# Power Tussle: Hedge Fund Activists and Short Sellers*

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**Abstract**

We study events in which activist hedge funds and short sellers target the same stock using unique European data on activism and mandatory disclosures of large short positions. The presence of large short sellers is associated with a 22.6% increase in the probability of becoming an activist target. Such presence also increases campaigns' success probability and profitability. Importantly, activists employ fewer hostile tactics, launch shorter campaigns, and achieve better post-activism corporate outcomes, consistent with firms becoming more receptive to activists' demands after facing pressure from short sellers. Hedge fund activism is also associated with a reduction in disclosed short positions.

**Keywords**: Hedge fund activism, short selling, short position disclosure, equity lending

**JEL classification**: G12, G14, G15, G2, G34

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# 1 Introduction

Activist hedge funds have become an important force in corporate decision-making (e.g., Becht et al. (2008), Brav et al. (2008), and Gantchev (2013)). These sophisticated investors purchase shares in underperforming firms and try to increase value through direct intervention or "voice." Another group of sophisticated investors, short sellers, often also target underperforming firms. However, short sellers hold a view contrary to that of activist hedge funds, believing that shares are overvalued and expecting prices to decrease further (e.g., Asquith et al. (2005) and Boehmer et al. (2022)).

Short sellers are able to forecast price decreases as a result of private information acquisition (Karpoff and Lou (2010) and Jank and Smajlbegovic (2015)) and better interpretation of public information (Engelberg et al. (2018)), obtaining positive abnormal returns from their trading strategies (e.g., Cohen et al. (2007), Richardson et al. (2017), and Jank et al. (2021)). Such price movements could significantly influence the expected profitability of an activist hedge fund's campaign that targets a company. An increase in shorting demand, leading to stock underperformance, may reduce the cost for an activist to acquire a sizeable block of shares—a "cost channel." Moreover, the negative effect on share price due to short selling could increase an activist's negotiating power, making corporate managers more receptive to the activist's demands and more likely to implement her proposals—a "bargaining power channel." Alternatively, an activist might be dissuaded from targeting a firm, knowing that a sophisticated short seller already holds a substantial short position in the company's stock.

We provide the first analysis of events in which activist hedge funds and large short sellers target the same company simultaneously.[1] Our study builds on a sample of 795 activist campaigns in

[1]In the European context, a notable case involved activist fund Elliott Management and short seller WorldQuant LLC. Elliott Management revealed in April 2018 a 5.1% stake in Micro Focus International PLC, a UK software company, and believed that the company should sell itself to a private equity firm and carve out its SUSE Linux division. The announcement came only weeks after WorldQuant LLC disclosed a 0.53% short position in Micro Focus, which dropped below the regulatory disclosure threshold of 0.5% in early May 2018. The company sold the SUSE division in July 2018 for $2.5 billion before eventually being sold to OpenText. The "long-short battle" involving GameStop in January 2021 can also be seen in a similar light, although most of the activists targeting GameStop were retail investors active on Reddit.

Europe between January 2010 and December 2019, merged with hand-collected data on 14,646 large short positions. Given the prominent role of activist hedge funds and short sellers in stock markets, this paper focuses on answering three main questions: How do these sophisticated investors react to each other's presence? Do their investment decisions change accordingly? And, how does their profitability get affected?

Our data on short positions come from the European Union (EU) requirement that across all EU members, any net short positions exceeding 0.5% of shares outstanding after November 2012 must be disclosed to the public. Following the EU's regulatory change, public disclosures by large short sellers allow other market participants to revise their own portfolio decisions. After November 2012, investors started to receive additional information about the composition of short sellers, identifying in more detail whether short selling activity is more or less concentrated among a few influential investors.

We hypothesize that such short selling disclosures are likely to attract activist hedge funds, which typically use public information to identify targets and acquire shares, aiming to increase equity value through their engagement with the firms' management (Brav et al. (2022)). Activist targeting is a multi-step screening process, the first steps of which are based on the firm's fundamental characteristics and corporate policies (Gantchev and Jotikasthira (2018)). After identifying an initial set of firms that may benefit from engagement, activists likely prefer those whose shares have experienced significant selling pressure. This is because managers would be more receptive to activists' demands to counter the negative effects of short selling on shareholders, their own compensation (De Angelis et al. (2017)), and the prospect of keeping their jobs (Edmans et al. (2017)).

We show that the presence of large short sellers positively affects the likelihood of activist targeting, controlling for aggregate short selling and other firm characteristics. The probability of an activist campaign is 0.14 percentage points higher when a large short seller has an outstanding position in a stock during the previous quarter, equivalent to a marginal increase of 22.6% relative to the average. This suggests that activist hedge funds pay attention to

and take cues from large short sellers' disclosures. This result is consistent with the dynamic trading model proposed by Cetemen et al. (2022), in which two informed investors (e.g., an activist hedge fund and a large short seller) change their trading behavior based on each other's actions.

