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Where Do Institutional Investors Seek Shelter when Disaster Strikes? Evidence from COVID-19

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Keywords: Cash holdings, Coronavirus, Corporate debt, COVID-19, ESG, Event study, Financial crisis, Institutional ownership, Leverage, Pandemic, Retail investors, Robinhood, SARS-CoV-2, Tail risk

JEL Classifications: G01, G12, G14, G32, F14

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Where do institutional investors seek shelter when disaster strikes?

Evidence from COVID-19*

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Comments welcome

Abstract

Institutional investors played a crucial role in the COVID-19 market crash. U.S. stocks with higher institutional ownership -- in particular, those held more by active, short-term, and domestic institutions -- performed worse. An analysis of changes in holdings through the first quarter of 2020 reveals that mutual funds, investment advisors, and pension funds favored stocks with strong financials (low debt and high cash), whereas hedge funds sold stocks indiscriminately. None of these institutional investor groups appear to have actively tilted their portfolios toward firms with better environmental and social performance. Data from a large discount brokerage indicate that retail investors acted as liquidity providers. Overall, the results suggest that when a tail risk realizes, institutional investors express a preference for ''hard'' measures of firm resilience.

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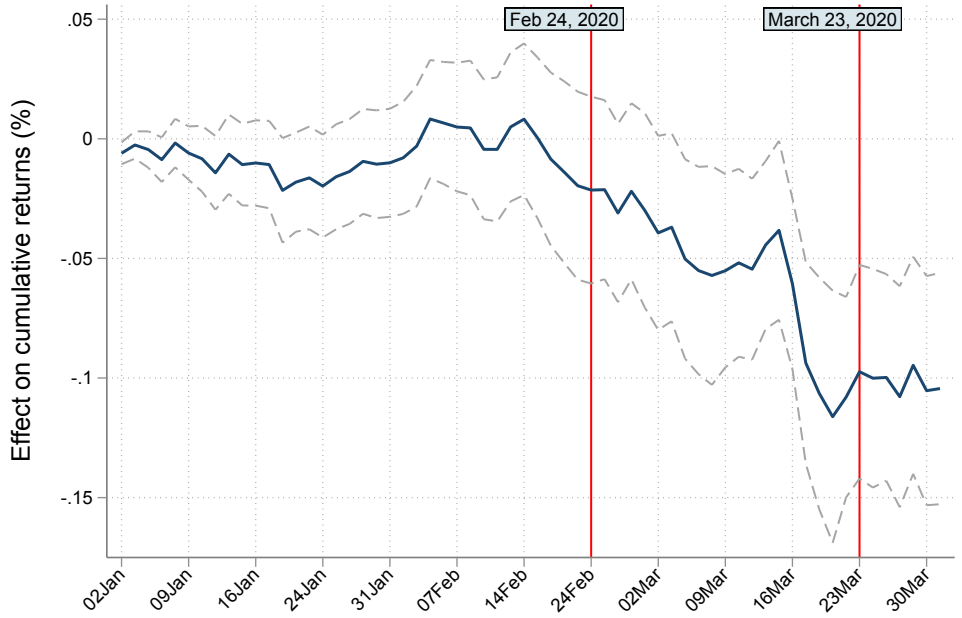
1 Introduction

This paper examines the novel coronavirus (COVID-19) pandemic to learn about the behavior of investors when a tail risk event realizes. As a motivation, consider Figure 1 which shows that the collapse of U.S. stock prices over the *Fever* period (Ramelli and Wagner, 2020) was associated with the level of institutional ownership.[1] Did this occur because all institutional investors ran for the exits indiscriminately? Or did different types of institutions favor or shun certain types of stocks? And what about individual investors?

Figure 1: Stock prices and institutional ownership
This graph shows the evolution of the coefficients on IO_{2019Q4} in regressions with the cumulative returns of Russell 3000 non-financial stocks from January 2, 2020 each day through March 31, 2020 as the dependent variable. IO_{2019Q4} is the percentage of a stock's outstanding shares owned by institutional shareholders at the end of the fourth quarter 2019. The regressions control for firm characteristics (Cash/assets, Leverage, Market beta, log(Market cap), Profitability, and Book-to-market) and industry fixed effects. The red vertical lines mark, respectively, the beginning of the *Fever* period (from February 24 through March 20), and the announcement of the Fed interventions (on March 23). The dashed lines indicate 90% confidence intervals based on robust standard errors.



[1] These results also hold for international stocks. See Online Appendix Figure OA1.

We examine the behavior of institutional investors as these have become the dominant players in the U.S. stock market (French, 2008), with institutional ownership (IO) rising from below 40% in 1980 to over 75% nowadays. Given their scale and professional resources, IO has been shown to make stock prices more informative in recent decades (Bai et al., 2016). However, Stein (2009) points out that, in periods of crises, institutions could all be entering the same trades and deleveraging at the same time, creating a fire-sales externality that further exacerbates a crash. The role of hedge funds in particular came under scrutiny in the Global Financial Crisis (GFC) (Ben-David et al., 2012).

The COVID-19 pandemic, a truly exogenous shock, offers a powerful setting to study the behavior and preferences of institutional investors. In fact, few firms had identified pandemics as a material risk (Loughran and McDonald, 2020). It is, therefore, unlikely that institutional investors were able to pre-position themselves by avoiding stocks that would be hit hardest by the the COVID-19 economic contraction. In the early phases of the outbreak, even after human-to-human transmission of the novel coronavirus was confirmed (on January 20), Figure 1 shows that institutional ownership was not significantly associated with stock returns. However, after European countries and then the U.S. introduced lockdowns and businesses were affected, stock prices experienced a historically fast and furious decline.[2]

Against this background, this paper provides insights on several questions: First, was IO associated with the COVID-19 crash and how did this vary across types of firms and institutions? Second, how did institutional investors change their portfolios from the end of 2019 to the end of the first quarter of 2020?[3] Third, in the COVID-19 crash companies

[2]On Sunday February 23, Italy initiated the first major intervention and the World Health Organization characterized COVID-19 as a pandemic on March 11. A current situation overview can be found here: `https://ourworldindata.org/coronavirus`.

[3]IO holdings are disclosed on a quarterly basis via 13-F form filings. This timing aligns well with the

with strong financials (high cash holdings, low leverage) fared relatively better (Ramelli and Wagner, 2020; Fahlenbrach et al., 2020) as did firms with strong environmental and social (ES) performance (Albuquerque et al., 2020; Garel and Petit-Romec, 2020).[4] Which of these firm resiliency characteristics -- the hard, or the soft -- did institutional investors care most about? Fourth, did retail investor interest for individual stocks mirror IO changes? Fifth, did different types of institutional investors (hedge funds, pension funds, and investment advisors) behave differently?

We begin by regressing the cumulative stock returns over the *Fever* period on firm characteristics and IO as of year-end 2019 for U.S. non-financial firms that were part of the Russell 3000 index. We show that the stock price performance during the *Fever* period is negatively related to the firm's IO ratio, net of the effects of cash, leverage, ES performance and other firm and industry characteristics.

We then examine this association in more detail, exploring several dimensions of investor heterogeneity. First, controlling for overall institutional ownership, stocks held more by passive investors performed relatively better. These results on passive investors are particularly intriguing as some policy makers had expressed concerns that the secular shift from active to passive could destabilize markets (Anadu et al., 2018; Sushko and Turner, 2018). A second result we uncover is that stocks held by long-term investors also performed relatively better.

timing of the pandemic. The first report of cases of pneumonia detected in Wuhan, China, was issued to the WHO on December 31, 2019. Conversely, the end of the first quarter is a plausible time to assess IO holdings. Specifically, after the wild market swings in the middle of March 2020, two major policy interventions occurred (the Fed's March 23 announcement to intervene in the corporate bond market and the passage of the CARES Act on March 27). At least temporarily, COVID-19 lockdown policies and social distancing appeared to work, and April to June saw a strong uptick in the stock market. In work in progress, we are analyzing the behavior and impact of institutional owners in the second quarter of 2020.

[4]In related evidence on ESG performance during the COVID-19 crash, Pástor and Vorsatz (2020) find that mutual funds with higher sustainability ratings performed better and continued to attract higher inflows.

This result is in line with the findings of Cella et al. (2013) for prior periods of market turmoil. Finally, the stock price drop was more pronounced for firms held by local U.S. (rather than foreign) institutions.

Second, our main results concern the changes in institutional ownership over the first quarter of 2020. The firm-level IO changes from the end of 2019-Q4 to the end of 2020-Q1 are more pronounced and skewed in the negative direction when compared to the changes in IO over the prior quarters from 2019-Q3 to 2019-Q4, which are more normally distributed. This is indicative of the unusual selling activity by institutions with the outbreak of the pandemic. Moreover, we find that these changes are more pronounced for non-S&P500 companies than for S&P500 constituent stocks; and they are more prominent for active institutional investors than for passive investors.

Third, we examine if selling was indiscriminate or if institutions expressed preferences that can help explain the cross-sectional patterns in the stock price drops exhibited by different types of firms during the *Fever* period. We find that IO fell more in highly levered firms and in firms with less cash, suggesting that institutions were the marginal investors setting the stock prices of firms that were more resilient. Interestingly, IO changes are not associated with the ES performance of companies. We conclude that institutional investors expressed a preference for financial resiliency but not for ES during the COVID-19 crash. Placebo checks suggest that the IO changes correlated with firm characteristics are likely due to active portfolio trading decisions by institutional investors.

Fourth, the aggregate selling by institutions implies that other groups of investors took the opposite side of those trades. Retail investors are a candidate group. Indeed, retail investor engagement, while unobserved, is often approximated by taking 100% minus IO (Koijen

et al., 2020). To probe how plausible it is that retail investors were providing liquidity where institutions wished to exit, we utilize a newly available proxy: the changes in popularity of individual stocks on the retail trading platform Robinhood Markets Inc. (RH). This commission-free trading app had more than 10 million users as of year-end 2019 and received substantial news coverage especially during the COVID-19 crisis.[5] We find that the change in the number of RH investors in individual stocks over the first quarter of 2020 exhibited opposite patterns to the changes in institutional ownership. In particular, in March 2020, retail interest substantially increased for stocks with high leverage and low cash holdings.

We conclude, fifth, by examining the portfolio changes by different types of institutions. Hedge funds received particular attention in the GFC (Ben-David et al., 2012) and are typically categorized as sophisticated arbitragers (Stein, 2009). Our analysis for the COVID-19 crash shows that changes in hedge fund holdings are not explained by a firm's leverage, cash, or ES position. Presumably these investors -- in the attempt to deleverage -- engaged in indiscriminate selling of stocks.[6] By contrast, investment companies and investment advisors delevered by rebalancing their portfolio away from stocks of companies with high leverage. We find a positive relation between a firm's financial strength and the change in holdings by these investors. Finally, contrary to what is perhaps the common narrative about social preferences and long-term orientation of pension funds, pension funds actually *decreased* their holdings of firms with strong ES scores.

Overall, the results suggest that when a tail risk occurs hard measures of firm resilience (cash and low leverage) are more important to institutional investors than soft measures

[5]Wall Street Journal, ''Free Trading Couldn't Have Come at a Worse Time'' (March 13, 2020), Wall Street Journal, ''Coronavirus Turmoil, Free Trades Draw Newbies Into Stock Market'' (April 29, 2020), Financial Times, ''Gamified Investing Leaves Millennials Playing with Fire'' (May 6, 2020).

[6]Schrimpf et al. (2020) argue that hedge funds massively sold even high-quality Treasury bonds.

(ES). The stock price premium associated with a company's the financial strength (but not the premium associated with the ES score of a company) appear to be driven by a demand pressure by institutional investors beyond what is reflected in prices.

Our paper relates to three major strands of literature. First, it contributes to the understanding of institutional investors' behavior during fire sale events. Gabaix et al. (2006) present a model in which institutional investors increase market volatility, and Coval and Stafford (2007) show that common ownership by institutional investors increases the downward pressure on stock prices during asset fire sales. Institutional investors also face the risk of having to respond to massive redemptions (Chernenko and Sunderam, 2020; Simutin, 2014). Cella et al. (2013) show that during the GFC, stocks held by more short-term investors performed worse. Firms with high institutional ownership are ''financially fragile'' being susceptible to non-fundamental shifts in demand (Greenwood and Thesmar, 2011). Barrot et al. (2016) show that individual investors provide liquidity to the stock market in case of fire sales by institutional investors (and are compensated for doing so). Our results suggest that institutional ownership indeed exacerbated the effects of the COVID-19 market crash and that, conversely, individual investors served as liquidity providers.

