higher probability of voting against the management. In particular, both in the case of ownership-weighted loading on negative BAB factor (columns (1) and (3)) and in the case of equal-weighted loading on negative BAB factor (columns (2) and (4)), the correlation between voting against the management and leverage constraints is positive. A one-standard-deviation higher degree of leverage constraints is related to about 5.4% (=0.129*0.226/0.538) higher probability that the funds vote against the management in the case of value-weighted aggregation and 4.7% (=0.132*0.193/0.538) in the case of equally-weighted aggregation.

B.2 Fund Leverage Constraints and CEO Termination

We now focus on the degree of "discipline" imposed on the CEO. We relate the degree of leverage constraints of the funds holding the stocks of the firm to forced CEO turnover. We define forced CEO turnover following Peters and Wagner (2014) and Jenter and Kanaan (2015). We estimate linear probability specifications in which the dependent variable is an indicator that takes the value of one if a forced turnover event occurs in a given year, and zero otherwise. The explanatory variables are defined as before.

We report the results in Table IV. As before, in specification (1) and (2), the independent variable is the ownership-weighted loading on negative BAB factor (*VW leverage constraint*) for all mutual fund shareholders aggregated at the firm level. In specifications (3) and (4), the independent variable is the equal weighted loading on negative BAB factor (*EW leverage constraint*) for all mutual fund shareholders aggregated at the firm level.

We find that the correlation forced CEO turnover and mutual funds' leverage constraints is positive. One standard deviation higher degree of leverage constraints is related to 16.1% (=0.023*0.168/0.024) (12.5%=0.023*0.130/0.024) higher probability of CEO turnover in the case of ownership-weighted (equal-weighted) loading on negative BAB factor.

Overall, these results provide evidence that the leverage-constrained mutual funds tend to better and more forceful monitor the managers of the firms in which they invest. The next question is which type of corporate policies they mostly affect.

C. Fund Leverage Constraints and Corporate Policies

Overall, these results provide evidence that the leverage-constrained mutual funds tend to better and more forceful monitor the managers of the firms in which they invest. The next question is which type of corporate policies they mostly affect.

We start with the payout policy. We test whether better and more forceful monitoring implies less need to resort to shareholder-catering acts such as payout policies.. In particular, we relate the payout to the degree of degree of leverage constraints. As we argued, we expect that better governance translates in lower need for the firm to pay out cash or engage in action that reduce the fear of the shareholders to be exposed to the agency cost of equity. We therefore relate the dividend payout ratio and repurchase ratio to the fund leverage constraint. We focus on a sample from 1982 and 2016. We define the dividend payout ratio as the ratio of cash dividends on common stock to total asset and the repurchase ratio as the ratio of purchases of common stock and preferred stock to total asset.

We report the results in Table V. In specifications (1) and (3), the independent variable is the ownership-weighted loading on NBAB factor (*VW leverage constraint*) for all mutual fund shareholders aggregated at the firm level, while in specifications (2) and (4), the independent variable is the equal weighted loading on NBAB factor (*EW leverage constraint*) for all mutual

fund shareholders aggregated at the firm level. We use the standard set of control variables and include firm and year fixed effects. We cluster the standard errors at the firm level.

We find a strong negative relationship between the fund leverage exposure and payout. This holds across the different specifications both statistically and economically. In particular, one standard deviation higher fund equally-weighed value leverage is related to 3.9%(=0.002*0.193/0.010) (14.5%(=0.006*0.193/ 0.008)) lower dividend payout (share repurchase).

Next, we focus on Cash Holdings. As we argued, if the leverage-constrained mutual funds monitor better the managers, we expect lower agency cost of equity. One way to assess the agency cost of equity is to focus on the value of cash. We know that in worse governed firms cash sends a bad signal and the firm is undervalued (e.g., Dittmar and Marth-Smith, 2007). We therefore expect that a higher degree of fund leverage constraints implies a higher degree of cash holdings and a positive relationship between cash holding and firm value.

We start by looking at the level of cash holdings. We therefore estimate a specification analogous to the previous one, but the dependent variable is the amount of cash holding of the firm. We report the results in Table VI. In specifications (1) and (3), the independent variable is the ownership-weighted loading on NBAB factor (*VW leverage constraint*) for all mutual fund shareholders aggregated at the firm level, while in specifications (2) and (4), the independent variable is the equal weighted loading on NBAB factor (*EW leverage constraint*) for all mutual fund shareholders aggregated at the firm level.

The results show a positive correlation between the degree of leverage constraints of the funds holding the firm and its amount of cash holdings. One standard deviation higher degree of fund leverage constraints is related to 4.0% (4.1%) higher cash holdings in the case of ownership-weighted (equal-weighted) fund leverage constraint.

Next, we test whether it is the case that in the presence of leverage-constrained mutual funds, cash sends a good signal. We rely on Faulkender and Wang (2005) and regress the annual excess return of the firm relative to the Fama and French (1993) 25 size and book-to-market portfolios on the change in cash from the previous year and a set of control variables. All these variables are normalized by the market value of equity (ME) of the firm at the beginning of the year. They include the lagged cash, changes in earnings (earnings before extraordinary items plus interest, deferred taxes, and investment tax), asset of net cash, R&D expenses, Interest expense, common dividends, Leverage (long term plus current debt dividend by market value of equity plus long term plus current debt), New Financing (net equity plus net cash issues). In specifications (1) and (2), we control for industry fixed effects. In specifications (3) and (4), we control for firm fixed effects. All independent variables are lagged one year. Cash is defined as cash plus marketable securities.

We report the results in Table VII. In specifications (1) and (3) (specifications (2) and (4)), the focus variable is the interaction term between the Δ Cash/ME and the ownership-weighted loading on NBAB factor (*VW leverage constraint*) (equal-weighted loading on NBAB factor (*EW leverage constraint*) for all mutual fund shareholders aggregated at the firm level.

A key result is that having more leverage-constrained mutual funds substantially and significantly increases the value of a dollar of cash, as evidenced by the positive and significant coefficient on the interaction between *VW leverage constraint* and the 1-year change in cash. This holds for the alternative definitions of the degree of leverage constraints of the funds holding the firm.

If we focus on the estimates in the first column, we see that for a firm owned by fund investors with zero *VW leverage constraint*[3], the marginal value of an extra dollar of cash

[3] This type of firm would have mean cash holdings equivalent to 16.9% of the book asset at the ending of the previous year, and the mean book leverage ratio is 21.1%

holdings for the shareholders is on average \$0.77 (= \$0.789 (-\$0.000 * 0.169) - (\$0.086 * 0.211)). In contrast, a dollar in a firm with a one-standard-deviation higher *VW leverage constraint* is worth as much as \$0.94 (= \$0.789 – (\$0.000 * 0.169) - (\$0.086 * 0.211) + 0.732*0.226). The difference is about 22% (=(0.94-0.77)/0.77). Using *EW leverage constraint* shows consistent results. Overall, the results in Table VII are consistent with our argument that good governance by mutual funds with high leverage constraints is likely to prevent managers from wasting cash reserves.

D. Fund Leverage Constraints, CEO Effectiveness and Firm Value

Finally, as an additional robustness check, we investigate how the market reacts to the most traditional "opaque" type of investment: R&D. In general the market negatively reacts to R&D expenditure as it expects the firm not to implement R&D, but to engage in wasteful allocation of resources. We expect that, in the presence of good governance, the firm will instead engage in efficient and successful R&D investment. To test this hypothesis, we focus on the firm's ability to generate revenue from its R&D investment between 1982 and 2016. R&D effectiveness is measured using 10-year rolling windows following Knott (2008):

$$LnY_{i,t} = (\beta_0+\beta_{0,i})+(\beta_1+\beta_{1,i})\text{Ln}K_{i,t}+(\beta_2+\beta_{2,i})\text{Ln}L_{i,t}+(\beta_3+\beta_{3,i})\text{Ln}R_{i,t-1}+(\beta_4+\beta_{4,i})\text{Ln}S_{i,t-1}+(\beta_5+\beta_{5,i})\text{Ln}D_{i,t}+\varepsilon_{i,t},$$

Where $Y_{i,t}$ is the revenue of firm i at time t, $K_{i,t}$ is its net property, plant and equipment, $L_{i,t}$ is its labor forced (defined as full-time equivalent employees), $R_{i,t-1}$ is the amount spent in R&D and $D_{i,t}$ is the amount spent on advertising. $S_{i,t-1}$ is the firm-specific spillover, estimated as the sum of the differences in knowledge between focal firm i and rival firm j for all firms in the four digit SIC industry with more knowledge (R&D) than the focal firm.

We report the results in Table VIII. In specifications (1), the independent variable is the ownership-weighted loading on NBAB factor (*VW leverage constraint*) for all mutual fund shareholders aggregated at the firm level. In specifications (2), the independent variable is the

equal weighted loading on NBAB factor (*EW leverage constraint*) for all mutual fund shareholders aggregated at the firm level.

We document a strong and statistically significant positive correlation between R&D effectiveness and fund leverage constraints. In particular, one standard deviation higher degree of fund leverage constraints is related to between 4.5%(=0.024*0.226/0.119) and 4.9% (6.0% (=0.193 *0.037/0.119)and 6.3%) higher R&D effectiveness in the case of ownership-weighted (equal-weighted) fund leverage constraint.