On the reverse side, the effect of activism on short sellers' decisions is not as clear. The price increase after an activist's campaign announcement would make the stock more overvalued from a short seller's perspective, reducing the cost of setting up a short position and an increase in the probability of a significant short sale position. At the same time, short sellers may be reluctant to initiate a new position or increase an existing one after an activist has targeted a company due to the risk of a short squeeze. Activist hedge funds' holdings are typically much higher than an individual short seller's stake (e.g., 9.4% vs. 2.1% of the outstanding stock in our sample). Furthermore, as pointed out by Brav et al. (2022), activists often form "wolf packs," in which lead activists implicitly coordinate with many smaller followers in engaging target management. This ownership change can increase limits to arbitrage and the risk of a short squeeze (e.g., Engelberg et al. (2018)) as activist investors are less likely to lend out their shares (Porras Prado et al. (2016)), reducing the expected returns of short selling by forcing short sellers to cover their positions at unfavourable prices. Therefore, the sign of the effect depends on the relative strength of each factor. We find that the amount shorted by large short sellers and the aggregate short selling activity decrease after the launch of an activist campaign, suggesting that the risk of a short squeeze dominates.

One potential concern is that an activist's decision to target a particular company is related to firm characteristics that are also used by short sellers when deciding whether to short the stock. Therefore, it is crucial to establish that our results are not driven by endogeneity concerns due to unobserved variables or reverse causality. To this end, we utilize the EU's harmonization of short sale disclosure rules in November 2012. Prior to the regulatory harmonization being implemented, several EU countries—France, Spain, and the United Kingdom—already had

short sale disclosure regimes in place (Jones et al. (2016)).[2] After November 2012, all stocks in the EU became subject to the same large short sale disclosure rules. Therefore, we expect that stocks without disclosure requirements prior to November 2012 (i.e., our "treatment" group) exhibit an increase in the likelihood of activist campaigns as a result of the increased availability of short sellers' signals, relative to stocks in countries that already had disclosure requirements in place (i.e., our "control" group).[3]

We find that after November 2012, EU stocks without prior disclosure requirements had an increase in the likelihood of activist campaigns, relative to stocks that were already subject to such requirements. This effect is significantly larger for firms with higher aggregate short selling before the regime change, since these firms were more likely to have individual large short positions, which were unknown to the market before the disclosure rules were implemented. The change in disclosure requirements allows hedge funds to better understand the composition of short selling, particularly if there is a large outstanding short position on a stock.

Our next hypothesis is that returns to activists and the likelihood of campaign success are higher in the presence of large short sellers. This is motivated by the underperformance of stocks following an increase in short selling activity (e.g., Jones and Lamont (2002)), which prompts managers to be more receptive to activists' demands to counter the effects of short selling, such as a reduction in firms' ability to raise capital (Goldstein and Guembel (2008) and Campello et al. (2018)) and lower managerial compensation due to lower share prices.

We employ a calendar-time portfolio approach to analyze the effect of large short sellers' presence on the profitability of hedge fund activism. We calculate the abnormal returns of portfolios that buy all stocks with an unresolved activist campaign on a given day for alternative sample splits. The portfolio that buys all target stocks *with* the presence of large short sellers in the previous

[2]Since January 2009, the United Kingdom required short sellers of financial sector stocks and any stock in a rights issue period to disclose positions exceeding 0.25%. In France, since February 2011, all short positions larger than 0.5% had to be disclosed the following day. Spain also had a similar regime to France, but the disclosure requirement started on June 10, 2010. All regimes were superseded by the EU-wide regulations after November 2012.

[3]In the Appendix, we use propensity score matching to create a randomized sample based on observed covariates and repeat our analysis. Our main results are similar to those found in the matched sample.

quarter has a value-weighted abnormal return equal to 12.9% per year, based on Carhart (1997)'s four-factor model. In contrast, the portfolio that buys target stocks *without* any large short position generates an annualized return of only 4.7%, with the estimate being statistically insignificant. In summary, returns to activism are associated with positive abnormal returns only in the presence of large short sellers.

We also form double-sorted portfolios, conditional on campaign outcomes and the presence of large short positions. While this is not an implementable strategy, our results suggest that the presence of activist hedge funds will prompt some short sellers to exit or cover their positions, increasing abnormal returns to hedge fund activism and even more so when the campaign achieves its stated goals.

Consistent with activists generating superior returns in the presence of large short sellers, we show that the involvement of large short sellers is associated with a 15.7-percentage-point increase in activists' success probability. Activist success is also more sensitive to short sellers' presence when blockholder ownership or the Herfindahl-Hirschman index (HHI) of institutional ownership is higher. Our results provide indirect evidence that when facing pressure from large short sellers, management tends to accept the demands of activists, who have the backing of institutional shareholders. These results also rationalize activists' initial targeting decisions: conditional on interventions, we find that activists are more likely to achieve their goals, as well as earn higher abnormal returns, when large short sellers also target the stock.

These results are consistent with De Angelis et al. (2017), who find that the threat of short selling leads to firms changing managerial contracts to reduce the negative effects of short sales. Goldstein and Yang (2015) describe a model in which competing investors produce information and acquire expertise, akin to the actions of short sellers and activist hedge funds. As investors interact and condition their decisions on security prices, strategic complementarity can arise, amplifying the effects of trading decisions.