Second, our paper contributes to the emerging literature studying how heterogeneous preferences across investors and changes in portfolio holdings influence market valuations (Koijen and Yogo, 2019; Koijen et al., 2020).[7] We uncover a great deal of heterogeneity in the reactions to COVID-19 among different types of institutional investors. Importantly, we are able to complement the analysis of IO behavior with an analysis of retail investor

[7]Koijen and Yogo (2019) develop a demand system approach to asset pricing, relaxing the traditional assumption of atomistic investors with homogeneous preferences, fully reflected in asset prices. Using this approach, Koijen et al. (2020) analyze institutional investor holdings to estimate the demand of investors for various firm characteristics and understand their relative influence in the price formation process.

behavior, further elucidating the lines of heterogeneity among investors.[8]

Third, our research contributes to a rapidly emerging literature that has investigated determinants of investor reactions to COVID-19.[9] There are only few studies that examine the role of institutional ownership in the COVID-19 crisis. In an international sample, Ding et al. (2020) find that in weeks when the number of cases goes up, firms fall by less on average in firms with nonfinancial corporate blockholders and fall more for firms with higher hedge fund ownership. Garel and Petit-Romec (2020) find that the relative outperformance of firms with greater environmental scores occurs in firms with higher ownership by investors with long-term orientation. For Japanese firms, Takahashi and Yamada (2020) find that ownership by traditional business groups (by foreign investors) is positively (negatively) associated with abnormal returns. So far, no study exists on the important question of which institutional shareholders moved out of or into which stocks. Indeed, this question could not be answered until institutions filings of their end-of-first-quarter 2020 holdings became public. We provide the first evidence on what institutional investors cared for in this tail risk event.

[8]To the best of our knowledge, ours is the first study to analyze the RH retail investor behavior data in a crisis. Blanchett et al. (2020) examine the likelihood of changes to investments by 401(k) plan participants and Giglio et al. (2020) study the sentiment of Vanguard clients. Ortmann et al. (2020) show that U.K. retail investors significantly increased their trading activities as COVID-19 unfolded, but they do not investigate which stocks investors flocked to. Other studies have considered other types of owners. Amore et al. (2020) find that firms with controlling family shareholders fared better in the crisis. Anginer et al. (2020) show that insiders bought own shares in high-leverage and value firms, providing also liquidity to institutions.

[9]Ramelli and Wagner (2020) analyze variation across industries, and the pricing of international exposure, cash, and leverage over time. Fahlenbrach et al. (2020), too, analyze financial flexibility of firms. Albuquerque et al. (2020) and Garel and Petit-Romec (2020) document that firms with high ES ratings fared better. Pagano et al. (2020) find that firms in industries less affected by social distancing outperformed. Alfaro et al. (2020) show that stock returns respond to daily *unanticipated* changes in COVID-19 cases. Studies on international stock price reactions include Ding et al. (2020), Gerding et al. (2020), and Ru et al. (2020).

2 Data

Our main sample consists of non-financial constituents of the Russell 3000 index as of the end of 2019-Q4. Table A1 in the Appendix provides detailed variable definitions.

2.1 Institutional and retail investor data

We retrieve firms' institutional ownership data from 2018-Q4 through 2020-Q1 from Factset (Ferreira and Matos, 2008). IO_{2019Q4} and IO_{2020Q1} are the percentage of a stock's outstanding shares held by institutional investors derived from 13-F form filings as of quarter-end 2019-Q4 and 2020-Q1, respectively. In line with common practice in the literature, we truncate institutional ownership at 100% (Gompers and Metrick, 2001). We compute Δ *IO 2020Q1* as the change in institutional ownership from 2019-Q4 to 2020-Q1, trimmed at the 1% and 99% percentiles to control for extreme values.

Since we are interested in examining investor heterogeneity, we consider different institutional investor types (their horizon, activeness, and origin). *IO Long-term* is the percentage of a stock's outstanding shares held by long-term investors, which are investors classified as having ''very low'' or ''low'' turnover. The turnover measure is calculated by Factset based on the transactions and market value of an investor, in the spirit of Gaspar et al. (2005). *IO Passive* is ownership held by passive investors (index funds and ETFs). *IO Foreign* is ownership held by non-domestic investors (Ferreira and Matos, 2008).

While our main focus is on institutional investors, we also consider the trading behavior of retail investors to better understand who is on the opposite side of institutional investor trades. While retail investor holdings are usually estimated as 100% minus IO holdings, there

are also other groups of shareholders (ex: insiders and control shareholders). There are no detailed holdings data for small retail investors which are not subject to a regulatory filing requirement like the 13-F form for institutional investors. A newly available data source, however, provides some potentially interesting insight into retail investor behavior.

Specifically, as a proxy for retail interest in a stock, we utilize data from Robinhood Markets Inc. (RH).[10] RH was the first brokerage with zero-commission trades and over 10 million users traded on this electronic platform at the end of 2019.[11] Robinhood investors tend to be young (median age of 30) and have between US$ 1,000-5,000 in their brokerage account. Thus, it is clear that individuals trading on this platform are not fully representative of US retail investors, but they represent a large fraction of active individual investors. For simplicity, we refer to the individuals with RH accounts as ''retail investors''. While data on amounts invested in individual stocks are not available, RH does provide data on the number of accounts that hold a given stock in real-time.[12] We compute the variable *%Δ log(RHusers) 2020Q1* as the percentage change of log Robinhood users invested in a given stock between December 31, 2019, and March 31, 2020. In additional analysis, we also consider the daily changes in RH users.

[10]We believe that this is the first systematic analysis of RH investor behavior in the crisis. Moss et al. (2020) were the first to utilize these data in their study on how retail investors respond to ESG disclosures between June 2018 and December 2019.

[11]This falls short of Charles Schwab's 12 million, but substantially exceeds E-Trade's 5 million and Morgan Stanley's 3 million accounts (Tech Crunch, ''As Morgan Stanley buys E-Trade, Robinhood preps social trading'', February 20, 2020).

[12]These data are compiled by Robintrack. https://robintrack.net/data-download

2.2 Stock returns, accounting information, and environmental and social performance

Firms' stock returns and accounting data are from Compustat Capital IQ's North America Daily database. Our stock return data cover the period between Monday February 24 and Friday March 20, 2020, which we label as the *Fever* period following Ramelli and Wagner (2020).[13] February 24 is a natural starting point for that period as on Sunday February 23, the first major intervention in a Western economy occurred as Italy placed almost 50,000 people under strict lockdown not far from the country's main economic center of Milan. March 20 is a natural end point, because on March 23 the Federal Reserve Board announced major interventions in the corporate bond market. The cumulative return in *Fever* is computed by compounding the daily returns (adjusted for dividends and stock splits) over this period. *Market beta* is computed based on regressions of daily excess returns in 2019 on a constant and the daily market factor.[14]

Accounting data refers to the latest 2019 quarterly results referring to periods ending before January 1, 2020, although we retrieve information also for previous quarters.[15] Appendix Table A1 provides detailed definitions of our variables of interest (*Cash/assets*, *Leverage*) and control variables (*log(Market cap)*, *Profitability*, *Book-to-market*).

We obtain information on firms' environmental and social performance from two distinct

[13]Gormsen and Koijen (2020) use a similar timeline.

[14]For robustness checks, we also compute capital asset pricing model (CAPM)-adjusted returns (CAPM alphas) as the daily excess return on the stock minus the stock's beta times the market excess return. Similarly, we compute Fama-French-adjusted returns as the daily excess return on the stock minus its factor exposures times the factor returns, where the factor exposures are computed on daily market excess return, size, and value factor returns (obtained from Kenneth French's website) throughout 2019.

[15]All firm-level variables in our analyses are, therefore, predetermined for stock returns. A robustness check shows that our results remain unchanged when using accounting data not only *referring* to periods ending before January 1, 2020, but also *reported* before that date.

sources. First, we employ MSCI's Intangible Value Assessment (IVA) database, which has been used in several academic studies (e.g., Liang and Renneboog, 2017). We define the variable *ES (msci)* as the average of the MSCI IVA's scores on the environmental and the social pillar in 2018 so it precedes our period of analysis. For robustness, we alternatively employ the environmental and social scores from Thomson Reuters Refinitiv (Asset 4), used by Albuquerque et al. (2020) in the context of COVID-19. We define the variable *ES (asset4)* as the average of the Thomson Reuters Refinitiv's scores on the environmental and the social pillars. Regressions employing either of these two ES scores have fewer observations, but still good coverage overall.

2.3 Descriptive statistics

Table 1 provides descriptive statistics for our full sample. The average firm in our sample has cumulative returns in the *Fever* period of −39%, a market capitalization of US$ 2,241 million, and an institutional ownership of 80% as of quarter-end 2019-Q4. With respect to the different institution types, we find that, on average, passive ownership is 21%, long-term ownership is 64%, and foreign ownership is 11%. We further notice that the average firm is held by 3,500 users of the Robinhood retail trading platform, with large variation across firms.

Table 1 about here

3 Stock prices and institutional ownership

To examine the stock price effects of institutional ownership characteristics, we regress the cumulative stock returns over the *Fever* period (from February 24, 2020 through March 20, 2020) on institutional ownership and firm characteristics as of year-end 2019. We control for *Leverage*, *Cash/assets*, *Market beta*, *log(Market cap)*, *Profitability*, *Book-to-market*, and *ES (msci)*. We also include industry fixed effects. Table 2 presents the results for the Russell 3000 sample (in Panel A), and Figure 2 illustrates the same results through a binned scatter plot.[16]

Table 2 about here

Figure 2 about here

Column (1) of Panel A in Table 2 shows that firms with higher institutional ownership at the end of the year 2019 experienced significantly worse stock price drops during the *Fever* period. Economically, a one standard deviation increase in IO_{2019Q4} corresponds to one-tenth lower standard deviation in cumulative *Fever* returns. This effect is sizable and quite similar in magnitude to the effects of one standard deviation differences in *Cash/assets* and *Leverage*, two features that prior literature has identified as key drivers of stock price performance in the COVID-19 crisis. As Figure 1 indicates, a large part of the effect comes from the last week of the Fever period, the time when large stock price drops on the aggregate market occurred.

[16]The figure does not control for industry fixed effects to provide additional information relative to Table 2. However, the figure looks quite similar when including fixed effects.

To examine investor heterogeneity, columns (2) to (4) differentiate between investor activeness, horizon and domicile. Column (2) indicates that a higher percentage of $PassiveIO_{2019Q4}$ is associated with more resilience, suggesting that price changes were caused by trades of active institutional investors. Column (3) indicates that a higher percentage of long-term institutional ownership is associated with relatively better stock price performance. This result on $Long\text{-}termIO_{2019Q4}$ is consistent with Cella et al. (2013) on the amplification of market shocks by short-horizon investors. Column (4) indicates that US stocks with higher foreign IO experienced better stock price performance. This result on $ForeignIO_{2019Q4}$ is in line with Kacperczyk et al. (2018), who argue that foreign ownership increases market liquidity. Ferreira et al. (2018) also suggest that foreign investors (whose location does not coincide with that of the stock holdings) can provide a benefit as they have fewer outflows during market downturns.

In column (5), we add the corporate environmental and social scores to the regression. Firms with higher *ES score (msci)* had a higher stock performance during the *Fever* period.[17] This result is in line with Albuquerque et al. (2020). Their findings are open to different interpretations because ES(G) may be correlated with institutional ownership (Nofsinger et al., 2019) and, ex ante, it is not clear whether firms with larger or smaller institutional ownership do better in the crisis. Our findings show that the positive effect of ES(G) holds even after controlling for differences in ownership structure, and that the impact of IO remains even after controlling for ES scores.