Overall, these results suggest that fund leverage constraints induce better governance, more trust by the market and higher effectiveness in investment. This would suggest higher value for the shareholders. To investigate whether this is the case, we focus on Tobin's Q. We therefore regress the Tobin's Q of the firm on fund leverage constraints of the fund holding it as well as a set of control variables. The panel specification contains year and firm fixed effects as well as errors clustered at the firm level.

We report the results in Table IX. In specifications (1), the independent variable is the ownership-weighted loading on NBAB factor (*VW leverage constraint*) for all mutual fund shareholders aggregated at the firm level. In specifications (2), the independent variable is the equal weighted loading on NBAB factor (*EW leverage constraint*) for all mutual fund shareholders aggregated at the firm level.

The results document a positive relationship between mutual funds' leverage constraints and firm Tobin's Q. One standard deviation higher degree of leverage constraints is related to between 2.8% (0.228*0.226/1.831), and 4.5% (0.365*0.226/1.831), (3.8% (=0.363*0.193/1.831) and 5.7%(=0.541*0.193/1.831)) higher firm's Tobin's Q in the case of value-weighed (equal-weighted) fund leverage constraint. Overall these results suggest that ownership by more leverage-constrained mutual funds translates in better governance and

therefore lower agency cost of equity and lower need to address them by paying out. The value of the firm is enhanced.

IV Assessing Causality and Market Variations in the Constraints

We now focus on some sub-sample analysis and address the potential concerns related to the endogeneity of ownership.

A. Sub-sample Analysis

We start with sub-sample analysis. We consider different sub-samples as a function of the degree "tighteness of investors' leverage constraints". As we mentioned above, the literature has long identified as anomaly the fact that the return difference between high-beta and low-beta stocks is significantly smaller than predicted by the capital asset pricing model (CAPM). The standard explanation behind this feature is the investors' inability to borrow at the risk-free rate (Black, 1972). More recently, Frazzini and Pedersen (2014) argue that investors face a limit on their leverage. They argue and show that the slope of the security market line – i.e., the return difference between high-beta and low-beta stocks – is a function of the tightness of investors' leverage constraints: a tighter leverage constraint induces a flatter security market line.

We rely on such literature, and investigate how exogenous shifts in the cost of funding in the market change the impact of our proxy on governance. The cost of financing increases the security market line gets flattened as investors in the market resort to load even more on high beta stocks as the cost of levering increases. This will further tighten the impact on the firm as it will be more difficult for the firm not following the good governance instructions of the constrained investors to replace them with previously unconstrained investors. We test this hypothesis by re-estimating our main specifications conditioning on the tightness of financing in the market.

We therefore investigate whether the impact of fund leverage constraints depends on the degree of tightness of investors' leverage constraints defined as the difference between the actual security market line and theoretical one (i.e., CAPM one). We define the "excess slope of the security market line" as the difference between the actual security market line and the one that CAPM would predict. A high value of the excess slope suggests that for high beta stocks the required rate of return in the market is higher than the one theory would predict, while a low value suggests that for high beta stocks the required rate of return is lower than the one theory would predict. The flatter the line, the higher the inability of the borrowing-constrained funds to get higher returns and the higher their incentives to go for high beta stocks. In other words, a flatter line is related to a more binding degree of borrowing constraints for the funds and in a flatter relation between betas and expected returns (Jylha, 2018).

We then, re-estimate all the main specifications, by separating the sample by the median of excess market line slope in Panel A and change in excess market line slope in Panel B. In the interest of brevity, we only report the control variables the same as Table IV. Industries are classified using the two-digit SIC. All independent variables are lagged one year.

The results are very consistent and show that the impact of fund leverage constraints are concentrated in the periods in which there are more binding degree of borrowing constraints – i.e., low slope (change in slope) of the security market line. This holds for the different tests we have been running before as both for the level effect – i.e., slope of security market line – and for the change of the effect – i.e., change in slope of security market line. Separate (unreported) tests of difference show that the difference between high and low slope are not only economically relevant but also statistically significant.

As a further robustness check, we also provide a specification in which, instead of splitting the sample, we interact our focus variable with the excess market line slope. We report the results in the Internet Appendix, IA-1. In panel A, we add the interaction between *(fund) VW*

leverage constraint and the median of excess market line slope in Panel A and change in excess market line slope in Panel B. Firm fixed effects and year fixed effects are included in all regressions. We control for all control variables in the previous tables. For brevity, we only report the coefficient estimates of *(fund) VW leverage constraint*, interaction term and Excess slope (Change of Excess slope). Industries are classified by using the two-digit SIC.

The results confirm the ones reported before: the impact of fund leverage constraints are concentrated in the periods in which there are more binding degree of borrowing constraints – i.e., low slope (change in slope) of the security market line. This holds for the different tests we have been running before as both for the level effect – i.e., slope of security market line – and for the change of the effect – i.e., change in slope of security market line.

B. Alternative Measures

Finally, we also experiment with alternative measures of investor financial constraints. We report the results in the Internet Appendix, IA-2. In Panel A, we estimate $R_{i,\tau} = \alpha_{i,t} + \beta^{MKT}{}_{i,t} R_{MKT,\tau} + \beta^{HML}{}_{i,t} R_{HML,\tau} + \beta^{SMB}{}_{i,t} R_{SMB,\tau} + \beta^{UMD}{}_{i,t} R_{UMD,\tau} + \beta^{NBAB}{}_{i,t} NBAB_{\tau} + \varepsilon_{i,\tau}$. $\tau \in \{t\text{-}23, t\}$.The four factors are market (MKT), value (HML), size (SMB), momentum (UMD). We then use the $\beta^{NBAB}{}_{i,t}$ and aggregate it at fund level or firm level as our alternative measure. In Panel B, we use abnormal fund beta, which is the value weighted fund portfolio beta minus the market beta. We estimate the market beta using the value-weighted average beta of the aggregate stock holdings of all the actively managed equity funds, following Boguth and Simutin (2017). We then aggregate the abnormal fund beta at the fund level or firm level as our alternative measure.

In Panel C, we estimate $R_{i,\tau} = \alpha_{i,t} + \beta^{MKT}{}_{i,t} R_{MKT,\tau} + \beta^{LCT}{}_{i,t} \Delta LCT_{\tau} + \varepsilon_{i,\tau}$. $\tau \in \{t\text{-}23, t\}$, where $R_{i,\tau}$ and $R_{MKT,\tau}$ are the excess returns of fund i and the market in month τ. $\Delta LCT\tau$ is the innovation in leverage constraint tightness. We then use $\beta^{LCT}{}_{i,t}$ and aggregate it at fund level or firm level as our alternative measure. The sample period is from 1982 to 2016. Firm fixed effects and year fixed effects are included in all the specifications. We include the same set of control

variables as in the previous tables. In the ineptest of brevity, we only report the control variables the same as Table 2. Industries are classified using the two-digit SIC. All independent variables are lagged one year.

The results are again consistent with the previous ones and document a direct link between fund financial constraints and fund portfolio concentration, voting behavior, incentive to forcefully terminate CEOs, cash holding, payout, repurchase, R&D effectiveness and Firm's Tobin's Q. In particular, one standard deviation higher degree of fund constraints is related to 5.1% (i.e., 0.224*.005/0.022) higher portfolio concentration, 4.0% (i.e., 0.115*0.186/0.538) higher voting against the management, 15.9% (i.e., 0.038*0.101/0.024) higher termination of CEOs, 3.0% (i.e., 0.027*0.190/0.169) higher cash holding, 3.8% (i.e., 0.002*0.190/0.010) lower payout, 4.8% (i.e., 0.002**0.190/0.008) lower amount of repurchase, 2.4% (i.e., 0.015*0.190/0.119) higher R&D effectiveness and 2.1% (0.199*0.190/1.831) higher Firm's Tobin's Q for fund constraint defined in terms of 4-factor model (fund abnormal portfolio beta, loading on LCT).

C. Addressing Potential Endogeneity

Overall, these results, while strongly suggestive, provide evidence of a correlation between degree of leverage constraints of the funds holding the stocks and the firm quality of governance. We now try to assess whether we can identify causality. For this purpose, we estimate an instrumental variable specification. We follow Edmans, Goldstein and Jiang (2012) and instrument the degree of leverage constraints of the funds holding the firm with mutual funds fire sales. We define a variable (*Ratio_firesale*), which is the ratio of mutual fund shareholders that have experienced fire sale. The intuition is that: fire sales induce an exogenous reshuffling of mutual fund ownership and this should reduce average holding by funds subject to financial constraints. We consider a fund has a fire sale if a fund experiences outflows of at least 5% of total assets (see Edmans, Goldstein and Jiang (2012)). Firm fixed

effects and year fixed effects are included in all specifications. We control for all control variables in the previous tables. Firm fixed effects and year fixed effects are included in all regressions. We control for all control variables in the previous tables.

We report the results in Table XI. Specifications (1) to (3) report estimates from the first-stage regressions, whole specifications (3) to (8) report estimates from the second-stage regressions. In the interest of brevity, we only report the control variables the same as Table 2. Industries are classified using the two-digit SIC.