In the final section of the paper, we directly test two potential mechanisms that may explain why activists are attracted to firms with large short sellers. First, we examine a "bargaining

power channel" and hypothesize that the negative share-price consequences associated with short selling (e.g., lower performance-based pay for managers and reduced ability to raise capital for the firm) increase an activist's bargaining power and make corporate managers more receptive to the activist's demands and more likely to implement her proposals. Consistent with this hypothesis, we find that in the presence of large short sellers, activists are significantly less likely to seek board seats or launch proxy contests, both of which are hostile (and costly) tactics. The involvement of large short sellers is also associated with a shorter duration of activist campaigns. In addition, target firms also achieve better post-activism outcomes, including a lower growth rate in CEO compensation, a higher probability of the firm being acquired, and a higher return on assets.

Next, we examine a "cost channel" and hypothesize that entering a position when a large short seller is present lowers an activist's cost to acquire a large block of shares relative to campaigns for which no large short seller is present, increasing activists' profits. Given the ability of large short sellers (and short sellers in general) to forecast underperformance (e.g., Jank et al. (2021)), this would allow activists to acquire shares at lower prices. Gantchev and Jotikasthira (2018) find that most of an activist's stakes are acquired during the 60-day window before the 13D regulatory filling is disclosed, which implies that a significant price decline during this period would benefit the activist. We, however, do not find that the presence of large short sellers has large price effects in the 60 days leading to the disclosure of an activist campaign. This suggests that on average, entering a position after a large short seller's disclosure does not significantly reduce an activist's cost to acquire a large block of shares, relative to campaigns for which no large short seller is present.

Our study contributes to several strands of the literature. First, the paper adds to a growing body of work on hedge fund activism that examines the short- and long-term performance of target firms (e.g., Brav et al. (2008), Klein and Zur (2009), and Becht et al. (2017)) and various drivers of activists' targeting decisions (Gantchev and Jotikasthira (2018), Appel et al. (2018), Kedia et al. (2021), and Brav et al. (2020)). However, not much is known about whether and

how the presence of large short sellers influences activists' targeting decisions, their success, and their profitability.

Second, our work also relates to studies on the negative relation between short selling and stock performance (e.g., Asquith and Meulbroek (1995), Jones and Lamont (2002), Asquith et al. (2005), Boehme et al. (2006), Cohen et al. (2007), and Diether et al. (2009)). Jiao et al. (2016) examine joint movements of aggregate short interest and hedge funds' holdings to identify informed demand shocks and the ability of short sellers and hedge funds to forecast stock returns. Jank and Smajlbegovic (2015) find that large short positions disclosed by hedge funds exhibit abnormal risk-adjusted performance of 5% per year, with an even higher return if a hedge fund has a first-mover advantage. Ljungqvist and Qian (2016) and Appel and Fos (2020) find that activist short selling campaigns are associated with negative abnormal returns for targets.

Third, our work links to the literature on investor disagreement (e.g., Miller (1977), Morris (1995), Chen et al. (2001), and Diether et al. (2002)), which focuses on the behavior of unsophisticated investors. A more recent study by Cookson et al. (2021) finds that disagreement among retail investors facilitates an increase in activist ownership and the level of aggregate short selling. Our paper, however, differs from Cookson et al. (2021) in two important ways. First, we focus on the interactions between activists and large short sellers, while Cookson et al. (2021) study whether retail-investor disagreement facilitates informed trading by activists and short sellers but not how activist trading affects short selling or vice versa. Second, in terms of economic mechanisms, we explore the bargaining power vs. cost channels as the driving forces behind our results, while Cookson et al. (2021) investigate the liquidity and valuation mechanisms behind their results.

# 2 Data

## 2.1 Hedge Fund Activism

In the absence of a central database of activist hedge fund campaigns in Europe, we rely on several sources to identify activist campaigns from January 2010 to December 2019. Our data collection comprises a three-step process. First, we obtained a list of all campaigns in Europe between 2010 and 2019 from Activist Insight, which specializes in providing data on activist investing. The data are collected from company disclosures through their investor relations' webpages and/or stock exchanges in the EU.[4] This yields a preliminary list of 1,135 activist campaigns involving 601 unique stocks. For each event, we obtain information on the activist's name, name and country of the target, initial disclosure date, size of the activist's investment, activist demands and tactics, campaign outcome (whether an activist achieves her stated goals), and outcome date. To obtain the International Securities Identification Number (ISIN) for each target firm, we conduct a manual search in Compustat Global.

In the second step, we supplement this initial list with European activism events from SharkRepellent, another data provider specializing in corporate governance, and from Bloomberg. This step yields 279 additional campaigns that are not covered by Activist Insight.