For robustness, we restimate the regressions in Panel A of Table 2 using CAPM-adjusted and FF-adjusted returns instead of raw returns. Online Appendix Table OA2 shows very

[17]Table OA1 displays similar results with *ES score (asset4)*, ES scores from Thomson Reuters Refinitiv.

similar inferences. This is as expected, as institutional ownership has very low correlation with any of the factor loadings.

Panels B and C of Table 2 split the sample into Russell 3000 members that are part of the S&P 500 index and those outside this major stock benchmark. We find that the negative relation between IO_{2019Q4} and COVID-related stock returns has higher statistical significance in Russell 3000 firms outside of the S&P500 index. Consistently, the effects on long-term owners and foreign ownership are also stronger for the non-S&P 500 firms than for the S&P 500 firms.

These baseline results establish institutional ownership as a key explanatory variable for stock returns in the COVID-19 crisis. We consider two different interpretations for the finding of the negative correlation between institutional ownership and stock performance during the *Fever* period. On the one hand, it is possible that the stock price drop was driven by institutional owners in what amounts to a ''fire sale'' (Coval and Stafford, 2007). Under this view, high-IO firms are ''financially fragile'' (Greenwood and Thesmar, 2011) that are susceptible to non-fundamental shifts in demand. Institutional investors also face the risk of having to respond to massive redemptions.[18]

On the other hand, it is also possible that in firms with more institutional owners, the stock price drop was steeper because *other* investors sold more aggressively. To distinguish between these alternative explanations, an analysis of the change in institutional ownership is required. We conduct this analysis in the next section.

[18]For example, Chernenko and Sunderam (2020) analyze the cash holdings of open-end mutual funds. They find that mutual funds with stronger incentives to limit their impact on price accommodate inflows and outflows by adjusting their cash buffers (instead of trading in portfolio securities). As a result, stocks held by these funds have lower volatility. Similar considerations are derived in Simutin (2014) with respect to equity mutual funds.

4 Changes in total institutional ownership and retail investor interest

This section examines more directly whether institutional owners amplified negative stock moves by studying ownership changes in the first quarter of 2020. To provide some descriptive background, Figure 3 plots, in Panel A, IO changes in 2020-Q1 and compares them against IO changes in 2019-Q4. We observe a highly negative skewed distribution of the firm-level changes in IO in 2020-Q1, indicating an overall divestment of institutional investors from stocks. This pattern stands in contrast to the average IO change in the prior quarters of 2019, which exhibits a balanced distribution of buying/selling centered around 0.[19]

In Panel B, Figure 3 compares the distribution of overall IO changes during 2020-Q1 against the distribution of changes in passive IO. As expected, changes in passive IO are less pronounced.[20]

Figure 3 about here

4.1 Drivers of institutional ownership changes

What explains the cross-section of changes in institutional ownership in the COVID-19 crisis? Do institutional investors value hard resiliency characteristics (cash and leverage) beyond what is reflected in market valuations? Do they value soft characteristics (ES performance)?

Table 3 about here

[19]Online Appendix Figure OA2 shows the distributions of the IO changes in each of the four quarters of 2019.

[20]Online Appendix Figure OA3 displays the change in 2020-Q1 broken-down on whether a Russell 3000 firm is in the S&P 500 or not. Interestingly, the changes are more pronounced for the non-S&P 500 firms.

To answer these questions, Panel A of Table 3 regresses the change in IO over the 2020-Q1 quarter (Δ *IO 2020Q1*) on firm characteristics. In column (1), we observe that institutional ownership decreased in high-leverage and low-cash firms, as well as in value and smaller firms. Adding the prior level of IO (IO_{2019Q4}, to control for potential mean reversion effects) changes the coefficients only mildly; see column (2). Firms with one standard deviation higher leverage experienced a 6% of a standard deviation stronger reduction of institutional ownership (-0.009 $\times$ 22.7/3.22).

In column (3), we observe that the stock performance in the *Fever* phase strongly explains the change in institutional ownership in 2020-Q1. Specifically, IO drops more in firms with worse stock price performance (or, equivalently, stock price drops are steeper in firms where IO drops more). This provides support for the notion that the large stock price drops were driven by institutional owners (rather than the alternative that in firms with large institutional ownership other investors sold particularly aggressively).

In column (4), we add firms' ES scores (*ES score (msci)*). Interestingly, institutional investors do not appear to have tilted their portfolios toward firms with higher environmental and social performance. Presumably, the stock-price premium associated with the ES score during the COVID-19 crash is not driven by a demand pressure coming from institutional investors. These results suggest that institutional investors, at least in times of crisis, prefer hard resiliency characteristics over soft ones.[21]

Figure 4 illustrates these results, plotting the relations between the net change in institutional ownership in 2020-Q1 and firm leverage, cash holdings, and environmental and social

[21] When we use ES scores from Thomson Reuters Refinitiv instead, we find that institutional investors tilted their portfolios *against* firms with higher environmental and social performance; see Table OA1.

(ES) scores.[22] In sum, institutional investors reacted to COVID-19 by significantly pulling out from corporations with low ex-ante financial strength.

Figure 4 about here

Note that, in normal times, it is difficult to identify the preferences of institutional investors for firms' financial policies because these policies are endogenously set by corporate managers also considering the level of firms' access to institutional capital on the equity market. As a result, the relation between changes in institutional ownership and financial policy decisions is the result of a mix of both endogenous decisions by corporations and institutional investors' portfolio choices.[23] COVID-19, by contrast, is an exogenous shock that offers a clean opportunity to exploit the portfolio reshuffling by institutional investors to infer their revealed preferences for firm characteristics.

4.2 Retail investors as liquidity providers

If institutions behaved (in aggregate) as net sellers, especially for certain types of stocks, who took the other side of their trades? Did individual investors act as liquidity providers, hence revealing heterogeneous preferences from their institutional counterparts?

Panel B of Table 3 investigates this question by exploiting retail investor interest data from Robinhood. We regress the percentage change in (the log of) Robinhood users in 2020-Q1 on firm characteristics. Effectively showing the flip side of the behavior of institutional investors, retail investors bought high-leverage and low-cash firms and invested particularly

[22]The figures do not control for industry fixed effects to provide additional information relative to Table 3. The figures look quite similar when including fixed effects.

[23]Grennan et al. (2017) empirically investigate the links between institutional ownership and capital structure decisions.

in firms with a worse stock performance. From column (2), a one standard deviation higher leverage led to a 6% of a standard deviation higher increase in popularity among retail investors (-0.042 $\times$22.7/15.14). The one exception is high-ES companies, which also did not generate additional interest from this sample of retail investors.

Panel A of Figure 5 shows that there is a strong negative correlation between the change in IO in a stock and the change in retail investor interest in 2020-Q1. Panel B offers an analysis by industry. Two findings emerge. First, Δ *IO 2020Q1* is negative in each single industry, whereas *%*Δ *log(RHusers) 2020Q1* is positive in each single industry. Second, institutional investors reduced holdings the most in those industries which were most favored by retail investors. Overall, these results are in line with Barrot et al. (2016), who find that retail investors provide liquidity when institutional liquidity providers are constrained.

Figure 5 about here

Figure 6 shows the day-to-day evolution of retail investor interest in cash, leverage, and ES performance during 2020-Q1. Using the high granularity of the Robinhood data, we rerun our baseline regressions in Panel B of Table 3 every day on an increasing time window over which we calculate the percentage change in Robinhood users. We notice that Robinhood users show an increasing interest for low-cash and high-leverage firms after March 11, 2020. Moreover, retail investor interest in firms with high ES scores decreases after March 16, 2020. The changes in retail investor interest align with the institutional-related stock price drop shown in Figure 1, which provides further evidence that retail investors moved into the high-leverage and low-cash stocks that institutional investors were selling during the *Fever* period.

Figure 6 about here

4.3 Placebo tests

Overall, the results shown thus far indicate that (beyond what is reflected in prices) institutional investors fled leverage, exhibited a preference for cash, and showed indifference towards ES scores. In this subsection, we conduct two placebo tests to probe whether this behavior is special to this tail risk phase and a matter of active IO response.

First, in Table 4 in Panel A, we re-estimate the regressions in Table 3 using only the subsample of S&P 500 constituents as of January 2020. Since the S&P 500 is a popular index for indexed funds and ETFs (and many active investors also use it as a benchmark), a large fraction of institutions do not sell these holdings so they can keep tracking its performance. As mentioned by Koijen and Yogo (2019), S&P 500 companies have a large exogenous component in demand, that is, their stock prices are less strongly connected to investors' demand. Therefore, we hypothesize that stocks that are part of the S&P 500 are less likely to experience large changes in institutional ownership, regardless of the fact that their specific characteristics led them to experience lower or higher abnormal returns. Indeed, we find that S&P 500 firms with high leverage and low cash holdings, despite having incurred stock price losses (see Panel B in Table 2), did not experience significant net outflows of institutional investor ownership.

Table 4 about here

Second, in Panel B of Table 4, we focus again on the full Russell 3000 sample, but we look at the change in passive institutional ownership (the percentage of stocks held by institutional

investors that are index funds and ETFs). Given the nature of passive investors, we expect no significant changes in their ownership ratios on the basis of firm characteristics. The results confirm this intuition.

5 Portfolio changes by institutional investor category

In the previous section, we presented evidence that the COVID-19 shock caused major changes in the investor base of firms depending on their financial metrics, with institutional investors exiting high-debt and low-cash firms, and being replaced by non-institutional (individual) investors. We interpret these observed shifts in stock holdings as the result of heterogeneous changes in preferences, which are only partially reflected in market prices.

Institutional investors can change their portfolios -- and, as a result, influence stock market valuations -- in two main ways: By adjusting the total size of their equity portfolio or by changing portfolio weights, i.e., their relative position in each firm. In this section, we examine how different investor types (hedge funds, pension funds, mutual funds, and investment advisors) changed their equity portfolios during 2020-Q1 along these two dimensions.

We first compute how the total equity position of each type of investors changed in 2020-Q1. For this analysis, we compute a measure of *active* change of the equity portfolio, that is, the change that is not due to changes in market valuations of individual stocks. Specifically, we compute this measure as:

$$\Delta Equity\ positions_{i,2020Q1} = \sum_{j \in S} (IO_{i,j,2020Q1} - IO_{i,j,2019Q4}) \times Market\ cap_{j,2019Q4}$$

where S denotes the set of firms in our sample, i denotes the category of institutional investors, $IO_{i,j}$ denotes the percentage of total stocks of firm j held by the investor category i. *Market* $cap_{j,2019q4}$ is the market capitalization of firm j as end of 2019-Q4. In other words, this measure captures how much of the equity positions as of 2019-Q4 changed during 2020-Q1 keeping stock prices constant.

Illustrating the change in equity positions, Figure 7 shows that the behavior of institutional investors during 2020-Q1 is heterogeneous. In particular, hedge funds appear to have divested around USD 100 billion of their equity positions as end of 2019-Q4, equal to approximately 4.4% of their assets under management at that time.[24] Hedge funds divested significantly more in absolute and relative numbers than pension funds, mutual funds, or investment advisors.

Figure 7 about here

Table 5 about here

In Table 5 we study the determinants of the change in stock ownership by the four categories of institutional investors. Columns (1) and (2) show that hedge funds do not appear to have changed their overall exposure to corporate cash and leverage, despite their massive divestment during the first quarter of 2020. Presumably these investors decreased their own leverage by selling ''everything'', perhaps even starting from the most liquid stocks.

Pension funds, often perceived as long-term investors, appear to have exited high-leverage firms (columns (3) and (4)). Interestingly, they appear to have slightly divested from high

[24]This estimation is consistent also with the numbers provided by market participants and investment platforms, see Pension and Investments, ''Hedge fund industry AUM slips below USD 3 trillion'' (April 22, 2020).

ES(G) firms, somehow in contrast with some narratives on the increased importance of ES(G) issues for institutional investors during the COVID crisis.[25]

Mutual funds (columns (5) and (6)) appear to have slightly decreased their overall exposure to highly-leverage firms, though this result is not robust. Indeed, this category of investors includes many passive investors, which by definition do not have incentives to tilt their portfolios away from what is determined by the current market valuations.