The results confirm the previous ones and show that the more leverage-constrained the mutual funds are, the more they discipline the management by voting against it. This leads to lower payout, higher cash holdings, higher R&D effectiveness and in general higher Tobin's Q.

Conclusion

We study the governance implication of the fact that many investors – mutual fund, pension funds, individuals – cannot lever up. The only solution for these "financially constrained" investors is to over-weight risky securities in their portfolios. This will have important governance implications for the firms they hold. Indeed, leverage-constrained investors, not being able to lever up, will tilt their portfolios towards a riskier allocation – higher degree of portfolio concentration in risky stocks.

The resulting higher amount of commitment will increase the incentives to monitor. Indeed, not being able to diversify away the risk, they will try to reduce it by directly affecting the risk taking of the company by monitoring the management, actively voting and inducing CEO turnout in the case of bad performance. This implies that leverage-constrained investors reduce the agency cost of equity of the firm. Firms held by more financially constrained funds should be more appreciated in the market and therefore required to pay out less cash.

We test this hypothesis by focusing on the US mutual funds and US corporations over the period 1982-2016. We create a measure of financial constrains for the mutual funds. Then, we relate it to fund ownership and monitoring behavior as well as to firm quality of governance.

We first document that leverage-constrained funds concentrate on fewer stocks. Then, we show that this induces them to monitor more. In particular, we show that leverage-constrained-funds are more likely to vote against the management and increase the probability of forced CEO turnover.

Finally, we look at the implications of this better quality of governance of the firm. We show that by reducing the agency cost of equity, firms held by more financially constrained funds display higher Tobin's Q, they are less required to pay out cash – i.e., they engage less in dividend payout and share repurchases and hold a higher amount of cash holding. Moreover, holding cash is considered to be a positive signal and leads to higher stock price. Firms held by more financially constrained funds are more effective in implementing their R&D investment.

More importantly, all these results a stronger in the periods in which the degree of "tighteness of investors' leverage constraints" is higher. Investigating how exogenous shifts in the tighteness of investors' leverage constraints in the market, we document that the impact of fund leverage constraints depends on the degree of tighteness of investors' leverage constraints defined as the difference between the actual security market line and theoretical one (i.e., CAPM one).

All these results do not just display correlation, but also are casual. Indeed, we follow the literature (e.g., Edmans, Goldstein and Jiang, 2012) and instrument the degree of leverage constraints of the funds holding the firm with mutual funds fire sales. We then repeat all our main tests using as explanatory variable the exogenous component of leverage-constrained ownership. The results are consistent with the previously described ones: the more leverage-

constrained the mutual funds are, the more they discipline the management by either voting against it. This leads to lower payout, higher cash holdings and in general higher Tobin's Q.

Our results provide a new dimension of the role played by the leverage constraints of the investors in the firm in enhacing the quality of governance of the firm.

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Appendix: Variable Definitions

The Appendix provides detailed descriptions of all the variables used in the tables.

Variable	Definition
Value-weighted Leverage Constraint	The ownership-weighted loading on NBAB factor for all equity mutual funds aggregated at the firm level. We obtain loadings β^{NBAB} as our proxy for leverage constraint tightness from rolling regressions. In particular, for each month t and for each fund i, we estimate $R_{i,\tau} = \alpha_{i,t} + \beta MKT_{i,t} R_{MKT,\tau} + \beta^{NBAB}_{i,t} NBAB_{\tau} + \varepsilon_{i,\tau}$. $\tau \in \{t\text{-}23, t\}$. $R_{i,\tau}$ is the excess return of fund i. $R_{MKT,\tau}$ is the monthly return in month τ. We require each fund to have non-missing returns for at least 12 months of the 24-months estimation period. *NBAB* is the monthly *negative* BAB factors from Frazzini and Pedersen (2014).
Equal-weighted Leverage Constraint	The equal-weighted loadings on NBAB factor for all equity mutual funds aggregated at the firm level.
Fund leverage constraint	The β^{NBAB} loading on NBAB factor for the voting fund averaged at the quarter before shareholder meeting.
Holding Hirfindahl	The holding Hirfindahl index of the mutual fund portfolio
Book leverage	(Debt in Current Liabilities(DLC)+ Long-term Debt (DLTT))/ book assets (AT).
Dividend payout ratio	Ratio of cash dividends on common stock (dv) to total asset.
Repurchase ratio	The repurchase ratio is the ratio of purchases of common stock and preferred stock (PRSTKC)to total asset.
Firm age	Number of years a firm has appeared in CRSP.
Free cash flow	Sum of Income Before Extraordinary Items (IB) plus Depreciation and Amortization (DP) less Cash Dividends (DV) less Non-Equity and Minority Interest Dividends Paid (NEQMI) less Equity Dividends Paid (EQDIVP) less Capital Expenditures (CAPX) or Additions to Fixed Assets (AFXA).
Forced CEO turnover	Indicator that takes the value of one if a forced CEO turnover occurs in a given year and zero otherwise. We obtain the forced CEO turnover sample from Peters and Wagner (2014), who classify turnover events as forced turnovers if 1) the press reports that the CEO has been fired, has been forced to depart from the position, or has departed due to unspecified policy differences, 2) the departing CEO is under the age of 60 and the stated reason for the departure is not death, poor health, or the acceptance of another position (outside or within the firm), or 3) the departing CEO is under the age of 60 and the stated reason for the departure is retirement but the firm does not announce the departure at least six months in advance.
Market-adjusted stock return	One-year buy-and-hold market-adjusted stock return. Equally weighted CRSP index return is used as the market return.
Book Size	Logarithm of book assets (AT).
ROA	Income before extraordinary items (IB) / book assets (AT).
Cash holding	Cash and Short-Term Investments (CHE) / book assets (AT).
Stock return volatility	Volatility of daily stock return over the year.
Tangibility	Net PPE (PPENT) / book assets (AT).
Tobin's q	(Book assets (AT) + market value of equity (CSHO *PRCC_F) –common equity (CEQ)) / book assets (AT).
Ln (1+fund size)	Logarithm of voting fund's average asset holding value.
Fund turnover	Average churn rate of voting fund, calculated as (aggregate purchase + aggregate sale – absolute value of total net flow) / equity asset holding
Fund return	Average voting fund buy-and-hold portfolio return.

Table I: Summary Statistics

This table presents summary statistics and data sources for the main regression variables. The Appendix provides detailed variable descriptions.

	Sample size	Mean	Median	Standard deviation	5th%	95th%	Source
Measures of Leverage Constraint:							
VW leverage constraint	107,012	0.009	0.000	0.226	-0.320	0.355	Thomson Reuters, CRSP
EW leverage constraint	107,012	0.014	0.011	0.193	-0.274	0.304	Thomson Reuters, CRSP
Fund leverage constraint	115,468	0.014	0.003	0.218	-0.361	0.440	Thomson Reuters, CRSP
Dependent Variable							
Against Management (Fund vote level)	1,411,081	0.538	1.000	0.498	0.000	1.000	Voting Analytics
Holding Hirfindahl	115,468	0.022	0.017	0.055	0.005	0.045	Thomson Reuters, CRSP
Holding Number Industry	115,468	1.476	0.700	2.933	0.180	4.990	Thomson Reuters, CRSP
Forced	14,216	0.024	0.000	0.155	0.000	1.000	Jenter and Kanaan (2015)
Cash holding	107,012	0.169	0.080	0.213	0.003	0.665	Compustat
Tobin's *q*	107,012	1.831	1.319	1.479	0.816	4.617	Compustat
Dividend Payout	107,012	0.010	0.000	0.021	0.000	0.052	Compustat
Repuchase	107,012	0.008	0.000	0.031	0.000	0.065	Compustat
R&D efficiency	32,254	0.119	0.122	0.111	-0.033	0.259	Compustat
Fund Characteristics							
Fund holding	1,411,081	0.002	0.001	0.005	0.000	0.010	Thomson Reuters, CRSP
Fund asset (TNA) (in Millions)	1,411,081	1471.416	296.966	3188.580	26.366	6073.800	Thomson Reuters, CRSP
Fund return	1,411,081	0.007	0.012	0.030	-0.047	0.045	Thomson Reuters, CRSP
Fund turnover	1,411,081	0.102	0.073	0.097	0.007	0.285	Thomson Reuters, CRSP
Firm Characteristics							
Tangibility	107,012	0.270	0.186	0.258	0.005	0.809	Compustat
Ln(1+Assets)	107,012	6.286	6.164	2.182	3.001	10.090	Compustat
ROA	107,012	0.079	0.095	1.392	-0.270	0.270	Compustat
Institutional ownership	107,012	0.451	0.427	0.292	0.035	0.942	Compustat
Free cash flow	107,012	-0.041	0.008	0.197	-0.417	0.127	Compustat
Book to market	107,012	0.723	0.567	0.642	0.122	1.818	Compustat
Book Leverage	107,012	0.211	0.174	0.195	0.000	0.584	Compustat
Return Volatility	14,748	0.029	0.025	0.014	0.013	0.057	CRSP
Firm Age	14,748	23.625	19.000	15.809	4.000	52.000	CRSP

Table II
Leverage Constraints and Mutual Fund Portfolio Concentration

This table presents the results of OLS regression analysis with fund fixed effects for mutual fund portfolio concentration. We measure portfolio concentration at the fund level, estimated as the holding Hirfindahl index of mutual fund portfolio in columns (1) to (2), and the number of industries in the portfolio in columns (3) to (4). The sample includes all equity mutual funds from 1982 to 2016. The independent variable is the loading on the NBAB factor (*fund leverage constraint*) for the fund at the quarter before shareholder voting. In columns (2) and (4), we add fund characteristics as controls. All independent variables are lagged one quarter. Fund and year-quarter fixed effects are included in all tests, and standard errors are clustered at the fund level. We report *t*-statistics in the parentheses below coefficient estimates, and statistical significance at the 1%, 5%, and 10% levels is indicated by ***, ** and *, respectively.