In the final step, for each of the 1,414 events, we compare the disclosure dates, outcome dates, and activist ownership if they exist in more than one database. When there are discrepancies, we read the original company disclosures and conduct news searches in Factiva using the activist and target company names as keywords if the company disclosures are not available. In this paper, we focus on the 795 events that were launched by 338 unique hedge funds.[5] In Appendix Tables A1 and A2, we repeat our main analysis using the remaining events launched

[4]The EU Transparency Directive of 2004 requires disclosure of major holdings in companies listed in Europe. However, blockholder disclosure thresholds differ across countries within the EU. For example, the United Kingdom and Germany currently have a threshold of 3%, while the cutoff in France is 5%.

[5]To determine whether an investment fund is a hedge fund, we rely on Bloomberg, the fund's website, news searches, and a list of U.S. hedge fund names identified by Agarwal et al. (2013).

by individual investors, corporations, and other entities, and compare the results with our main results.

To the best of our knowledge, our sample of hedge fund activism events in Europe is the most comprehensive for the post–financial crisis period. In an international study on hedge fund activism, Becht et al. (2017) collect 380 European hedge fund interventions initiated between January 2000 and December 2010. Our larger sample of events suggests that activist activity in Europe has increased substantially in recent years.

## 2.2 European Short Selling Disclosures

During the 2008 financial crisis, regulators worldwide became concerned about the role of short sellers in exacerbating price movements, adopting various measures to restrict or prohibit short selling for a limited period of time (e.g., Beber and Pagano (2013)). In the EU, each member state was free to set its own regulations due to the absence of a specific common regulatory framework. In March 2012, the European Parliament enacted Regulation (EU) No. 236/2012 to harmonize short selling regulation and disclosure across member states. Notably, Article 6 states that from November 2012 onward any investor (excluding market makers) with a net short position that crosses a threshold equal to 0.5% of shares outstanding in a stock traded on European exchanges must publicly disclose details of the position once and for each additional 0.1% above that. The notification must be made no later than 15:30 on the following trading day, including the name of the shorted stock, its ISIN code, the size of the short position as a fraction of shares outstanding, and the identity of the investor.

One of the reasons cited by the European Parliament in support of the disclosure requirement is that "Enhanced transparency relating to significant net short positions in specific financial instruments is likely to be of benefit to both the regulator and market participants [...] positions should be publicly disclosed to the market in order to provide useful information to other market participants about significant individual short positions in shares."[6] The disclosure

[6]The full text can be found at http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2012:086:0001:0024:en:PDF

requirement provides a unique set-up that allows researchers to investigate the information conveyed by the presence of large short sellers in financial markets (e.g. Jank and Smajlbegovic (2015) and Jank et al. (2021)).

We hand-collect 14,646 individual short position disclosures involving 1,648 stocks from the websites of the National Competent Authorities (NCA) for all 28 EU member states and two European Securities and Markets Authority observers (i.e., Iceland and Norway) from November 2012 to December 2019. Historical short positions are available for 20 developed countries (Austria, Belgium, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Lithuania, Luxembourg, Malta, Netherlands, Norway, Portugal, Slovenia, Spain, Sweden, and the United Kingdom) and four developing countries (Bulgaria, Czech Republic, Hungary, and Poland).[7] Each individual country discloses data in a non-standardized fashion. Some regulators, such as the United Kingdom's Financial Conduct Authority, make their short position data easily accessible in a spreadsheet format. Others, such as Spain's Comisión Nacional Del Mercado De Valores, do not disclose the ISIN codes but just the name of the stocks being shorted. We develop country-specific Python algorithms to retrieve all relevant large short selling position data for these markets and create a comprehensive dataset of European short selling disclosures.

## 2.3 Equity Lending and Aggregate Short Selling

The data used to measure aggregate short selling activity are provided by Markit, which compiles statistics in the equity lending market from major participants in this market, such as custodians, lending agents, and prime brokers, for securities all over the world (see, e.g., Saffi and Sigurdsson (2011)). Short sellers must borrow shares for delivery in the equity lending market, with the vast majority of stock loans being made with the purpose of settling short sales (Aggarwal et al. (2015)). The data are available at a daily frequency. For each stock, we observe the number of shares available for borrowing, the number of shares effectively borrowed, and the average loan fee. The proxy for aggregate short selling activity in a given stock is

[7] For the remaining markets—Croatia, Cyprus, Estonia, Latvia, Romania, and Slovakia—there were no short position disclosures during our sample period.

*On Loan*, defined as the end-of-quarter quantity of shares borrowed as a percentage of shares outstanding.

### 2.4 Other Data Sources

We merge data from several other sources with our sample. Financial accounting and stock return information is from Compustat Global. Institutional ownership data come from Thomson Eikon. CEO compensation, including pay components, and turnover data are from BoardEx. As BoardEx's compensation data cover less than 20% of our sample firms, we supplement them by manually extracting pay information from firms' annual reports and proxy statements. Information on mergers and acquisitions is from the Securities Data Company database. Our final sample includes 4,480 firms with available stock prices and accounting measures for the sample period from January 2010 to December 2019. Of these 4,480 unique firms, 9.73% are targets in one of the 795 activist events at least once and 33.5% have at least one large short seller.