Finally, the investment advisor category appears to have strongly discriminated between firms on the basis of their financial positioning (columns (6) and (7)). In conjunction with the stock price effects, this result is consistent with Koijen, Richmond, and Yogo (2020), who show that the asset demand by active investment advisors has a relatively large influence on market valuation relative to other type of institutional investors.

Overall, the results in this section suggest considerable heterogeneity in how different types of institutional investors reacted to the COVID-19 shock, both in terms of total equity position change and in terms of revealed preferences for firm characteristics.

6 Conclusion

In this study we shed light on the first quarter of 2020 to understand the role of institutional investors in the COVID-19 market collapse and, more generally, their preferences for specific firm characteristics. We document that institutions valued financial resiliency (high cash, low leverage) to insure against the indeterminate duration of the cash flow shortfall. We find that active institutional investors were the marginal investors on these firm characteristics,

[25] UN-Backed Principles for Responsible Investment, ''How responsible investors should respond to the COVID-19 coronavirus crisis'' (March 27, 2020).

as their quarterly portfolio changes were associated with cross-sectional patterns in stock returns. Conversely, ''soft'' characteristics such as those captured by ESG scores do not appear to have generated extra interest from institutional investors.

We also provide evidence that retail investors -- at least the ones we capture with the Robinhood trading proxy -- increased their interest in more financially-fragile firms, hence revealing significantly more risk-tolerance than their institutional counterparts in times of crisis.

At the time of writing this paper, the COVID-19 pandemic has not yet been contained and markets are still in flux. U.S. stocks pared back some of the losses in second quarter of 2020, and we are planning to investigate the role of institutional and retail investors in this period as well. COVID-19 is still an active and evolving crisis with many uncertainties (how towering the still-growing first wave in the US will become, whether a fully-fledged second wave of the pandemic will emerge, the time to develop a vaccine, the speed of the post-pandemic economic recovery, etc.). How will institutional and retail investors react and what consequences will their trading have on stock prices? We will continue our research efforts on these questions.

References

Albuquerque, Rui A., Yrjo Koskinen, Shuai Yang, and Chendi Zhang, 2020, Resiliency of environmental and social stocks: An analysis of the exogenous COVID-19 market crash, Working Paper.

Alfaro, Laura, Anusha Chari, Andrew N. Greenland, and Peter K. Schott, 2020, Aggregate and firm-level stock returns during pandemics, in real time, Working Paper.

Amore, Mario Daniele, Valerio Pelucco, and Fabio Quarato, 2020, Family ownership during the COVID-19 pandemic, Working Paper.

Anadu, Kenechukwu E., Mathias S. Kruttli, Patrick E. McCabe, Emilio Osambela, and Chae Hee Shin, 2018, The shift from active to passive investing: Potential risks to financial stability?, Working Paper.

Anginer, Deniz, Anil Donmez, H. Nejat Seyhun, and Ray Zhang, 2020, Global economic impact of COVID-19: Evidence from insider trades, Working Paper.

Bai, Jennie, Thomas Philippon, and Alexi Savov, 2016, Have financial markets become more informative?, *Journal of Financial Economics* 122, 625--654.

Barrot, Jean-Noel, Ron Kaniel, and David Sraer, 2016, Are retail traders compensated for providing liquidity?, *Journal of Financial Economics* 120, 146--168.

Ben-David, Itzhak, Francesco Franzoni, and Rabih Moussawi, 2012, Hedge fund stock trading in the financial crisis of 2007--2009, *Review of Financial Studies* 25, 1--54.

Blanchett, David, Michael S Finke, and Jonathan Reuter, 2020, Portfolio delegation and 401(k) plan participant responses to COVID-19, Working Paper.

Cella, Cristina, Andrew Ellul, and Mariassunta Giannetti, 2013, Investors' horizons and the amplification of market shocks, *The Review of Financial Studies* 26, 1607--1648.

Chernenko, Sergey, and Adi Sunderam, 2020, Do fire sales create externalities?, *Journal of Financial Economics* 135, 602--628.

Coval, Joshua, and Erik Stafford, 2007, Asset fire sales (and purchases) in equity markets, *Journal of Financial Economics* 86, 479--512.

Ding, Wenzhi, Ross Levine, Chen Lin, and Wensi Xie, 2020, Corporate immunity to the COVID-19 pandemic, Working Paper.

Fahlenbrach, Rüdiger, Kevin Rageth, and René M. Stulz, 2020, How valuable is financial flexibility when revenue stops? Evidence from the COVID-19 crisis, Working Paper.

Ferreira, Miguel A, Massimo Massa, and Pedro Matos, 2018, Investor--stock decoupling in mutual funds, *Management Science* 64, 2144--2163.

Ferreira, Miguel A., and Pedro Matos, 2008, The colors of investors' money: The role of institutional investors around the world, *Journal of Financial Economics* 88, 499--533.

French, Kenneth R., 2008, Presidential address: The cost of active investing, *The Journal of Finance* 63, 1537--1573.

Gabaix, Xavier, Parameswaran Gopikrishnan, Vasiliki Plerou, and H Eugene Stanley, 2006, Institutional investors and stock market volatility, *The Quarterly Journal of Economics* 121, 461--504.

Garel, Alexandre, and Arthur Petit-Romec, 2020, Investor rewards to environmental responsibility: Evidence from the COVID-19 crisis, Working Paper.

Gaspar, José-Miguel, Massimo Massa, and Pedro Matos, 2005, Shareholder investment horizons and the market for corporate control, *Journal of Financial Economics* 76, 135--165.

Gerding, Felix, Thorsten Martin, and Florian Nagler, 2020, The value of fiscal capacity in the face of a rare disaster, Working Paper.

Giglio, Stefano, Matteo Maggiori, Johannes Stroebel, and Stephen Utkus, 2020, Inside the mind of a stock market crash, Working Paper.

Gompers, Paul A., and Andrew Metrick, 2001, Institutional investors and equity prices, *The Quarterly Journal of Economics* 116, 229--259.

Gormsen, Niels J., and Ralph S. J. Koijen, 2020, Coronavirus: Impact on stock prices and growth expectations, Working Paper.

Greenwood, Robin, and David Thesmar, 2011, Stock price fragility, *Journal of Financial Economics* 102, 471--490.

Grennan, Jillian, Roni Michaely, and Christopher J. Vincent, 2017, The deleveraging of US firms and institutional investors' role, Working Paper.

Kacperczyk, Marcin, Savitar Sundaresan, and Tianyu Wang, 2018, Do foreign investors improve market efficiency?, Working Paper.

Koijen, Ralph S. J., Robert Richmond, and Motohiro Yogo, 2020, Which investors matter for equity valuations and expected returns?, Working Paper.

Koijen, Ralph S.J., and Motohiro Yogo, 2019, A demand system approach to asset pricing, *Journal of Political Economy* 127, 1475--1515.

Liang, Hao, and Luc Renneboog, 2017, On the foundations of corporate social responsibility, *The Journal of Finance* 72, 853--910.

Loughran, Tim, and Bill McDonald, 2020, Management disclosure of risk factors and COVID-19, Working Paper.

Moss, Austin, James P. Naughton, and Clare Wang, 2020, The Irrelevance of ESG Disclosure to Retail Investors: Evidence from Robinhood, Working Paper.

Nofsinger, John R, Johan Sulaeman, and Abhishek Varma, 2019, Institutional investors and corporate social responsibility, *Journal of Corporate Finance* 58, 700--725.

Ortmann, Regina, Matthias Pelster, and Sascha Tobias Wengerek, 2020, COVID-19 and investor behavior, Working Paper.

Pagano, Marco, Christian Wagner, and Josef Zechner, 2020, Disaster resilience and asset prices, Working Paper.

Pástor, Ľuboš, and M. Blair Vorsatz, 2020, Mutual fund performance and flows during the COVID-19 crisis, Working Paper.

Ramelli, Stefano, and Alexander F. Wagner, 2020, Feverish Stock Price Reactions to COVID-19, *Review of Corporate Finance Studies* forthcoming.

Ru, Hong, Endong Yang, and Kunru Zou, 2020, What do we learn from SARS-CoV-1 to SARS-CoV-2: Evidence from global stock markets, Working Paper.

Schrimpf, Andreas, Hyun Song Shin, Vladyslav Sushko, et al., 2020, Leverage and margin spirals in fixed income markets during the COVID-19 crisis, Bank for International Settlements.

Simutin, Mikhail, 2014, Cash holdings and mutual fund performance, *Review of Finance* 18, 1425--1464.

Stein, Jeremy C., 2009, Presidential address: Sophisticated investors and market efficiency, *Journal of Finance* 64, 1517--1548.

Sushko, Vladyslav, and Grant Turner, 2018, The implications of passive investing for securities markets, Bank for International Settlements.

Takahashi, Hidenori, and Kazuo Yamada, 2020, When the Japanese stock market meets COVID-19: Impact of ownership, China and US exposure, and ESG channels, Working Paper.

Figures

Figure 2: Institutional ownership and Covid-related stock price drops
Binned scatter plot of cumulative stock-level returns during the *Fever* period (February 24 through March 20, 2020) on *IO 2019Q4*, firms' institutional ownership ratios as of December 31, 2019. The sample consists of non-financial Russell 3000 constituents. The plot controls for firm characteristics (Cash/assets, Leverage, log(Market cap), and Profitability, and Book-to-market). Appendix A1 provides a description of all variables.

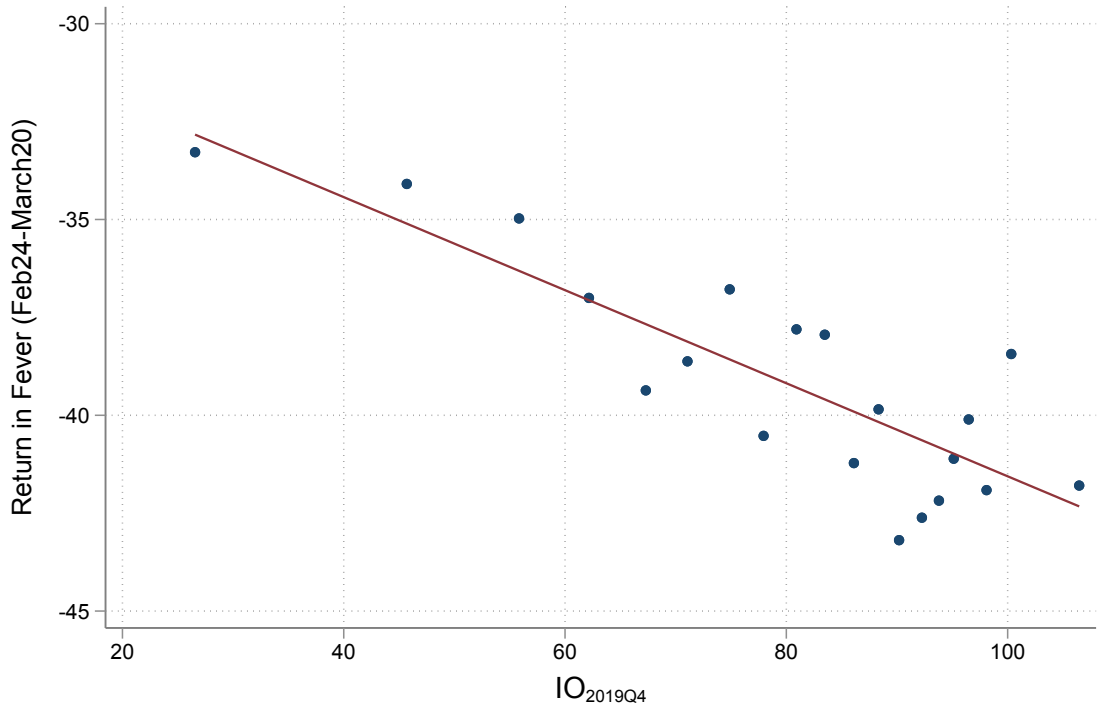
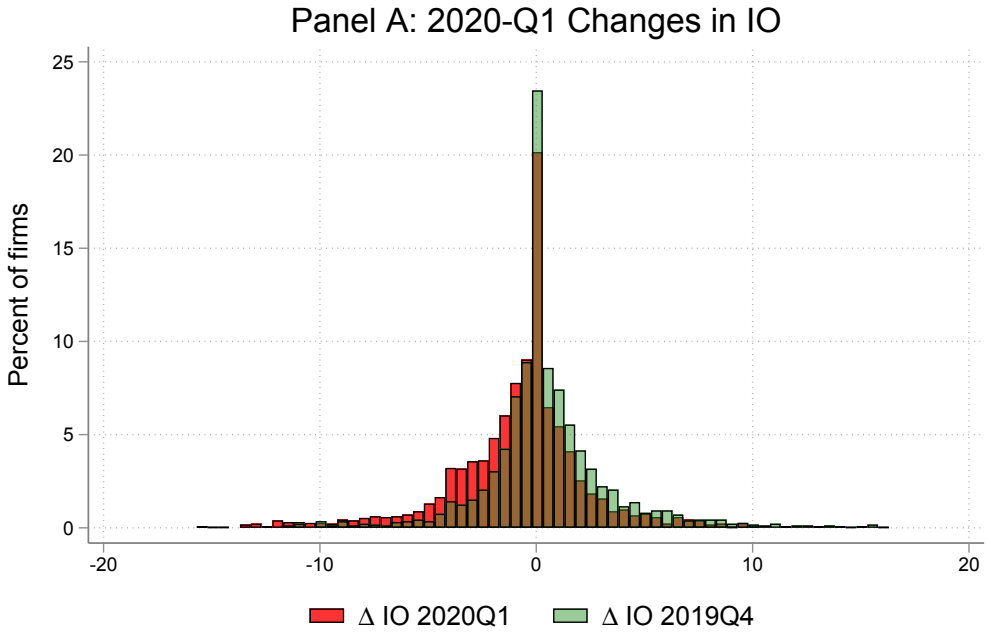