	Holding Hirfindahl		*Holding Num Industry*	
	(1)	(2)	(3)	(4)
Fund leverage constraint	0.005***	0.005***	-3.893***	-4.009***
	(5.61)	(5.64)	(-7.10)	(-7.48)
Fund Characteristics				
Ln(1+fund asset)		0.001***		0.422**
		(3.12)		(2.42)
Fund return		-0.022***		1.374**
		(-4.85)		(2.40)
Fund turnover		-0.029***		1.253*
		(-8.43)		(1.67)
Time fixed effects	Yes	Yes	Yes	Yes
Fund fixed effects	Yes	Yes	Yes	Yes
Observations	115,468	115,468	115,468	115,468
R-squared	0.299	0.349	0.114	0.116

Table III
Leverage Constraints and Mutual Fund Voting

This table examines the effects of leverage constraints on mutual fund voting behaviour. The sample includes all contentious votes in the Voting Analytics data set covering the period from 2003 to 2016. Contentious votes are the votes in which the ISS recommendation for a proposal does not coincide with the management recommendation. The dependent variable is an indicator variable *Against Management*, set to one if the fund does not follow the management recommendation (either by voting against management or by withholding its vote from a management-sponsored proposal) and set to zero if the fund votes to support the management recommendation.

Panel A presents the univariate analysis for the ratio of mutual funds voting against management for contentious votes. *T*-test is conducted to test for differences between the means for *Against Management* of funds with low *fund leverage constraint* and funds with high *fund leverage constraint*. We separate the sample by the median of *fund leverage constraint*.

Panel B presents the results of OLS regression for mutual fund voting at the fund-year level. The dependent variable is *Against Management* aggregated for each fund-year. The independent variable is the yearly average loading on the NBAB factor (*fund leverage constraint*) for the voting fund. We control for fund fixed effects and year fixed effects in all specifications.

Panel C presents the results of linear probability regression for mutual fund voting at the fund-proposal level. The dependent variable is an indicator variable *Against Management*. The independent variable is the loading on NBAB factor (*fund leverage constraint*) for the voting fund at the quarter before shareholder meeting. We include fund fixed effects, firm fixed effects and year fixed effects in all specifications. In column (2), we control for fund characteristics. In column (3), we add in firm characteristics.

Panel D performs the analyses at the firm level. The dependent variable is an indicator variable *Against Management* aggregated at the firm level. *Against Management* is equal to one if the fund does not follow the management recommendation (either by voting against management or by withholding its vote from a management-sponsored proposal) and set to zero if the mutual fund votes to support the management recommendation. In regressions (1) and (3), the independent variable is the ownership-weighted loading on NBAB factor (*VW leverage constraint*) for all mutual funds aggregated at the firm level. In regressions (2) and (4), the independent variable is the equal weighted loading on NBAB factor (*EW leverage constraint*) for all mutual funds aggregated at the firm level. Firm and year fixed effects are included in all tests, and standard errors are clustered at the firm level.

All independent variables are lagged by one year. Standard errors are clustered at the fund level, except in Panel D we cluster standard errors at the firm level. We report *t*-statistics in the parentheses below coefficient estimates, and statistical significance at the 1%, 5%, and 10% levels is indicated by ***, ** and *, respectively.

Panel A: Univariate analysis

	Low Leverage Constraint	High Leverage Constraint	Difference
Against Management	0.501	0.568	0.067*** (*t*= 88.36)

Table III Continued

Panel B: Multivariate Analysis at Fund Level

	(1)	(2)
fund leverage constraint	0.131***	0.128***
	(5.35)	(5.40)
Fund Characteristics		
Ln(1+fund asset)		0.074*
		(1.91)
Fund return		-0.274***
		(-3.88)
Fund turnover		-0.054*
		(-1.66)
Year fixed effects	Yes	Yes
Fund fixed effects	Yes	Yes
Observations	12,031	12,031
R-squared	0.715	0.717

Panel C: Multivariate Analysis at Fund-proposal Level

	(1)	(2)	(3)
fund leverage constraint	0.114***	0.118***	0.116***
	(4.66)	(4.73)	(5.05)
Fund Characteristics			
Fund ownership		-2.013	-2.056
		(-1.30)	(-1.37)
Ln(1+fund asset)		0.074*	0.069*
		(1.91)	(1.88)
Fund return		-0.274***	-0.253***
		(-3.88)	(-3.64)
Fund turnover		-0.054*	-0.043
		(-1.66)	(-1.33)
Firm Characteristics			
Tangibility			0.047***
			(2.87)
Ln(1+Assets)			0.020***
			(5.08)
ROA			-0.089***
			(-7.24)
Free cash flow			0.019*
			(1.84)
Book-to-market			0.005
			(1.39)
Book leverage			0.044
			(3.44)
Year fixed effects	Yes	Yes	Yes
Fund fixed effects	Yes	Yes	Yes
Firm fixed effects	Yes	Yes	Yes
Observations	1,411,081	1,411,081	1,169,831
R-squared	0.375	0.363	0.369

Table III Continued

Panel D: Multivariate Analysis at Firm Level

	(1)	(2)	(3)	(4)
VW leverage constraint	0.131***		0.129***	
	(5.59)		(5.26)	
EW leverage constraint		0.132***		0.132***
		(3.61)		(3.43)
Firm Characteristics				
Institutional ownership			0.033	0.033
			(1.37)	(1.37)
Tangibility			-0.002	-0.004
			(-0.04)	(-0.08)
Ln(1+asset)			-0.021**	-0.022***
			(-2.47)	(-2.64)
Roa			0.022	0.024
			(0.61)	(0.65)
Free cash flow			0.021	0.020
			(0.70)	(0.68)
Book-to-market			0.023***	0.024***
			(2.81)	(2.89)
Book leverage			-0.078***	-0.075***
			(-2.68)	(-2.58)
Year fixed effects	Yes	Yes	Yes	Yes
Firm fixed effects	Yes	Yes	Yes	Yes
Observations	13,208	13,208	12,461	12,461
R-squared	0.080	0.082	0.086	0.088

Table IV
Leverage Constraints and Forced CEO Turnover

This table presents estimates of linear probability regressions in which the dependent variable is an indicator that takes the value of one if a forced turnover event occurs in a given year, and zero otherwise. The sample consists of 14,216 firm-year observations covered in the Compustat, CRSP, Thomson Reuters Institutional (13F) Holdings, and ExecuComp databases from 1992 to 2008. In regression (1) and (2), the independent variable is the ownership-weighted loading on NBAB factor (*VW leverage constraint*) for all mutual fund shareholders aggregated at the firm level. In regressions (3) and (4), the independent variable is the equal weighted loading on NBAB factor (*EW leverage constraint*) for all mutual fund shareholders aggregated at the firm level. Please refer to Appendix A for the variable definitions. All independent variables are lagged by one year. Firm and year fixed effects are included in all tests, and standard errors are clustered at the firm level. We report *t*-statistics in the parentheses below coefficient estimates, and statistical significance at the 1%, 5%, and 10% levels is indicated by ***, ** and *, respectively.

	(1)	(2)	(3)	(4)
VW leverage constraint	0.020**		0.023**	
	(2.00)		(1.97)	
EW leverage constraint		0.025*		0.039**
		(1.78)		(2.47)
Firm Characteristics				
Firm return			-0.010***	-0.010***
			(-3.51)	(-3.43)
CEO ownership			-0.065	-0.065
			(-1.15)	(-1.17)
CEO tenure			0.002***	0.002***
			(3.53)	(3.55)
Dummy_CEO60			-0.024***	-0.024***
			(-5.23)	(-5.23)
Dummy_Chairman			-0.010	-0.010
			(-1.60)	(-1.60)
Tangibility			0.026	0.026
			(1.09)	(1.09)
Ln(1+Assets)			-0.007	-0.007
			(-1.51)	(-1.54)
Book-to-market			0.001	0.001
			(0.45)	(0.49)
Book leverage			0.020	0.020
			(1.11)	(1.14)
Free cash flow			0.078*	0.078*
			(1.81)	(1.81)
ROA			-0.104**	-0.104**
			(-2.10)	(-2.10)
Return Volatility			0.131	0.137
			(0.53)	(0.55)
Firm age			0.003	0.003
			(1.15)	(1.06)
Observations	14,216	14,216	14,216	14,216
R-squared	0.002	0.011	0.002	0.010

Table V
Leverage Constraints and Corporate Payout

This table presents the results of OLS regression analysis for dividend payout ratio and repurchase ratio between 1982 and 2016. The dividend payout ratio is the ratio of cash dividends on common stock to total asset. The repurchase ratio is the ratio of purchases of common stock and preferred stock to total asset. In regressions (1) and (3), the independent variable is the ownership-weighted loading on NBAB factor (*VW leverage constraint*) for all mutual fund shareholders aggregated at the firm level. In regressions (2) and (4), the independent variable is the equal weighted loading on NBAB factor (*EW leverage constraint*) for all mutual fund shareholders aggregated at the firm level. Please refer to Appendix A for the variable definitions. All independent variables are lagged by one year. Firm and year fixed effects are included in all tests, and standard errors are clustered at the firm level. We report t-statistics in the parentheses below coefficient estimates, and statistical significance at the 1%, 5%, and 10% levels is indicated by ***, ** and *, respectively.