## 3 Descriptive Statistics

### 3.1 Activist Campaigns

In Table 1, we present summary statistics for activist campaigns in Europe. In Panel A, we report statistics on activist campaigns and a number of country-level metrics related to activism, broken down by target country. First, the 795 activist campaigns are unevenly distributed across countries, with 65% concentrated in just three countries: the United Kingdom, Germany, and Italy. Second, about 70% of all the campaigns are launched by European activists. In 59% of the campaigns, the activist is a foreign hedge fund (either based in other European countries or on other continents), often from the United States (25.4%). For instance, nearly all campaigns in Italy are launched by foreign hedge funds. In contrast, only 39.5% of events in

the United Kingdom involve foreign funds, with most of them coming from the United States. Third, success rates exhibit large differences across countries, even among countries with the largest number of events (e.g., 70.0% for Italy and only 59.4% for the United Kingdom). We also find similarities across countries. Although there is some dispersion in activist ownership, it is lower than 10% for most countries, suggesting that activists are minority holders who need support from institutional investors.

TABLE 1 ABOUT HERE

In Panel B, we report statistics on campaign outcomes, grouped by activist demands. Following Greenwood and Schor (2009) and Brav et al. (2010), we classify activist demands into six major categories: (1) business strategy (excess diversification or investment, and poor operational efficiency), (2) capital structure (dividends or stock repurchases, equity issuance, restructuring debt, and recapitalization), (3) corporate governance (board declassification, replacing directors or management, removing takeover defense, management compensation, and a lack of disclosure or fraud), (4) opposing merger (either target or acquirer), (5) sale of firm or assets, and (6) general activism to maximize shareholder value. The objectives, except the last, are not mutually exclusive, as one activist campaign can target multiple issues.

As shown in Panel B, 56.7% of all campaigns are related to corporate governance, with the sale of firm or assets ranking the second (21.0%). Outcomes are available for 94.3% of the campaigns, with approximately 61.4% successful, and activists achieve at least one of their stated goals. The overall success rate is close to that found for campaigns taking place in the United States (Brav et al. (2008) and He and Li (2022)).

In untabulated analysis, we find that the average dollar investment is $195 million, substantially greater than the median dollar investment of $40 million, while the difference between the average (9.4%) and median (5.6%) ownership fraction is less dramatic. This suggests that the distribution of target size is skewed towards large deals. The level of ownership is comparable to that reported in the U.S. sample (Brav et al. (2008) and Gantchev (2013)).

In addition, in Figure 1 we plot the annual number of activist campaigns and the associated success rates over our sample period. Activism has generally increased over the years, while success rates have trended down. This suggests that when more activists are searching for targets, low-hanging fruit becomes scarcer.

FIGURE 1 ABOUT HERE

## 3.2 Large Short Positions and Aggregate Short Interest

In Panel A of Table 2, we show summary statistics on large short selling positions across European markets. During our sample period running from January 2010 to December 2019, 1,648 stocks are shorted by 1,223 unique large short sellers. The United Kingdom has the largest number of large short selling positions, with 581 stocks shorted by 468 unique large short sellers. For the EU as a whole, the average (median) short position as a percentage of outstanding shares is 2.06% (1.18%), with a modest variation across countries.

TABLE 2 ABOUT HERE

Panel B reports aggregate short interests for our sample firms, including both firms with and without large short positions. The average short interest is 0.87% and the median equals 0.08%. Firms in larger markets, such as those in the Netherlands and United Kingdom, generally have a higher short interest, while smaller markets, such as Greece and Hungry, see little shorting activity.

## 3.3 Target Company Characteristics

We organize our merged data by quarter before analyzing them. In Table 3, we present statistics for the target companies. Columns (1)-(3) report the averages, medians, and standard deviations for major firm characteristics, and columns (4)-(7) show the differences relative to

two alternative sets of matched firms. In columns (4)-(5), each firm targeted by an activist is matched to other firms in the same six-digit GICS industry and year. In columns (6)-(7), the matched firm is the one with the closest market capitalization in the same six-digit GICS industry and year as the target.

TABLE 3 ABOUT HERE

Relative to industry-year matched companies, firms targeted by activist hedge funds are more likely to have large short positions disclosed. The level of aggregate short selling is also greater in target companies. The differences are all significant at the 1% level. Target firms are more liquid and held by more institutional owners, whose support is crucial for the activist to prevail (Jiang et al. (2018) and Brav et al. (2023)). Interestingly, target companies are larger than non-targets in Europe, consistent with a finding in Becht et al. (2017). Compared with peers in the United States, European firms are owned by fewer institutions and are less liquid, implying that activists need to target relatively large firms to increase the odds of a successful campaign. Targets have a lower market-to-book ratio and Tobin's $q$, which are associated with undervaluation. Relative to their matched peers, targets have lower dividend yields (not significant at the 10%), suggesting that one goal for activists is to seek higher payouts. These patterns are broadly consistent with those in Brav et al. (2008). In columns (6)-(7), the differences in short sales variables between target firms and the industry-year-size matched sample are similar to those in columns (4)-(5), but differences of other firm characteristics generally have lower statistical significance.