Figure 3: Change in institutional ownership in 2020-Q1
Panel A shows the difference in the distribution of Δ *IO 2020Q1*, the stock-level changes in institutional ownership of Russell 3000 non-financial constituents between 2019-Q4 and 2020-Q1, compared to Δ *IO 2019Q4*, the equivalent changes between 2019-Q3 and 2019-Q4. Panel B compares changes in overall institutional ownership in 2020-Q1 Δ *IO 2020Q1* with the distribution of changes in passive institutional ownership (which is used as a placebo benchmark).



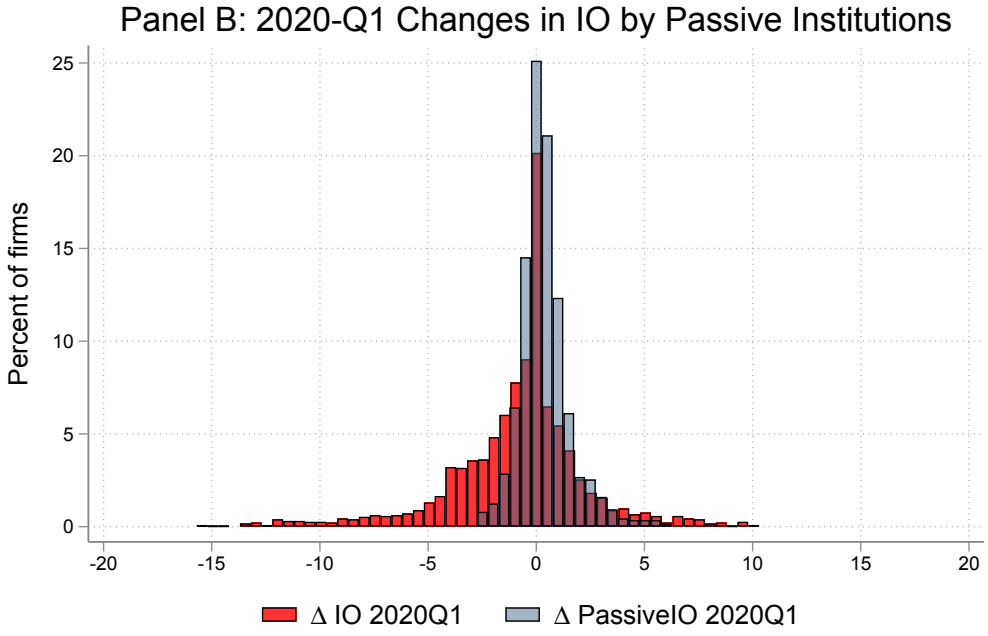


Figure 4: Change in institutional ownership and firm characteristics
Binned scatter plots of the net change in institutional ownership in 2020-Q1 on firm leverage, cash holdings, and environmental and social (ES) scores. The plots control for firm size, profitability, and book-to-market, as well as the level of IO at the end of the previous quarter.

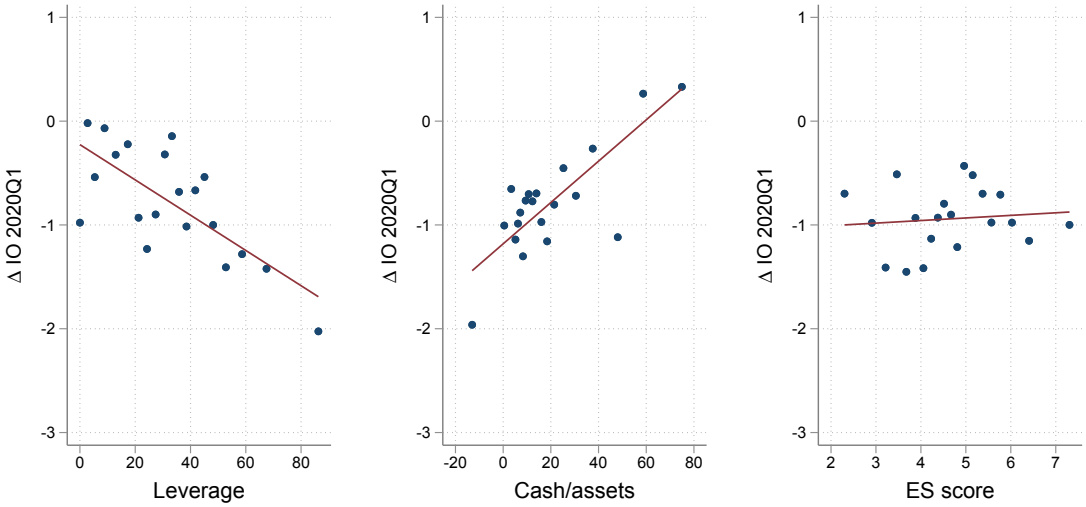


Figure 5: Change in retail investor popularity against the change in institutional ownership

Panel A shows a binned scatter plot of the percentage change in the popularity of a stock with retail investors (proxied by the log of Robinhood users between 2019-Q4 and 2020-Q1, *%Δ log(RHusers) 2020Q1*) against the change in institutional ownership over the same time period (Δ *IO 2020Q1*). Panel B plots Δ *IO 2020Q1* and *%Δ log(RHusers)* 2020Q1 by industry. The industries are sorted in ascending order by average cumulative returns in the *Fever* period, reported (rounded to integers) in parentheses next to the industry names.

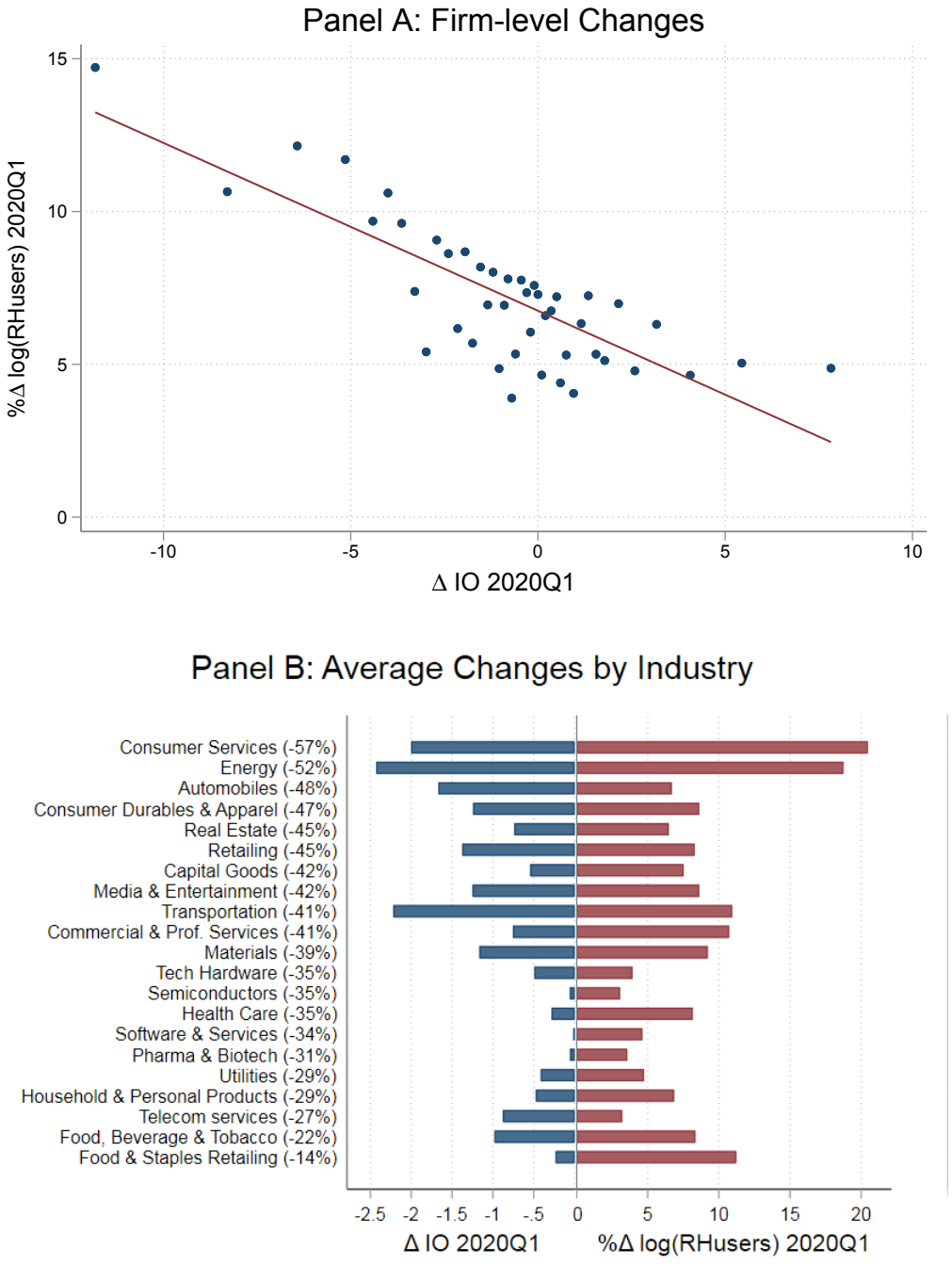


Figure 6: Evolution of retail investor interest and firm characteristics
These graphs show the day-to-day evolution of retail investor interest in cash, leverage, and ES performance. Each point is the coefficient on either Cash/assets, Leverage, or ES (msci) from OLS regressions of the percentage change in log Robinhood users between 2020-01-01 and the given date (shown on the x-axis). The explanatory variables in all regressions are Cash/assets, Leverage, log(RHusers_{2019Q4}), log(Market cap), Profitability, Book-to-market, and industry fixed effects. The raw data are missing from January 7, 2020 to January 15, 2020. The red vertical lines mark, respectively, the beginning of the *Fever* period (from February 24 through March 20), and the announcement of the Fed interventions (on March 23). The dashed lines indicate 90% confidence intervals based on robust standard errors.