	Dividend Payout Ratio		Repurchase Ratio	
	(1)	(2)	(3)	(4)
VW leverage constraint	-0.001***		-0.004***	
	(-4.96)		(-10.16)	
EW leverage constraint		-0.002***		-0.006***
		(-5.12)		(-12.28)
Firm Characteristics				
Institutional ownership	-0.001**	-0.001**	0.005***	0.005***
	(-2.17)	(-2.16)	(7.64)	(7.71)
Tangibility	0.000	0.000	0.002*	0.002**
	(0.17)	(0.18)	(1.95)	(2.00)
Ln(1+asset)	0.001***	0.001***	0.001***	0.001***
	(3.96)	(3.93)	(2.99)	(2.90)
ROA	0.003***	0.003***	0.008***	0.008***
	(6.63)	(6.64)	(7.43)	(7.44)
Free cash flow	-0.000	-0.000	-0.000	-0.000
	(-1.13)	(-1.12)	(-0.70)	(-0.67)
Book-to-market	-0.001***	-0.001***	-0.001***	-0.001***
	(-16.02)	(-16.03)	(-7.74)	(-7.79)
Book leverage	-0.006***	-0.006***	-0.001	-0.001
	(-11.17)	(-11.17)	(-0.60)	(-0.65)
Year fixed effects	Yes	Yes	Yes	Yes
Firm fixed effects	Yes	Yes	Yes	Yes
Observations	107,012	107,012	107,012	107,012
R-squared	0.050	0.050	0.054	0.055

Table VI
Leverage Constraints and Cash Holding

This table presents the results of OLS regression analysis for cash holding between 1982 and 2016. In regressions (1), the independent variable is the ownership-weighted loading on NBAB factor (*VW leverage constraint*) for all mutual fund shareholders aggregated at the firm level. In regressions (2), the independent variable is the equal weighted loading on NBAB factor (*EW leverage constraint*) for all mutual fund shareholders aggregated at the firm level. Please refer to Appendix A for the variable definitions. All independent variables are lagged by one year. Firm and year fixed effects are included in all tests, and standard errors are clustered at the firm level. We report t-statistics in the parentheses below coefficient estimates, and statistical significance at the 1%, 5%, and 10% levels is indicated by ***, ** and *, respectively.

	(1)	(2)	(3)	(4)
VW leverage constraint	0.030***		0.030***	
	(9.48)		(9.31)	
EW leverage constraint		0.037***		0.036***
		(9.56)		(9.16)
Firm Characteristics				
Institutional ownership			0.015***	0.015***
			(3.33)	(3.32)
Tangibility			-0.245***	-0.245***
			(-24.77)	(-24.77)
Ln(1+asset)			-0.029***	-0.029***
			(-16.72)	(-16.66)
Roa			-0.015***	-0.015***
			(-2.70)	(-2.72)
Free cash flow			-0.004***	-0.004***
			(-4.98)	(-5.09)
Book-to-market			-0.004***	-0.004***
			(-3.68)	(-3.69)
Book_leverage			-0.093***	-0.093***
			(-15.03)	(-15.07)
Year fixed effects	Yes	Yes	Yes	Yes
Firm fixed effects	Yes	Yes	Yes	Yes
Observations	107,012	107,012	107,012	107,012
R-squared	0.011	0.011	0.080	0.080

Table VII
Leverage Constraints and the Value of Cash

This table presents the results of OLS regressions motivated by Faulkender and Wang (2005). The dependent variable is the annual excess return of the firm relative to the Fama and French (1993) 25 size and book-to-market portfolios. Δ indicates the change from the previous year. Cash is the cash plus marketable securities. In regression (1) and (3) (regression (2) and (4)), the interested variable is the interaction term between the Δ Cash/ME and the ownership-weighted loading on NBAB factor (*VW leverage constraint*) (equal-weighted loading on NBAB factor (*EW leverage constraint*) for all mutual fund shareholders aggregated at the firm level. All other independent variables are normalized by the market value of equity (ME) of the firm at the beginning of the year. They include the lagged cash, changes in earnings (earnings before extraordinary items plus interest, deferred taxes, and investment tax), asset of net cash, R&D expenses, Interest expense, common dividends, Leverage (long term plus current debt dividend by market value of equity plus long term plus current debt), New Financing (net equity plus net cash issues). In regression (1) and (2), we control for industry fixed effects. In regression (3) and (4), we control for firm fixed effects. All independent variables are lagged one year. Please refer to Appendix A for the variable definitions. Standard errors are clustered at the firm level. We report t-statistics in the parentheses below coefficient estimates, and statistical significance at the 1%, 5%, and 10% levels is indicated by ***, ** and *, respectively.

	(1)	(2)
ΔCash/ME	0.789***	0.747***
	(18.17)	(19.95)
VW leverage constraint *ΔCash/ME	0.732***	
	(2.80)	
VW leverage constraint	-0.046**	
	(-2.19)	
EW leverage constraint *ΔCash/ME		0.638**
		(2.07)
EW leverage constraint		-0.060***
		(-3.12)
ΔEbit/ME	0.004	0.002*
	(1.01)	(1.86)
ΔNA/ME	0.006**	0.003
	(2.16)	(1.39)
ΔR&D/ME	-0.039	-0.038**
	(-1.54)	(-1.97)
ΔInterest/ME	-0.013	-0.005
	(-1.31)	(-1.25)
ΔDividend/ME	-0.046	0.093
	(-0.66)	(1.58)
Cash/ME	0.028**	0.004**
	(2.44)	(2.00)
Leverage/ME	-0.559***	-0.452***
	(-36.22)	(-38.96)
New Finance/ME	-0.023	-0.004
	(-1.48)	(-0.43)
Cash/ME*ΔCash/ME	0.000	-0.000
	(0.05)	(-1.20)
Leverage/ME*ΔCash/ME	-0.086***	-0.049
	(-2.70)	(-1.60)
Year fixed effects	Yes	Yes
Industry fixed effects	Yes	Yes
Firm fixed effects	No	No
Observations	92,634	92,634
R-squared	0.043	0.042

Table VIII
Leverage Constraints and R&D Productivity

This table presents the results of OLS regression analysis for a firm's ability to generate revenue from its R&D investment between 1982 and 2016. R&D effectiveness is measured using 10-year rolling windows following (Knott 2008):

$$LnY_{i,t} = (\beta_0+\beta_{0,i})+(\beta_1+\beta_{1,i})\text{Ln}K_{i,t}+(\beta_2+\beta_{2,i})\text{Ln}L_{i,t}+(\beta_3+\beta_{3,i})\text{Ln}R_{i,t-1}+(\beta_4+\beta_{4,i})\text{Ln}S_{i,t-1}+(\beta_5+\beta_{5,i})\text{Ln}D_{i,t}+\varepsilon_{i,t}$$

$Y_{i,t}$ is the revenue. $K_{i,t}$ is the net property, plant and equipment. $L_{i,t}$ is the labor as full-time equivalent employees (1000). $R_{i,t-1}$ is the R&D. $D_{i,t}$ is the advertising. $S_{i,t-1}$ is the firm-specific spillover, estimated as the sum of the differences in knowledge between focal firm *i* and rival firm *j* for all firms in the four digit SIC industry with more knowledge (R&D) than the focal firm. In regressions (1), the independent variable is the ownership-weighted loading on NBAB factor (*VW leverage constraint*) for all mutual fund shareholders aggregated at the firm level. In regressions (2), the independent variable is the equal weighted loading on NBAB factor (*EW leverage constraint*) for all mutual fund shareholders aggregated at the firm level. Please refer to Appendix A for the variable definitions. All independent variables are lagged by one year. Firm and year fixed effects are included in all tests, and standard errors are clustered at the firm level. We report *t*-statistics in the parentheses below coefficient estimates, and statistical significance at the 1%, 5%, and 10% levels is indicated by ***, ** and *, respectively.

	(1)	(2)	(3)	(4)
VW leverage constraint	0.026***		0.024***	
	(4.71)		(4.58)	
EW leverage constraint		0.039***		0.037***
		(5.36)		(5.31)
Firm Characteristics				
Institutional ownership			0.007	0.007
			(1.05)	(0.98)
Tangibility			-0.059***	-0.060***
			(-3.30)	(-3.33)
Ln(1+asset)			0.006***	0.006***
			(2.87)	(2.92)
Roa			0.027**	0.027**
			(2.07)	(2.06)
Free cash flow			0.002	0.002
			(0.35)	(0.35)
Book-to-market			-0.000	-0.000
			(-0.02)	(-0.02)
Book_leverage			-0.031***	-0.030***
			(-3.42)	(-3.39)
Year fixed effects	Yes	Yes	Yes	Yes
Firm fixed effects	Yes	Yes	Yes	Yes
Observations	32,254	32,254	32,254	32,254
R-squared	0.037	0.037	0.047	0.047

Table IX
Leverage Constraints and Tobin's *q*.