# 4 Short Selling Disclosures and Hedge Fund Activism

## 4.1 Activism following Short Selling Disclosures

We start our analysis by testing the hypothesis that the likelihood of activist campaigns increases with the presence of large short sellers. Our regression specification has the following form:

$$D(Activist\ Targeting)_{i,c,t} = \alpha + \beta \times SS_{i,c,t-1} + \gamma' \times \mathbf{X}_{i,c,t-1} + \psi_c + \theta_t + \epsilon_{i,c,t}. \quad (1)$$

The dependent variable, *D(Activist Targeting)*, is an indicator variable equal to one if there is an activist campaign announcement targeting firm $i$ in country $c$ in quarter $t$ and zero otherwise. We use two measures of short selling activity (*SS*): (i) *D(Large Short)* is an indicator variable equal to one if there is at least one reported large short position in quarter $t-1$ and zero otherwise, and (ii) *Large Short Interest* is the sum of disclosed short selling positions at the end of quarter $t-1$ as a fraction of outstanding shares. We include in the matrix $\mathbf{X}$ several firm-level controls discussed in Section 3. We also include end-of-quarter *On Loan*, which controls for the effect of aggregate short interest on activist targeting decisions. Country-fixed effects are captured by the parameter $\psi_c$ and time-fixed effects by $\theta_t$. Standard errors are clustered at the firm level.

In Table 4, we report the probit coefficients and their associated marginal probabilities.[8] Consistent with the results in Table 3, we find that, all else being equal, the presence of large short sellers has a positive effect on the likelihood of activist targeting. The probability of an activist intervention is 0.14 percentage points higher when a short seller is involved in the previous quarter (significant at the 5% level), which amounts to 22.6% of the unconditional probability of targeting. Similarly, a one-standard-deviation increase in large short interest

[8]The results from a linear probability model with country- and time-fixed effects are qualitatively similar.

is associated with a 0.21-percentage-point increase in hedge fund activism. Relative to the unconditional probability of activism of 0.62%, the incremental probability is meaningful. It is worth noting that we obtain the results after controlling for a firm's aggregate short interest (proxied by *On Loan*), which also positively predicts the occurrence of activism. However, the marginal effect of the aggregate short interest is smaller compared to the marginal effect of large short sellers, suggesting that activist hedge funds pay particular attention to and take cues from individual short sellers' disclosures.[9]

TABLE 4 ABOUT HERE

The effects of the other firm controls largely confirm our univariate results reported in Table 3. Consistent with prior literature on hedge fund activism (e.g., Brav et al. (2008), Klein and Zur (2009), and Becht et al. (2017)), activists tend to target firms with low market-to-book ratios, stock returns, or dividend yields. This suggests that activists aim to reduce underperformance and seek higher payouts.

To mitigate the concern that firms targeted by activists might be intrinsically different from non-targeted firms, we use propensity score matching to control for observable differences between targeted and non-targeted firms (e.g., Cremers et al. (2018)). The procedure is detailed in Appendix I. Our main findings remain unchanged when we use the matched sample to re-estimate Equation (1).

## 4.2 Changes in Short Positions following Activism

Next, we examine whether the likelihood of short sellers establishing a new position or increasing an existing short position relates to the presence of an activist hedge fund. Our specification

[9] As shown in column (2) of Table 4, a one-standard-deviation increase in aggregate short interest is associated with a 0.05-percentage-point increase in hedge fund activism. This amounts to 8.03% of the unconditional probability of targeting.

takes the following form:

$$D(\Delta(\textit{Large Short})<0)_{i,c,t} = \alpha + \beta \times D(\textit{Activist Targeting})_{i,c,t-1} + \gamma' \times \mathbf{X}_{i,c,t-1} + \psi_c + \theta_t + \epsilon_{i,c,t}, \quad (2)$$

in which $D(\Delta(\text{Large Short}) < 0)$ is a dummy variable equal to one if the total size of reported large short selling positions in firm $i$ in country $c$ decreases from quarter $t-1$ to quarter $t$ and zero otherwise. *D(Activist Targeting)* is an indicator equal to one if a firm is targeted by an activist in quarter $t-1$ and zero otherwise. All the other controls are identical to those in Equation (1). As shown in column (1) of Table 5, the results from a probit model suggest that the probability of a reduction in disclosed positions by large short sellers is 1.57 percentage points higher in the presence of an activist hedge fund, which amounts to 16.3% of the unconditional probability. Using estimates in column (1c), we calculate that a one-standard-deviation increase in *On Loan* is associated with a 4.8-percentage-point increase in the marginal probability of having a large short seller.

TABLE 5 ABOUT HERE

In addition to being associated with a subsequent decrease in the presence of large short sellers, hedge fund activism may also change the aggregate supply and demand for shorting stocks. The evidence of long-run price increases following hedge fund activism campaigns, as shown in Brav et al. (2008), may be used as a signal by some (small) short sellers to reduce their positions. As reported in column (2), activism negatively predicts aggregate short selling in the quarter following an activist campaign announcement. Using the estimates in column (2c), we find that the presence of activists is associated with a 8.2-percentage-point decrease in the marginal probability of aggregate short selling activity.