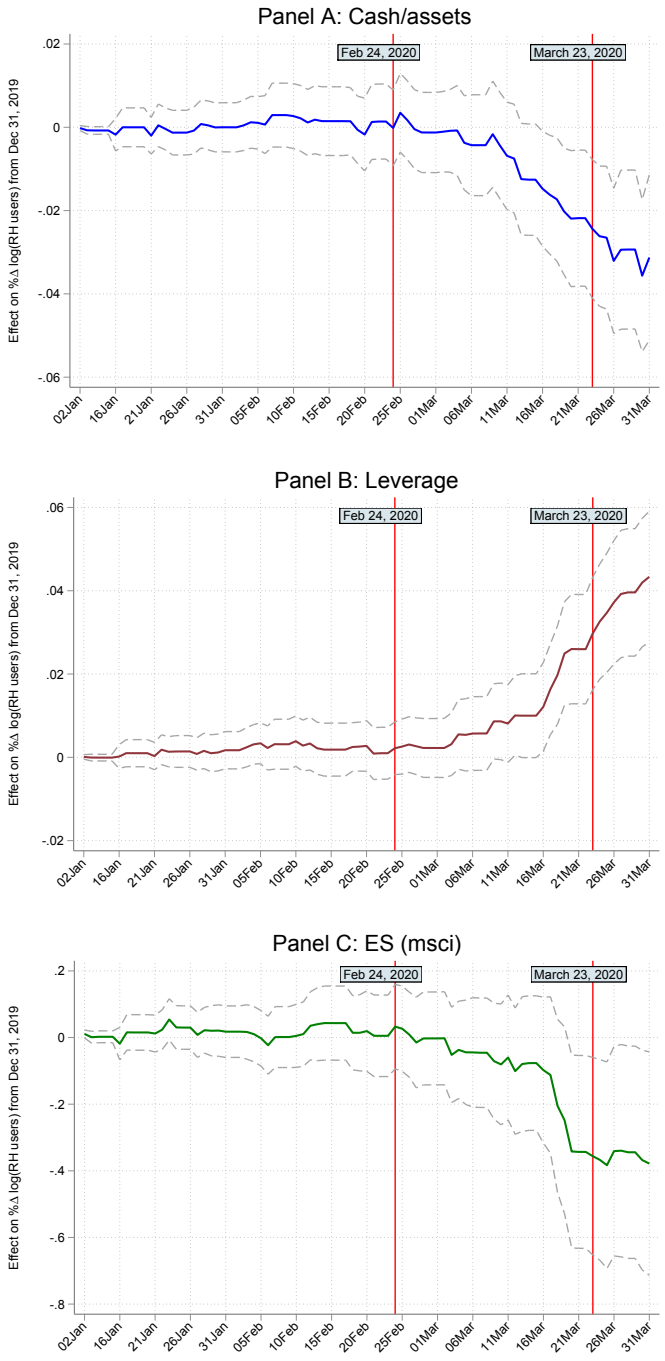
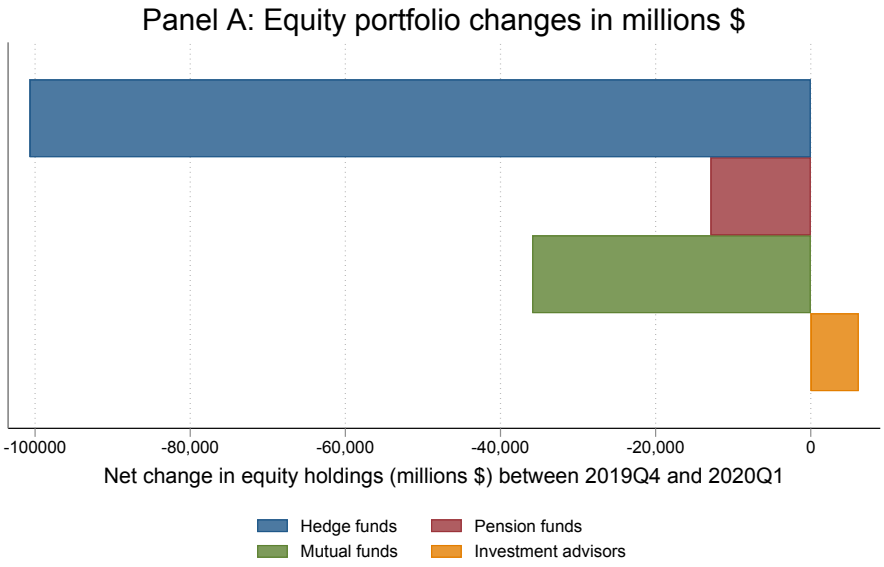
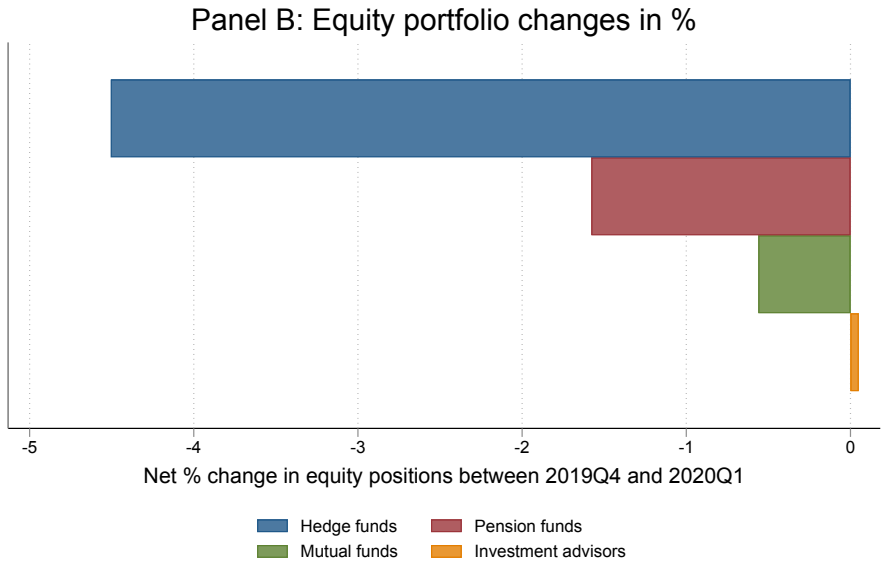


Figure 7: Net change in equity positions by investor category
These graphs show the net changes in equity positions between 2019-Q4 and 2020-Q1 due to active trading by institutional investor category. These changes are estimated based on the ownership by investor category of non-financial Russell 3000 constituents in 2019-Q4 and 2020-Q1, relative to firms' market capitalization on December 31, 2019. Panel A shows the change in million US$ and Panel B shows the changes in percentage of AUM as of 2019-Q4. *Hedge funds* include: hedge funds, funds of hedge funds, and private bank wealth. *Pension funds* include: pension funds and endowments. *Mutual funds* include: mutual funds and funds of mutual funds. *Investment advisors* include: investment advisors and brokers.





Tables

Table 1: Sample statistics
This table shows descriptive statistics of the variables used in the analyses. The sample consists of non-financial constituents of Russell 3000. Appendix Table A1 provides a description of all variables.

	N	min	p25	mean	p50	p75	max	sd
Institutional and retail investor data								
IO_{2019Q4}	2,282	1.90	69.40	79.62	86.80	96.80	100.00	21.49
Δ IO 2020Q1	2,237	-15.70	-2.00	-0.79	-0.20	0.60	10.10	3.22
$PassiveIO_{2019Q4}$	2,282	0.78	15.48	21.26	21.60	27.54	61.60	8.37
$Long\text{-}termIO_{2019Q4}$	2,282	1.38	52.49	64.23	70.27	79.63	97.30	20.19
$ForeignIO_{2019Q4}$	2,282	0.02	3.78	10.57	7.05	12.30	100.00	14.55
$IOhedgefunds_{2019Q4}$	2,282	0.05	6.23	13.45	10.16	17.67	75.30	10.34
Δ IOhedgefunds 2020Q1	2,238	-8.09	-1.32	-0.14	-0.28	0.85	9.92	2.48
$IOpensionfunds_{2019Q4}$	2,282	0.03	0.86	1.96	1.77	2.64	18.74	1.53
Δ IOpensionfunds 2020Q1	2,238	-1.68	-0.19	-0.09	-0.03	0.06	1.29	0.34
$IOmutualfunds_{2019Q4}$	2,282	0.18	12.19	18.93	19.13	25.25	50.75	8.99
Δ IOmutualfunds 2020Q1	2,237	-7.05	-0.69	0.00	0.07	0.83	5.54	1.69
$IOadvisors_{2019Q4}$	2,282	0.77	34.85	43.94	45.93	55.12	90.40	15.16
Δ IOadvisors 2020Q1	2,237	-12.87	-2.06	-0.63	-0.39	1.03	8.01	2.98
$RHusers_{2019Q4}$	2,262	0.00	157	3,521.94	452	1,492	321,191	17,716.92
$\log(RHusers_{2019Q4})$	2,262	0.00	5.06	6.25	6.12	7.31	12.68	1.72
%Δ log(RHusers) 2020Q1	2,259	-100.00	1.44	8.01	4.37	9.60	371.15	15.14
Stock returns, accounting information, and environmental and social performance								
Return in Fever	2,282	-88.03	-50.93	-39.16	-38.57	-27.72	209.57	19.66
Market beta	2,283	-0.87	0.82	1.15	1.13	1.47	3.56	0.50
Leverage	2,270	0.00	14.68	33.09	32.58	46.77	100.00	22.66
Cash/assets	2,276	0.00	2.60	19.83	8.61	25.83	99.74	25.00
log(Market cap)	2,283	16.35	20.27	21.53	21.42	22.61	27.92	1.72
Profitability	2,276	-32.73	-1.03	-1.01	0.61	1.73	9.33	6.10
Book-to-market	2,275	-6.49	0.16	0.47	0.34	0.61	22.14	0.84
ES score (msci)	1,671	1.30	3.70	4.62	4.60	5.50	8.55	1.25
ES score (asset4)	1,635	10.15	13.81	34.13	21.58	48.65	95.90	26.32

Table 2: Stock prices and institutional ownership

This table shows results of OLS regressions of stock-level returns in the *Fever* period (from February 24 through March 20, 2020), on measures of institutional ownership, Leverage, Cash holdings, ES score, and other controls (Market beta, log(Market cap), Profitability, and Book-to-market). Panel A shows the results for non-financial Russell 3000 firms, while Panel B shows only non-financial S&P 500 firms, and Panel C shows only non-financial Russell 3000 firms not included in the S&P 500. All models also control for GICS industry group fixed effect indicators. t-statistics based on robust standard errors in parentheses. ***, **, and * indicate that the coefficient estimate is significantly different from zero at the 1%, 5%, and 10% level, respectively.

Panel A: Russell 3000

	(1)	(2)	(3)	(4)	(5)
	Dependent variable: Return in Fever (Feb24-Mar20)				
IO_{2019Q4}	-0.091***	-0.120***	-0.273***	-0.099***	-0.064**
	(-4.58)	(-4.63)	(-5.50)	(-4.92)	(-2.37)
$PassiveIO_{2019Q4}$		0.125*			
		(1.93)			
$Long\text{-}termIO_{2019Q4}$			0.230***		
			(4.25)		
$ForeignIO_{2019Q4}$				0.082***	
				(2.81)	
Leverage	-0.109***	-0.106***	-0.099***	-0.112***	-0.134***
	(-4.95)	(-4.80)	(-4.47)	(-5.12)	(-5.50)
Cash/assets	0.090***	0.097***	0.111***	0.091***	0.148***
	(3.76)	(4.00)	(4.59)	(3.79)	(5.13)
ES score (msci)					0.818**
					(2.21)
Market beta	-6.342***	-6.375***	-6.387***	-6.318***	-8.116***
	(-6.13)	(-6.15)	(-6.19)	(-6.11)	(-6.42)
log(Market cap)	1.157***	1.137***	0.755***	0.984***	0.967***
	(4.41)	(4.32)	(2.60)	(3.56)	(3.48)
Profitability	0.143	0.138	0.147	0.146	0.285*
	(1.30)	(1.25)	(1.34)	(1.33)	(1.71)
Book-to-market	0.988	0.989	1.104*	0.868	1.212*
	(1.60)	(1.60)	(1.86)	(1.33)	(1.69)
Constant	-32.067***	-32.453***	-30.074***	-30.875***	-34.498***
	(-10.13)	(-10.26)	(-9.20)	(-9.51)	(-8.72)
Observations	2,267	2,267	2,267	2,267	1,662
R-squared	0.230	0.231	0.237	0.233	0.313
Industry FE	Yes	Yes	Yes	Yes	Yes