This table presents the results of OLS regression analysis for Tobin's *q* between 1982 and 2016. In regressions (1), the independent variable is the ownership-weighted loading on NBAB factor (*VW leverage constraint*) for all mutual fund shareholders aggregated at the firm level. In regressions (2), the independent variable is the equal weighted loading on NBAB factor (*EW leverage constraint*) for all mutual fund shareholders aggregated at the firm level. Please refer to Appendix A for the variable definitions. All independent variables are lagged by one year. Firm and year fixed effects are included in all tests, and standard errors are clustered at the firm level. We report t-statistics in the parentheses below coefficient estimates, and statistical significance at the 1%, 5%, and 10% levels is indicated by ***, ** and *, respectively.

	(1)	(2)	(3)	(4)
VW leverage constraint	0.365***		0.228***	
	(8.96)		(5.75)	
EW leverage constraint		0.541***		0.363***
		(10.32)		(7.20)
Firm Characterisics				
Institutional ownership			0.138***	0.136***
			(3.22)	(3.18)
Tangibility			-0.172**	-0.174**
			(-2.08)	(-2.11)
Ln(1+asset)			-0.442***	-0.441***
			(-25.58)	(-25.58)
ROA			0.315***	0.314***
			(4.35)	(4.34)
Free cash flow			-0.042***	-0.042***
			(-3.95)	(-3.96)
Book-to-market			-0.359***	-0.358***
			(-34.02)	(-34.03)
Book leverage			-0.336***	-0.332***
			(-6.13)	(-6.07)
Year fixed effects	Yes	Yes	Yes	Yes
Firm fixed effects	Yes	Yes	Yes	Yes
Observations	107,012	107,012	107,012	107,012
R-squared	0.041	0.042	0.128	0.128

Table X: Subsample Analyses

This table presents estimates of subsample analysis. The sample period is from 1982 to 2016. The sample size differs across regressions depending on the variables available in the various data sources. We separate the sample by the median of excess market line slope in Panel A and change in excess market line slope in Panel B. Firm fixed effects and year fixed effects are included in all regressions. We control for all control variables in the previous tables. For brevity, we only report the control variables the same as Table IV. Industries are classified using the two-digit SIC. All independent variables are lagged one year. The Appendix provides detailed variable descriptions. We report *t*-statistics in the parentheses below coefficient estimates, and statistical significance at the 1%, 5%, and 10% levels is indicated by ***, ** and *, respectively.

Panel A: Sample Split by Excess Slope of Security Market Line

	Portfolio Concentration		Voting Against		Forced Turnover		Dividend Payout		Repurchase		Cash		Effectiveness of R&D		Tobin's q	
	Low	High	Low	High	Low	High	Low	High	Low	High	Low	High	Low	High	Low	High
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)
(fund)VW leverage constraint	0.008***	0.000	0.220***	0.089**	0.035**	0.021	-0.001***	-0.001***	-0.006***	-0.002***	0.039***	0.023***	0.028***	0.023***	0.323***	0.062
	(4.81)	(0.30)	(5.11)	(2.38)	(2.29)	(1.08)	(-3.96)	(-4.01)	(-10.67)	(-4.50)	(9.06)	(5.65)	(3.96)	(3.53)	(6.19)	(1.19)
Fund Characteristics																
Ln(1+fund asset)	0.003***	0.001														
	(3.71)	(1.30)														
Fund return	-0.058***	-0.006***														
	(-4.66)	(-2.95)														
Fund turnover	-0.049***	-0.012***														
	(-7.83)	(-4.68)														
Institutional ownership			0.102***	-0.029			-0.001***	-0.001	0.004***	0.005***	0.015***	0.012**	0.008	0.009	0.162***	0.130**
			(2.61)	(-0.77)			(-2.58)	(-1.53)	(4.54)	(6.04)	(2.79)	(2.11)	(0.97)	(1.09)	(3.18)	(2.26)
Tangibility			-0.122	0.075	0.029	0.021	-0.002*	0.001	0.003**	0.003*	-0.234***	-0.240***	-0.083***	-0.042**	-0.202*	-0.056
			(-1.41)	(1.04)	(0.80)	(0.55)	(-1.69)	(1.49)	(2.04)	(1.88)	(-18.29)	(-20.72)	(-4.02)	(-2.00)	(-1.81)	(-0.56)
Ln(1+asset)			-0.049***	-0.020*	-0.008	-0.004	0.001***	0.001***	0.001***	0.001***	-0.031***	-0.025***	0.005**	0.004	-0.424***	-0.426***
			(-3.65)	(-1.65)	(-1.15)	(-0.56)	(3.86)	(3.84)	(2.85)	(3.41)	(-14.69)	(-13.05)	(2.14)	(1.59)	(-21.17)	(-20.04)
Roa			0.044	-0.040	-0.074	-0.135*	0.007***	0.003***	0.010***	0.008***	-0.040**	-0.017**	0.044**	0.024	0.556***	0.268***
			(0.68)	(-0.76)	(-1.29)	(-1.93)	(8.43)	(6.66)	(6.96)	(6.38)	(-2.52)	(-2.20)	(2.36)	(1.49)	(2.77)	(2.95)
Free cash flow			0.040	0.085**	0.090*	0.103*	-0.004***	-0.000	0.001	-0.000	0.014	-0.005***	-0.007	0.006	-0.084	-0.037***
			(0.69)	(2.44)	(1.93)	(1.66)	(-5.78)	(-1.17)	(1.12)	(-1.01)	(1.15)	(-16.49)	(-0.70)	(1.07)	(-0.55)	(-5.38)
Book-to-market			0.076***	-0.002	-0.005	0.000	-0.002***	-0.001***	-0.001***	-0.001***	-0.005***	-0.005***	0.001	-0.001	-0.461***	-0.348***
			(4.63)	(-0.14)	(-1.29)	(0.20)	(-12.13)	(-13.52)	(-6.85)	(-5.82)	(-3.00)	(-4.39)	(0.17)	(-0.24)	(-26.24)	(-28.78)
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Fund fixed effects	Yes	Yes	No	No	No	No	No	No	No	No	No	No	No	No	No	No
Firm fixed effects	No	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	57,734	57,734	6,231	6,230	7,108	7,108	53,506	53,506	53,506	53,506	53,506	53,506	16,127	16,127	53,506	53,506
R-squared	0.008	0.003	0.155	0.045	0.013	0.009	0.049	0.057	0.046	0.071	0.080	0.084	0.052	0.045	0.138	0.125

Table X Continued

Panel B: Sample Split by Changes of Excess Slope of Security Market Line

	Portfolio Concentration		Voting Against		Forced		Dividend Payout		Repurchase		Cash		Effectiveness of R&D		Tobin's q	
	Low	High	Low	High	Low	High	Low	High	Low	High	Low	High	Low	High	Low	High
	(1)	(2)	(7)	(8)	(9)	(10)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)	(21)	(22)
(fund)VW leverage	0.009***	0.000	0.170***	0.099***	0.034**	0.021	-0.001***	-0.001***	-0.007***	-0.002***	0.035***	0.023***	0.033***	0.018***	0.325***	0.075
constraint	(5.92)	(0.35)	(4.53)	(2.71)	(2.27)	(1.07)	(-3.01)	(-5.81)	(-11.69)	(-4.13)	(8.25)	(5.63)	(4.56)	(3.02)	(6.58)	(1.41)
Fund Characteristics																
Ln(1+fund asset)	0.005***	-0.002***														
	(5.77)	(-5.07)														
Fund return	-0.069***	0.006														
	(-6.26)	(1.58)														
Fund turnover	-0.047***	-0.016***														
	(-7.78)	(-4.88)														
Institutional			0.070*	-0.031			-0.001**	-0.001**	0.004***	0.005***	0.014***	0.016***	0.008	0.008	0.182***	0.065
ownership			(1.89)	(-0.84)			(-2.04)	(-2.32)	(4.72)	(6.86)	(2.67)	(2.82)	(1.09)	(0.87)	(3.60)	(1.18)
Tangibility			-0.132*	0.074	0.052	0.017	-0.001	0.000	0.002*	0.002	-0.249***	-0.239***	-0.072***	-0.064***	-0.255**	-0.095
			(-1.84)	(0.94)	(1.48)	(0.44)	(-0.58)	(0.49)	(1.76)	(1.11)	(-20.59)	(-20.08)	(-3.12)	(-3.40)	(-2.40)	(-0.91)
Ln(1+asset)			-0.028**	-0.012	-0.007	-0.005	0.001***	0.001***	0.001***	0.001***	-0.029***	-0.028***	0.005**	0.004*	-0.408***	-0.499***
			(-2.40)	(-0.87)	(-0.98)	(-0.80)	(4.10)	(4.60)	(3.31)	(2.60)	(-14.70)	(-14.02)	(2.15)	(1.73)	(-21.42)	(-23.51)
Roa			0.080	-0.111**	-0.024	-0.102*	0.008***	0.002***	0.010***	0.009***	-0.034**	-0.016**	0.030	0.036**	0.620***	0.326***
			(1.38)	(-1.97)	(-0.42)	(-1.70)	(8.68)	(6.62)	(6.42)	(7.02)	(-2.16)	(-2.00)	(1.55)	(2.03)	(2.99)	(3.44)
Free cash flow			-0.004	0.114***	0.056	0.079	-0.004***	-0.000	0.001	-0.000	0.011	-0.004***	-0.004	0.005	-0.156	-0.038***
			(-0.08)	(2.80)	(1.25)	(1.51)	(-5.95)	(-1.18)	(0.93)	(-0.84)	(0.91)	(-10.05)	(-0.28)	(0.93)	(-0.95)	(-5.33)
Book-to-market			0.050***	0.010	-0.005	0.000	-0.002***	-0.001***	-0.001***	-0.001***	-0.006***	-0.004***	0.002	0.000	-0.439***	-0.326***
			(3.38)	(0.86)	(-1.06)	(0.14)	(-12.34)	(-14.17)	(-6.87)	(-5.48)	(-3.87)	(-3.37)	(0.64)	(0.09)	(-26.80)	(-27.13)
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Fund fixed effects	Yes	Yes	No	No	No	No	No	No	No	No	No	No	No	No	No	No
Firm fixed effects	No	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	57,734	57,734	6,231	6,230	7,108	7,108	53,506	53,506	53,506	53,506	53,506	53,506	16,127	16,127	53,506	53,506
R-squared	0.010	0.005	0.155	0.045	0.012	0.011	0.052	0.057	0.056	0.059	0.084	0.081	0.056	0.041	0.142	0.128