Lamont (2012) shows that firms react to short selling, coordinating with large shareholders to restrict the supply of shares available. More generally, the availability of shares for shorting depends on the ownership structure of a firm. Porras Prado et al. (2016) find that lending supply is lower following the disclosure of a 13D filing by activists targeting U.S. firms. Indeed,

column (3) shows that European activist campaigns are also associated with a lower probability of higher lendable supply, with a marginal probability of 7.0%.[10]

Overall, the evidence presented in Subsections 4.1 and 4.2 supports our hypothesis that activist hedge funds are more likely to target a firm when large short sellers are present. However, the reverse is not true: large short sellers are less likely to target a company involving an activist campaign. This is consistent with short sellers facing high costs and risks associated with shorting activity (Porras Prado et al. (2016) and Engelberg et al. (2018)). In the remainder of this paper, we focus our attention on how short sellers affect hedge fund activism and post-activism outcomes.

### 4.3 Establishing Causal Effects

An activist hedge fund's decision to target a particular firm might be related to unobserved characteristics that are also used by short sellers when deciding whether to short the stock. This raises concerns about reverse causality and simultaneity, which cannot be addressed by matching estimators and can potentially bias our estimates. In this subsection, we employ the harmonization of short selling regulation across the EU as our identification strategy to mitigate these concerns.

The EU's harmonized short sale disclosure requirements became effective on November 1st, 2012 for all member countries. Before this date, three countries – France, Spain, and the United Kingdom – had already implemented alternative large short sale disclosure regimes (Jones et al. (2016)).[11] This staggered adoption of short selling rules across EU countries allows us to study activist targeting decisions using a difference-in-differences (DiD) estimation strategy.

[10] In Appendix Table A3, we report qualitatively similar results when using changes in aggregate short interest and lendable supply as respective dependable variables instead of dummy variables for such changes.

[11] In September 2008, France and Spain mandated the disclosure of individual short positions in financial stocks, which expanded to all Spanish stocks in June 2010 and all French stocks in February 2011. In January 2009, the United Kingdom set up short position disclosure requirements for financial stocks and stocks in a rights issue period.

Relative to stocks in countries that already had disclosure requirements in place (i.e., France, Spain, and the United Kingdom), stocks without disclosure requirements before November 2012 should exhibit an increase in the likelihood of activist campaigns as a result of the availability of short sellers' signals. Crucially, the change in disclosure requirements provides a plausible source of exogenous variation about the composition of short sellers. For example, a stock with only 0.25% of its outstanding shares being lent out would not, by definition, have any large short positions that require disclosure after November 2012. Firms with a higher *aggregate* short interest before November 2012 are more likely to have large *individual* short positions above the minimum disclosure level. In turn, this makes treated firms with large ex-ante aggregate shorting positions more likely to exhibit an increase in the probability of being targeted after November 2012 relative to those with small aggregate short positions.[12]

We utilize quarterly data during the six quarters before and after November 2012, with a total of 30,053 stock-year-quarter observations. The indicator variable *Post* equals one for periods after November 2012, when the disclosure rule was in effect, and zero otherwise. *Treat* equals zero for stocks traded in France, Spain, and the United Kingdom that were subject to short sale disclosure rules before November 2012 and one otherwise. Our treatment group comprises stocks in which investors are subject to large short sale disclosure requirements starting from November 2012. We also use *On Loan* as a proxy for end-of-quarter aggregate short selling (*SS*).

We estimate the following linear probability model:

$$\begin{aligned} D(\textit{Activist Targeting})_{i,c,t} \;=\; & \alpha + \beta_1 \times Post_t + \beta_2 \times Treat_i + \beta_3 \times SS_{i,c,t-1} \\ & + \delta_1 \times Post_t \times Treat_i + \delta_2 \times Post_t \times SS_{i,c,t-1} \\ & + \delta_3 \times Treat_i \times SS_{i,c,t-1} + \delta_4 \times Post_t \times Treat_i \times SS_{i,c,t-1} \\ & + \gamma' \times \mathbf{X}_{i,c,t-1} + \psi_c + \theta_t + \epsilon_{i,c,t}. \end{aligned} \tag{3}$$

[12] We find that 43.8% of stock-quarter observations in the top quintile of *On Loan* (i.e., aggregate short interest) have a large short position disclosed, but only 3.8% of those in the bottom quintile of *On Loan*. The correlation between aggregate short selling and an indicator for large short positions is 0.4 in our sample.

The main parameter of interest is $\delta_1$. A positive value indicates that stocks in the treatment group (i.e., *Treat*=1) are more likely to be targeted by activists after the large short sale disclosure requirement is implemented (i.e., *Post*=1). In some specifications, we also include firm-fixed effects ($\psi_c$) and year-quarter-fixed effects ($\theta_t$). We note that adding these fixed effects makes the time-invariant variable *Post* and firm-invariant variables (*Treat* and *On Loan*) redundant, eliminating them from the estimation output.