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Panel B: S&P500					
	(1)	(2)	(3)	(4)	(5)
	Dependent variable: Return in Fever (Feb24-Mar20)				
IO_{2019Q4}	-0.072	-0.111*	0.006	-0.075	-0.076
	(-1.31)	(-1.92)	(0.03)	(-1.36)	(-1.34)
$PassiveIO_{2019Q4}$		0.271			
		(1.43)			
$Long\text{-}termIO_{2019Q4}$			-0.093		
			(-0.51)		
$ForeignIO_{2019Q4}$				0.016	
				(0.60)	
ES score (msci)					0.823
					(1.63)
Leverage	-0.116***	-0.114***	-0.118***	-0.115***	-0.110***
	(-2.94)	(-2.90)	(-2.95)	(-2.91)	(-2.73)
Cash/assets	0.105**	0.109**	0.097*	0.106**	0.119**
	(2.15)	(2.26)	(1.89)	(2.18)	(2.41)
Constant	-24.413**	-31.362**	-25.153**	-24.442**	-24.030**
	(-2.23)	(-2.51)	(-2.29)	(-2.22)	(-2.04)
Observations	423	423	423	423	401
R-squared	0.528	0.530	0.528	0.528	0.547
Controls	Yes	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes	Yes

Panel C: Russell 3000 not S&P500					
	(1)	(2)	(3)	(4)	(5)
	Dependent variable: Return in Fever (Feb24-Mar20)				
IO_{2019Q4}	-0.083***	-0.111***	-0.267***	-0.090***	-0.058*
	(-3.95)	(-4.00)	(-5.29)	(-4.28)	(-1.94)
$PassiveIO_{2019Q4}$		0.117*			
		(1.70)			
$Long\text{-}termIO_{2019Q4}$			0.233***		
			(4.18)		
$ForeignIO_{2019Q4}$				0.091**	
				(2.52)	
ES score (msci)					0.630
					(1.24)
Leverage	-0.119***	-0.116***	-0.108***	-0.124***	-0.153***
	(-4.80)	(-4.67)	(-4.34)	(-5.00)	(-5.26)
Cash/assets	0.093***	0.100***	0.115***	0.092***	0.149***
	(3.44)	(3.64)	(4.19)	(3.39)	(4.29)
Constant	-31.043***	-31.647***	-29.339***	-29.697***	-33.421***
	(-7.71)	(-7.84)	(-7.15)	(-7.22)	(-6.45)
Observations	1,844	1,844	1,844	1,844	1,261
R-squared	0.206	0.207	0.214	0.210	0.281
Controls	Yes	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes	Yes

Table 3: Determinants of changes in institutional ownership and retail popularity
This table shows results of OLS regressions of the change in institutional ownership or retail investor interest between 2019-Q4 and 2020-Q1 on firm characteristics. The dependent variable in Panel A is the change in the percentage of institutional ownership (Δ *IO 2020Q1*), while the dependent variable in Panel B is the percentage change in log Robinhood users (*%*Δ *log(RHusers) 2020Q1*). The sample consists of non-financial Russell 3000 constituents. t-statistics based on robust standard errors in parentheses. ***, **, and * indicate that the coefficient estimate is significantly different from zero at the 1%, 5%, and 10% level, respectively.

	(1)	(2)	(3)	(4)
Panel A: Dependent variable: Δ *IO 2020Q1*				
Leverage	-0.010**	-0.009**	-0.007	-0.005
	(-2.48)	(-2.40)	(-1.64)	(-1.20)
Cash/assets	0.009**	0.007*	0.006	0.007
	(2.12)	(1.69)	(1.41)	(1.33)
IO_{2019Q4}		-0.017***	-0.015***	-0.008*
		(-5.66)	(-5.08)	(-1.85)
Return in Fever			0.019***	
			(3.51)	
ES score (msci)				-0.059
				(-0.92)
log(Market cap)	0.195***	0.250***	0.225***	0.259***
	(4.69)	(5.74)	(5.08)	(5.00)
Profitability	0.026*	0.034**	0.029*	0.024
	(1.66)	(2.14)	(1.78)	(1.16)
Book-to-market	-0.179	-0.150	-0.151	-0.139
	(-1.52)	(-1.28)	(-1.28)	(-1.09)
Constant	-2.059***	-1.093***	-0.377	-1.967***
	(-5.19)	(-2.63)	(-0.81)	(-3.11)
Observations	2,224	2,224	2,223	1,638
R-squared	0.072	0.082	0.092	0.071
Industry FE	Yes	Yes	Yes	Yes
Panel B: Dependent variable: *%*Δ *log(RHusers) 2020Q1*				
Leverage	0.023**	0.042***	0.028***	0.047***
	(2.47)	(4.42)	(2.80)	(4.01)
Cash/assets	-0.056***	-0.032***	-0.023*	-0.048***
	(-4.70)	(-2.71)	(-1.86)	(-2.95)
$\log(\text{RHusers}_{2019Q4})$		-1.575***	-1.600***	-1.490***
		(-12.99)	(-13.23)	(-10.18)
Return in Fever			-0.114***	
			(-4.69)	
ES score (msci)				-0.370*
				(-1.84)
Constant	7.612***	11.175***	6.114***	13.302***
	(7.49)	(11.10)	(4.12)	(9.44)
Observations	2,201	2,201	2,200	1,625
R-squared	0.172	0.233	0.278	0.239
Controls	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes

Table 4: Determinants of changes in institutional ownership: Placebo tests
This table shows results of OLS regressions of the change in institutional ownership between 2019-Q4 and 2020-Q1 on firm characteristics. Panel A shows the change in institutional ownership for non-financial S&P 500 firms and Panel B show the change in passive ownership for non-financial Russell 3000 firms. t-statistics based on robust standard errors in parentheses. ***, **, and * indicate that the coefficient estimate is significantly different from zero at the 1%, 5%, and 10% level, respectively.

	(1)	(2)	(3)	(4)
Panel A: Dependent variable: Δ *IO 2020Q1* for S&P 500				
Leverage	-0.002	-0.002	0.002	-0.001
	(-0.29)	(-0.21)	(0.31)	(-0.17)
Cash/assets	0.005	0.005	0.004	0.007
	(0.54)	(0.51)	(0.40)	(0.73)
IO_{2019Q4}		-0.019	-0.018	-0.019
		(-1.59)	(-1.45)	(-1.59)
Return in Fever			0.034***	
			(2.69)	
ES score (msci)				-0.005
				(-0.06)
Constant	-0.556	2.062	3.582	2.029
	(-0.43)	(0.91)	(1.57)	(0.86)
Observations	421	421	421	399
R-squared	0.111	0.118	0.144	0.106
Firm controls	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes
Panel B: Dependent variable: Δ *PassiveIO 2020Q1*				
Leverage	0.002	0.002	0.002	0.003
	(1.45)	(1.56)	(1.09)	(1.50)
Cash/assets	-0.002	-0.002	-0.001	-0.003
	(-1.57)	(-1.09)	(-0.89)	(-1.57)
$PassiveIO_{2019Q4}$		0.009**	0.008**	0.003
		(2.49)	(2.40)	(0.75)
Return in Fever			-0.004**	
			(-2.36)	
ES score (msci)				0.031
				(1.23)
Constant	0.761***	0.621***	0.438***	0.744***
	(5.52)	(4.32)	(2.76)	(3.49)
Observations	2,223	2,223	2,222	1,626
R-squared	0.114	0.116	0.121	0.136
Firm controls	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes

Table 5: Changes in ownership by investor category and firm characteristics
The table shows results of OLS regressions of the change in ownership by investor category between 2019-Q4 and 2020-Q1 on firm characteristics. *Hedge funds* include: hedge funds, funds of hedge funds, and private bank wealth. *Pension funds* include: pension funds and endowments. *Mutual funds* include: mutual funds and funds of mutual funds. *IO advisors* include: investment advisors and brokers. The sample consists of non-financial Russell 3000 constituents. t-statistics based on robust standard errors in parentheses. ***, **, and * indicate that the coefficient estimate is significantly different from zero at the 1%, 5%, and 10% level, respectively.

Dep. variable:	Δ IO hedge funds		Δ IO pension funds		Δ IO mutual funds		Δ IO advisors	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Leverage	-0.001	0.002	-0.001**	-0.001**	-0.004*	-0.002	-0.008**	-0.010**
	(-0.31)	(0.64)	(-2.14)	(-1.99)	(-1.88)	(-0.84)	(-2.50)	(-2.45)
Cash/assets	-0.001	-0.001	-0.000	-0.001	-0.004	-0.002	0.008**	0.006
	(-0.22)	(-0.33)	(-0.92)	(-1.44)	(-1.59)	(-0.47)	(2.07)	(1.20)
ES score (msci)		-0.053		-0.015*		-0.030		0.067
		(-0.93)		(-1.85)		(-0.75)		(1.02)
$IOhedgefunds_{2019Q4}$	-0.023***	-0.023***						
	(-3.52)	(-2.59)						
$IOpensionfunds_{2019Q4}$			-0.085***	-0.087***				
			(-7.98)	(-6.86)				
$IOmutualfunds_{2019Q4}$					-0.030***	-0.027***		
					(-5.73)	(-4.29)		
$IOadvisors_{2019Q4}$							-0.042***	-0.033***
							(-9.98)	(-5.86)
log(Market cap)	-0.065**	-0.043	0.051***	0.056***	-0.039	-0.055*	0.316***	0.271***
	(-2.13)	(-1.15)	(9.40)	(8.79)	(-1.51)	(-1.78)	(9.08)	(6.38)
Profitability	-0.028**	-0.037**	-0.003***	-0.003	0.028***	0.023*	0.047***	0.060***
	(-2.17)	(-2.22)	(-3.14)	(-1.61)	(3.41)	(1.69)	(3.75)	(3.29)
Book-to-market	-0.204**	-0.192*	0.008	0.009	0.041	0.046	-0.015	-0.045
	(-2.05)	(-1.67)	(1.30)	(1.47)	(0.84)	(0.82)	(-0.18)	(-0.50)
Constant	0.784**	0.731*	-0.296***	-0.265***	1.072***	1.167***	-1.082***	-1.416***
	(2.53)	(1.73)	(-8.39)	(-5.41)	(5.24)	(3.97)	(-3.09)	(-2.61)
Observations	2,225	1,634	2,224	1,633	2,223	1,631	2,223	1,642
R-squared	0.034	0.036	0.108	0.110	0.030	0.025	0.117	0.110
Industry FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Appendix

Table A1: Variable definitions

	Institutional and retail investor data Sources: FactSet and Robinhood
IO_{2019Q4}	is the percentage of common stocks held by 13-F investors as of 2019-Q4, truncated at 100.
Δ *IO 2020Q1*	is the change between 2019-Q4 and 2020-Q1 in the percentage of common stocks held by 13-F investors, trimmed at the 1st and 99th percentiles.
$PassiveIO_{2019Q4}$	is the percentage of common stocks held by passive investors.
$Long\text{-}termIO_{2019Q4}$	is the percentage of common stocks held by institutional investors classified as having a ''very low'' or ''low'' turnover as of 2019-Q4.
$ForeignIO_{2019Q4}$	is the percentage of common stocks held by non-domestic investors as of 2019-Q4.
$IOhedgefunds_{2019Q4}$	is the percentage of common stocks held by hedge funds, funds of hedge funds, and private bank wealth as of 2019-Q4.
$IOpensionfunds_{2019Q4}$	is the percentage of common stocks held by pension funds and endowments as of 2019-Q4.
$IOmutualfunds_{2019Q4}$	is the percentage of common stocks held by mutual funds and funds of mutual funds as of 2019-Q4.
$IOadvisors_{2019Q4}$	is the percentage of common stocks held by investment advisors and brokers as of 2019-Q4.
$log(RHusers_{2019Q4})$	is the natural logarithm of the Robinhood users (plus one) holding a firm's stock as of December 31, 2019.
%Δ *log(RHusers) 2020Q1*	is the percentage change in log Robinhood users (plus one) between December 31, 2019 and March 31, 2020.
	Stock returns and accounting data Source: Compustat Capital IQ North America
Return in Fever	is computed by compounding daily returns (adjusted for stock splits and dividends) from February 24 through March 20, 2020.
Market beta	is computed based on regressions of daily excess returns in 2019 on a constant and the daily market factor. The market excess return and the return on the riskless asset (the U.S. 1-month Treasury-bill rate) are from Kenneth French's website.
Leverage	is the percentage of long-term debt plus debt in current liabilities over total assets ((dltt + dlc)*100/at) as of 2019-Q4, truncated at 100.
Cash/assets	is cash and cash equivalents over total assets (che*100/at) as of 2019-Q4, in percentage points.
log(Market cap)	is the logarithm of the equity market capitalization as of December 31, 2019.
Book-to-market	is the book value of equity divided by market valuation as of December 31, 2019.
Profitability	is the return on assets (in percentage) computed as the quarterly income before extraordinary items over total assets as of 2019-Q4.