Table XI: Instrumental Variables Regression

This table presents estimates of two-stage least squares (2SLS) regressions. The sample period is from 1982 to 2016. The sample size differs across regressions depending on the variables available in the various data sources. Regressions (1) report estimates from the first-stage regressions in which the dependent variable is *VW leverage constraint*. The instrumental variable is *Ratio_firesale*, which is the ratio of mutual fund shareholders that have experienced fire sale. We consider a fund has a fire sale if a fund experiences outflows of at least 5% of total assets, following Edmans, Goldstein and Jiang (2012). Regressions (1) to (3) report estimates from the first-stage regressions. Regressions (3) to (8) report estimates from the second-stage regressions. Firm fixed effects and year fixed effects are included in all regressions. We control for all control variables in the previous tables. For brevity, we only report the control variables the same as Table 2. Industries are classified using the two-digit SIC. All independent variables are lagged one year. The Appendix provides detailed variable descriptions. We report *t*-statistics in the parentheses below coefficient estimates, and statistical significance at the 1%, 5%, and 10% levels is indicated by ***, ** and *, respectively.

	VW leverage constraint	*VW leverage constraint*	*VW leverage constraint*	Firm level *Against Management*	Forced CEO turnover	Dividend Payout	Repurchase	Cash holding	R&D Productivity	Tobin's *q*
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
VW leverage constraint				0.118**	0.012	-0.006***	-0.007***	0.038***	0.020***	0.620***
				(2.12)	(0.47)	(-8.10)	(-5.66)	(3.94)	(2.58)	(6.22)
Ratio_firesale	0.732***	0.845***	1.522***							
	(36.74)	(9.72)	(40.27)							
Firm characterstics										
Institutional ownership	0.004	0.000		0.035		-0.001***	0.005***	0.005*	0.013***	0.062*
	(0.72)	(0.02)		(1.55)		(-4.43)	(8.87)	(1.79)	(3.17)	(1.95)
Tangibility	0.007	0.008	-0.019	-0.005	0.026	-0.001***	0.004***	-0.256***	-0.057***	-0.375***
	(0.78)	(0.76)	(-1.25)	(-0.12)	(1.06)	(-2.63)	(4.02)	(-37.56)	(-4.01)	(-6.11)
Ln(1+asset)	-0.014***	-0.020***	-0.011***	-0.024***	-0.007	0.000***	0.000***	-0.029***	0.002*	-0.495***
	(-10.22)	(-10.60)	(-5.50)	(-3.15)	(-1.56)	(5.32)	(2.77)	(-26.94)	(1.87)	(-42.61)
Roa	-0.004	-0.011	-0.054**	0.016	-0.104**	0.004***	0.011***	-0.008*	0.033***	0.443***
	(-0.72)	(-1.41)	(-2.51)	(0.45)	(-2.40)	(7.98)	(7.45)	(-1.91)	(3.48)	(6.54)
Free cash flow	0.001***	0.011*	0.043**	0.029	0.077**	-0.000	0.000	-0.005***	0.001	-0.039***
	(3.11)	(1.72)	(2.17)	(0.97)	(2.04)	(-1.21)	(0.04)	(-7.86)	(0.21)	(-3.45)
Book-to-market	-0.009***	0.011***	-0.005***	0.024***	0.001	-0.002***	-0.001***	-0.005***	0.000	-0.337***
	(-5.86)	(5.96)	(-4.92)	(3.20)	(0.54)	(-23.41)	(-7.85)	(-6.70)	(0.28)	(-43.57)
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Controls the same as	Table 2	Table 4	Table 6	Table 4	Table 6			Table 7	Table 2	Table 8
Observations	107,012	13,208	14,216	13,208	14,216	107,012	107,012	107,012	32,254	107,012
R-squared	0.500	0.660	0.524	0.196	0.011	0.050	0.058	0.082	0.056	0.123

Internet Appendix

Table IA-1: Interactions with Slopes of Security Market Line

This table presents estimates of interaction analysis. The sample period is from 1982 to 2016. The sample size differs across regressions depending on the variables available in the various data sources. In panel A, we add the interaction between *(fund) VW leverage constraint* and the median of excess market line slope in Panel A and change in excess market line slope in Panel B. Firm fixed effects and year fixed effects are included in all regressions. We control for all control variables in the previous tables. For brevity, we only report the coefficient estimates of *(fund) VW leverage constraint*, interaction term and Excess slope (Change of Excess slope). Industries are classified using the two-digit SIC. All independent variables are lagged one year. The Appendix provides detailed variable descriptions. We report *t*-statistics in the parentheses below coefficient estimates, and statistical significance at the 1%, 5%, and 10% levels is indicated by ***, ** and *, respectively.

Panel A: Interaction of (*fund*)*VW leverage constraint* and Excess Slope

	Portfolio Concentration	Voting Against	Forced	Dividend Payout	Repurchase	Cash	Effectiveness of R&D	Tobin's q
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
(fund)VW leverage constraint	0.005***	0.118***	0.026**	-0.001***	-0.004***	0.028***	0.023***	0.236***
	(4.75)	(5.02)	(2.07)	(-4.79)	(-9.45)	(8.45)	(4.31)	(5.82)
Interaction	-0.132***	-0.462*	0.260	0.000	0.046***	-0.317***	-0.168**	1.173
	(-3.68)	(-1.68)	(0.85)	(0.01)	(3.83)	(-4.43)	(-2.21)	(1.40)
Excess slope	-0.329***	0.123***	-0.259	-0.030	-0.238***	-0.372*	-41.345***	15.295***
	(-9.54)	(3.96)	(-0.89)	(-1.04)	(-6.47)	(-1.95)	(-12.14)	(7.69)
Other controls	Table II Col(2)	Table III Panel B Col(3)	Table V Col(3)	Table VI Col(1)	Table VI Col(3)	Table VII Col(3)	Table IX Col(3)	Table X Col(3)
Observations	115,468	1,169,831	14,216	107,012	107,012	107,012	32,254	107,012
R-squared	0.007	0.369	0.010	0.044	0.052	0.081	0.042	0.128

Table IA-1 Continued

Panel B: Interaction of (*fund*)*VW leverage constraint* and Change of Excess Slope

	Portfolio Concentration	Voting Against	Forced	Dividend Payout	Repurchase	Cash	Effectiveness of R&D	Tobin's q
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
(fund)VW leverage constraint	0.006***	0.118***	0.021*	-0.002***	-0.004***	0.027***	0.0231***	0.100***
	(5.19)	(5.11)	(1.69)	(-5.95)	(-8.67)	(8.07)	(4.31)	(3.20)
Interaction	-0.175***	-0.467*	-0.037	-0.000	0.045***	-0.235***	-0.071*	-0.757**
	(-4.67)	(-1.87)	(-0.21)	(-0.01)	(5.85)	(-4.94)	(-1.65)	(-2.02)
Change of Excess slope	0.087***	0.037*	-0.707	0.012	0.182***	0.333**	-4.373***	-9.167***
	(7.64)	(1.67)	(-0.88)	(1.07)	(6.25)	(2.21)	(-12.06)	(-7.48)
Other controls	Table II Col(2)	Table III Panel B Col(3)	Table V Col(3)	Table VI Col(1)	Table VI Col(3)	Table VII Col(3)	Table IX Col(3)	Table X Col(3)
Observations	115,468	1,169,831	14,216	107,012	107,012	107,012	32,254	107,012
R-squared	0.006	0.369	0.010	0.045	0.052	0.081	0.057	0.130

Table IA-2: Alternative Measures of Investor Leverage Constraints

This table presents estimates of alternative measure of investor financial constrain. In Panel A, we estimate $R_{i,\tau} = \alpha_{i,t} + \beta^{MKT}_{i,t} R_{MKT,\tau} + \beta^{HML}_{i,t} R_{HML,\tau} + \beta^{SMB}_{i,t} R_{SMB,\tau} + \beta^{UMD}_{i,t} R_{UMD,\tau} + \beta^{NBAB}_{i,t} NBAB_{\tau} + \varepsilon_{i,\tau}$. $\tau \in \{t\text{-}23, t\}$.The four factors are market (MKT), value (HML), size (SMB), momentum (UMD). We then use the $\beta^{NBAB}_{i,t}$ and aggregate it at fund level or firm level as our alternative measure. In Panel B, we use abnormal fund beta, which is the value weighted fund portfolio beta minus the market LCT. We estimate the market LCT using the value-weighted average beta of the aggregate stock holdings of all actively managed equity funds, following (Boguth and Simutin, 2017). We then aggregate the abnormal fund beta at the fund level or firm level as our alternative measure. In Panel C, we estimate $R_{i,\tau} = \alpha_{i,t} + \beta^{MKT}_{i,t} R_{MKT,\tau} + \beta^{LCT}_{i,t} \Delta LCT_{\tau} + \varepsilon_{i,\tau}$. $\tau \in \{t\text{-}23, t\}$, where $R_{i,\tau}$ and $R_{MKT,\tau}$ are the excess returns of fund i and the market in month τ. $\Delta LCT\tau$ is the innovation in leverage constraint tightness. We estimate the market LCT using the value-weighted average beta of the aggregate stock holdings of all actively managed equity funds, following (Boguth and Simutin, 2017). We then use $\beta^{LCT}_{i,t}$ and aggregate it at fund level or firm level as our alternative measure. The sample period is from 1982 to 2016. Firm fixed effects and year fixed effects are included in all regressions. We control for all control variables in the previous tables. For brevity, we only report the control variables the same as Table 2. Industries are classified using the two-digit SIC. All independent variables are lagged one year. The Appendix provides detailed variable descriptions. We report *t*-statistics in the parentheses below coefficient estimates, and statistical significance at the 1%, 5%, and 10% levels is indicated by ***, ** and *, respectively.

Panel A: Using 4-Factor Model for Leverage Constraint

	Portfolio Concentration	Voting Against	Forced	Dividend Payout	Repurchase	Cash	R&D Effectiveness	Tobin's *q*
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
VW leverage constraint	0.005***	0.115***	0.038*	-0.002***	-0.002***	0.027***	0.015*	0.199***
	(4.84)	(5.00)	(1.78)	(-5.42)	(-3.33)	(6.53)	(1.90)	(3.80)
Fund Characteristics								
Ln(1+fund asset)	0.002***	0.069*						
	(3.20)	(1.87)						
Fund return	-0.019***	-0.247***						
	(-4.40)	(-3.58)						
Fund turnover	-0.028***	-0.044						
	(-8.32)	(-1.35)						
Firm Characteristics								
Institutional ownership				-0.001**	0.005***	0.015***	0.009	0.143***
				(-2.24)	(7.46)	(3.47)	(1.25)	(3.33)
Tangibility			0.029	0.000	0.002*	-0.244***	-0.059***	-0.167**
			(1.19)	(0.08)	(1.83)	(-24.62)	(-3.28)	(-2.01)
Ln(1+asset)			-0.005	0.001***	0.001***	-0.029***	0.006***	-0.445***
			(-1.22)	(4.04)	(3.09)	(-16.75)	(2.79)	(-25.58)
Roa			-0.105**	0.003***	0.008***	-0.015***	0.027**	0.315***
			(-2.12)	(6.63)	(7.43)	(-2.72)	(2.10)	(4.35)
Free cash flow			0.078*	-0.000	-0.000	-0.004***	0.002	-0.042***
			(1.82)	(-1.11)	(-0.67)	(-5.06)	(0.30)	(-3.95)
Book-to-market			0.001	-0.002***	-0.001***	-0.004***	-0.000	-0.358***
			(0.44)	(-16.16)	(-7.51)	(-3.66)	(-0.04)	(-33.78)
Book leverage			0.021	-0.006***	-0.000	-0.095***	-0.032***	-0.344***
			(1.21)	(-11.06)	(-0.32)	(-15.31)	(-3.58)	(-6.28)
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Fund fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	115,468	1,411,081	14,216	107,012	107,012	107,012	32,254	107,012
R-squared	0.005	0.366	0.010	0.050	0.052	0.079	0.046	0.127

Table IA-2 Continued

Panel B: Using Fund Abnormal Portfolio Beta for Leverage Constraint

	Portfolio Concentration	Voting Against	Forced	Dividend Payout	Repurchase	Cash	R&D Effectiveness	Tobin's *q*
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
VW leverage constraint	0.000	0.033**	0.002	-0.003***	-0.008***	0.026***	0.013***	0.330***
	(0.95)	(2.24)	(0.17)	(-13.15)	(-18.54)	(8.58)	(3.20)	(11.08)
Fund Characteristics								
Ln(1+fund asset)	-0.003	0.095**						
	(-0.45)	(2.49)						
Fund return	0.100***	-0.252***						
	(5.23)	(-3.73)						
Fund turnover	0.155***	-0.051						
	(5.30)	(-1.50)						
Firm Characteristics								
Institutional ownership				-0.001*	0.005***	0.014***	0.008	0.127***
				(-1.84)	(8.14)	(3.18)	(1.07)	(3.00)
Tangibility			0.026	-0.000	0.001	-0.243***	-0.058***	-0.138*
			(1.10)	(-0.24)	(1.27)	(-24.45)	(-3.23)	(-1.67)
Ln(1+asset)			-0.006	0.000***	0.000**	-0.028***	0.006***	-0.438***
			(-1.33)	(3.57)	(2.32)	(-16.50)	(2.95)	(-25.52)
Roa			-0.102**	0.003***	0.008***	-0.016***	0.026**	0.305***
			(-2.06)	(6.80)	(7.57)	(-2.84)	(2.02)	(4.23)
Free cash flow			0.076*	-0.000	-0.000	-0.004***	0.002	-0.042***
			(1.78)	(-1.14)	(-0.84)	(-4.95)	(0.36)	(-3.94)
Book-to-market			0.001	-0.002***	-0.001***	-0.003***	0.000	-0.347***
			(0.52)	(-17.05)	(-9.46)	(-3.03)	(0.20)	(-33.06)
Book leverage			0.020	-0.006***	-0.001	-0.094***	-0.032***	-0.323***
			(1.11)	(-11.41)	(-0.76)	(-15.11)	(-3.54)	(-5.91)
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Fund fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	115,468	1,411,081	14,216	107,012	107,012	107,012	32,254	107,012
R-squared	0.299	0.366	0.010	0.054	0.059	0.080	0.046	0.130

Table IA-2 Continued

Panel C: Using Loading on LCT for Leverage Constraint

	Portfolio Concentration	Voting Against	Forced	Dividend Payout	Repurchase	Cash	R&D Effectiveness	Tobin's *q*
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
VW leverage constraint	0.000*	0.017	0.072**	-0.000***	-0.001***	0.058***	0.002**	0.661***
	(1.03)	(0.51)	(2.00)	(-9.90)	(-11.93)	(5.36)	(2.02)	(5.06)
Fund Characteristics								
Ln(1+fund asset)	0.005	0.087**						
	(0.73)	(2.29)						
Fund return	0.091***	-0.365***						
	(4.00)	(-5.17)						
Fund turnover	0.138***	-0.049						
	(4.57)	(-1.48)						
Firm Characteristics								
Institutional ownership				-0.001	0.005***	0.015***	0.008	0.489***
				(-1.55)	(8.54)	(3.40)	(1.17)	(10.86)
Tangibility			0.027	0.000	0.002*	-0.245***	-0.059***	-0.414***
			(1.13)	(0.14)	(1.85)	(-24.65)	(-3.26)	(-4.73)
Ln(1+asset)			-0.007	0.001***	0.001***	-0.029***	0.006***	-0.364***
			(-1.49)	(3.87)	(3.07)	(-16.86)	(2.69)	(-20.60)
Roa			-0.103**	0.003***	0.008***	-0.015***	0.027**	0.510***
			(-2.08)	(6.86)	(7.48)	(-2.67)	(2.09)	(4.16)
Free cash flow			0.077*	-0.000	-0.000	-0.004***	0.001	-0.066***
			(1.81)	(-1.15)	(-0.90)	(-4.94)	(0.26)	(-3.26)
Book-to-market			0.001	-0.002***	-0.001***	-0.004***	0.001	-0.728***
			(0.56)	(-16.60)	(-8.21)	(-3.73)	(0.47)	(-42.30)
Book leverage			0.021	-0.006***	0.000	-0.095***	-0.035***	-0.510***
			(1.15)	(-10.93)	(0.06)	(-15.28)	(-3.86)	(-8.79)
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Fund fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	115,468	1,411,081	14,216	107,012	107,012	107,012	32,241	107,012
R-squared	0.076	0.373	0.010	0.052	0.053	0.080	0.041	0.184