Environmental and social performance

Sources: MSCI IVA and Thomson Reuters Refinitiv

ES score (msci)	is the average of the 2018 environmental and social scores from the MSCI IVA database.
ES score (asset4)	is the average of the 2017 environmental and social scores from Thomson Reuters Refinitiv database (asset4).

Online Appendix

Figure OA1: Stock prices and institutional ownership -- International sample
This graph shows the evolution of the coefficients on *Institutional Ownership* in regressions with the cumulative returns from January 2, 2020 each day through March 31, 2020 as the dependent variable, for a sample of 1,159 non-financial and non-US stocks firms included in the MSCI ACWI index and located in 48 emerging and developed markets countries. The regressions control for GICS industry group indicators and firm characteristics (Market beta, log(Market cap), Profitability, and Book-to-market). *Institutional Ownership* is the percentage of shares owned by institutional shareholders at the end of the fourth quarter 2019. The red vertical lines mark, respectively, the beginning of the Fever period (from February 24 through March 20), and the announcement of the Fed interventions (on March 23). The dashed lines indicate 90% confidence intervals based on robust standard errors.

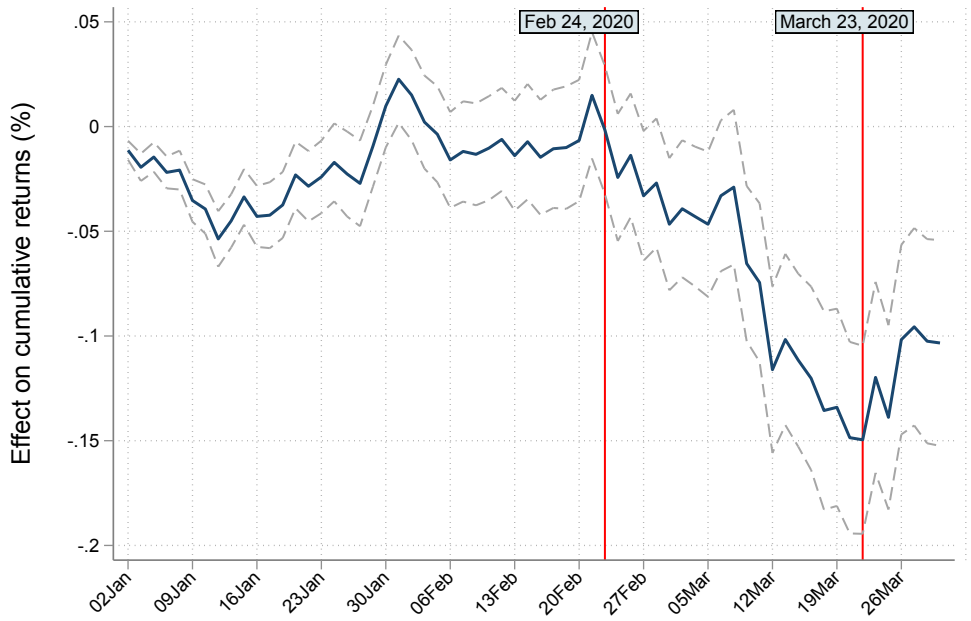

Figure OA2: Quarterly changes in institutional ownership in 2019
These graphs show the distribution of quarter-to-quarter changes in institutional ownership in 2019.

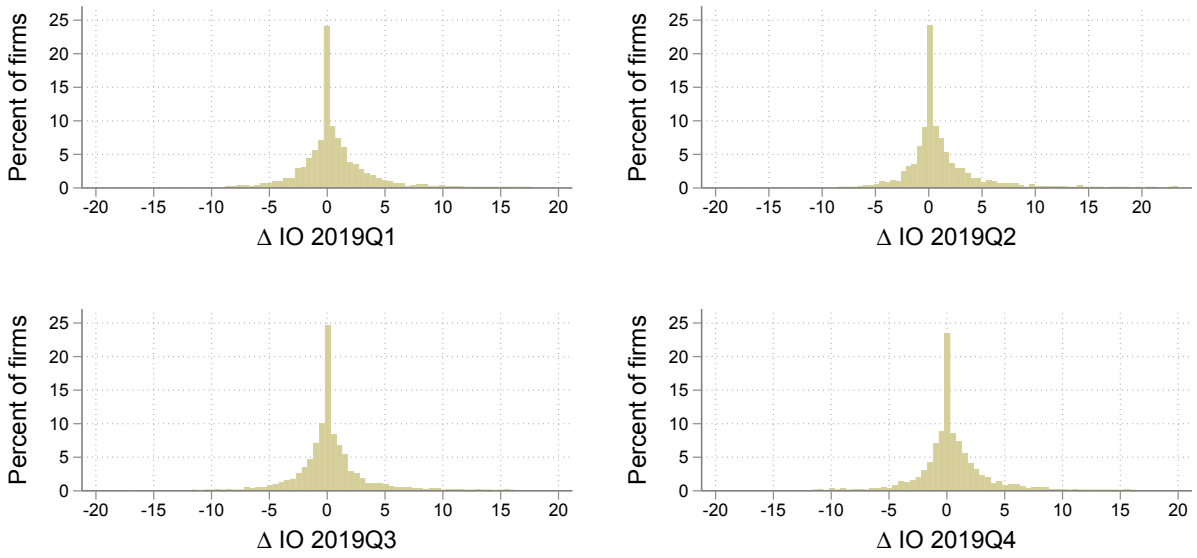

Figure OA3: Change in institutional ownership: S&P500 vs. non-S&P500 firms
This graph compares changes in institutional ownership between 2019-Q4 and 2020-Q1 of non-financial S&P500 firms vs. non-financial Russell 3000 firms not included in the S&P500 index.

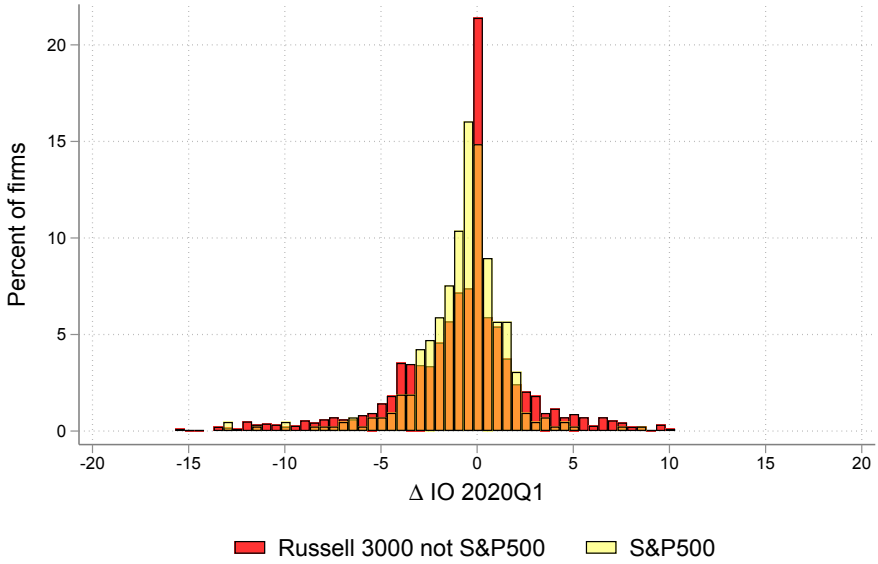

Table OA1: Robustness using Asset4 ESG scores

This table shows results of OLS regressions of stock returns in *Fever* (column (1)), the change in institutional ownership in 2020-Q1 (column (2)), and the percentage change in log Robinhood users in 2020-Q1 (column (3)) on firm characteristics, including the ES score from Asset4. The sample consists of non-financial Russell 3000 constituents. t-statistics based on robust standard errors are reported in parentheses. ***, **, and * indicate that the coefficient estimate is significantly different from zero at the 1%, 5%, and 10% level, respectively.

	(1)	(2)	(3)
Dep. variable:	Return in Fever	Δ IO 2020Q1	%Δ log(RHusers) 2020Q1
Leverage	-0.129***	-0.007	0.051***
	(-5.04)	(-1.41)	(4.27)
Cash/assets	0.136***	0.000	-0.036**
	(4.58)	(0.02)	(-2.13)
ES score (asset4)	0.043*	-0.010***	0.024*
	(1.96)	(-2.67)	(1.93)
$IO_{2019-Q4}$	-0.068***	-0.011***	
	(-2.77)	(-2.78)	
Market beta	-8.313***		
	(-6.47)		
log(Market cap)	0.637	0.370***	0.453**
	(1.57)	(5.20)	(2.49)
Profitability	0.227	0.015	-0.189***
	(1.50)	(0.72)	(-3.92)
Book-to-market	1.114	-0.152	0.641**
	(1.53)	(-1.01)	(2.39)
$\log(RHusers_{2019Q4})$			-1.529***
			(-10.26)
Constant	-29.178***	-2.341***	11.134***
	(-7.51)	(-3.71)	(8.15)
Observations	1,626	1,601	1,586
R-squared	0.287	0.079	0.233
Industry FE	Yes	Yes	Yes

Table OA2: Robustness test: CAPM-adjusted and Fama-French-adjusted returns

This table shows results of OLS regressions of CAPM-adjusted and Fama-French-adjusted stock-level returns in the *Fever* period (from February 24 through March 20, 2020), on measures of institutional ownership, Leverage, Cash holdings, ES score, and other controls (log(Market cap), Profitability, and Book-to-market). Panel A shows the results for CAPM-adjusted returns, while Panel B shows results for Fama-French-adjusted returns. The coefficients on the control variables are not shown for brevity. All models also control for GICS industry group fixed effect indicators. t-statistics based on robust standard errors in parentheses. ***, **, and * indicate that the coefficient estimate is significantly different from zero at the 1%, 5%, and 10% level, respectively.

	(1)	(2)	(3)	(4)	(5)
Panel A: Dependent variable: CAPM-adjusted return in Fever (Feb24-Mar20)					
IO_{2019Q4}	-0.114***	-0.165***	-0.396***	-0.123***	-0.076*
	(-3.31)	(-3.88)	(-4.86)	(-3.55)	(-1.83)
$PassiveIO_{2019Q4}$		0.224**			
		(2.15)			
$Long\text{-}termIO_{2019Q4}$			0.359***		
			(3.98)		
$ForeignIO_{2019Q4}$				0.104**	
				(2.29)	
ES score (msci)					1.096*
					(1.87)
Constant	-5.217	-6.006	-2.278	-3.682	-8.707
	(-1.09)	(-1.25)	(-0.46)	(-0.75)	(-1.38)
Observations	2,250	2,250	2,250	2,250	1,662
R-squared	0.247	0.249	0.254	0.249	0.312
Controls	Yes	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes	Yes
	(1)	(2)	(3)	(4)	(5)
Panel B: Dependent variable: Fama-French-adjusted Return in Fever (Feb24-Mar20)					
IO_{2019Q4}	-0.097**	-0.221***	-0.486***	-0.109***	-0.088*
	(-2.46)	(-4.71)	(-5.38)	(-2.73)	(-1.71)
$PassiveIO_{2019Q4}$		0.540***			
		(4.24)			
$Long\text{-}termIO_{2019Q4}$			0.494***		
			(4.84)		
$ForeignIO_{2019Q4}$				0.127***	
				(2.61)	
ES score (msci)					1.360*
					(1.90)
Constant	7.781	5.881	11.820*	9.662	11.535
	(1.29)	(0.97)	(1.91)	(1.56)	(1.33)
Observations	2,250	2,250	2,250	2,250	1,662
R-squared	0.223	0.230	0.233	0.226	0.263
Controls	Yes	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes	Yes

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