We present the estimated coefficients in Table 6. The estimates under column (1) show that the cross-product (*Post*× *Treat*) is positive and statistically significant at the 1% level. This implies that firms without prior short sale disclosure requirements become more likely to be targeted by activists *after* November 2012, when regulation was harmonized across EU countries, compared with firms that already had them. The estimated coefficient implies a marginal increase of 0.5% in targeting probability, an economically significant effect given that the unconditional sample targeting probability is 0.35%. The results are similar in column (3) after controlling for firm- and year-quarter-fixed effects.

Table 6 About Here

In column (2), we include aggregate short interest and its triple interaction term with *Post* and *Treat*. The results suggest that treated firms with high *On Loan* are even more likely to be targeted by activists after the November 2012 policy change. In column (4), we further include year-quarter-fixed effects and firm-fixed effects. The estimated coefficient on the triple interaction term becomes slightly larger and is statistically significant at the 5% level. To summarize, our results are consistent with the conjecture that an exogenous shock to information about the presence of large short sellers leads to an increase in the likelihood of a firm being targeted by activists. This effect is even larger for firms with a higher aggregate short interest activity since they are more likely to have large short positions.

#### 4.3.1 Placebo Tests

The key identifying assumption in DiD models is that, in the absence of treatment, the treatment group exhibits similar trends to the control group. Although the parallel trend assumption is not directly testable, the literature often resorts to a placebo test, demonstrating parallel trends in the pre-period. Unlike the never-treated groups typically found in DiD studies, our case is slightly different; as of the beginning of our sample period, six quarters before November 2012, the *control group* was already treated: UK stocks undergoing rights issues were subject to a disclosure rule from June 2008, UK financial stocks from January 2009, all Spanish stocks from June 2010, and all French stocks from February 2011.

We regress *D(Activist Targeting)* on quarterly indicator variables, interacted with the *Treat* indicator, and plot the coefficients along with their confidence intervals in Figure 2. The second quarter of 2012, or -1 relative to the final treatment date in November 2012, is set as the baseline period. In line with our assumptions, we observe negative coefficients for quarter -3 to quarter 0, with those for quarter -2 and quarter 0 being significant at the 5% level. This implies a higher likelihood of an activist campaign targeting the control group—French, Spanish and UK stocks that received the treatment prior to November 2012. However, none of the post-treatment coefficients are significant, suggesting that the effect between control and treated stocks does not exhibit any meaningful difference after November 2012.

FIGURE 2 ABOUT HERE

As a further robustness analysis, we re-estimate Equation (3) around "pseudo-event times" that are set to one year before and after the actual policy change implemented in November 2012. The treatment and control groups are identical to those used in Section 4.3. As reported in Appendix Table A4, none of the estimated coefficients on the cross-product (*Post*× *Treat*) or triple interaction term is significant at the 10% level, supporting our identification strategy.

# 5 Short Positions and Activists' Profitability

We now examine the profitability of activist campaigns and how it is affected by the presence of large short sellers. We employ a standard calendar-time portfolio approach, examining the returns of a strategy that is long all stocks with an unresolved campaign on a given day. Abnormal returns (*Alpha*) are computed using a four-factor model, the factors of which are *MKT*, *SMB*, *HML*, and *UMD*, and annualized by multiplying the daily estimated alpha by 252.

In Table 7, Panel A, we report average abnormal returns for four value-weighted portfolios based on whether a stock subject to an activist campaign has a large short position in the previous quarter or not and whether a campaign is successful or not. In columns (1a)-(2b), we find a large difference when conditioning returns on the presence of at least one large short position in the previous quarter. Activists make higher abnormal profits in campaigns *with* the presence of large short positions, rationalizing our previous findings that activists are more likely to target companies involving large short sellers. The annualized alpha in column (1a) for campaigns initiated with large short positions is 12.9% and statistically significant, while in column (2a) we find that campaigns without the presence of large short sellers exhibit a lower abnormal return of 4.7%, which is not significant at the 10% level. In columns (3a)-(4b) we report portfolio returns conditional on whether a campaign is successful or not. As expected, we find that abnormal returns are positive and statistically significant for campaigns in which activists achieve their stated goals. The performance is worse for *Unsuccessful* campaigns, resulting in lower returns.

TABLE 7 ABOUT HERE

In Panel B, we estimate abnormal returns of double-sorted portfolios based on the campaign outcome and on the presence of a large short position. While not an implementable strategy, these conditional portfolios allow us to rationalize activists' targeting decisions. Results in

columns (1a)-(2b) show that the presence of large short sellers is associated with statistically significant positive abnormal performance only if the campaign is successful ($L + S$), with an average return higher than successful ones without large short sellers ($N + S$). These results are consistent with the hypothesis that activism generates higher returns when large short sellers are presem. In addition, the results from columns (3a)-(4b) in Panel B show that when large short sellers are not present the activists still achieve positive abnormal returns in successful campaigns, while in failed campaigns they do not. In the latter, abnormal returns are lower and not statistically different from zero.

# 6 Why Activists are Attracted to Firms with Large Short Sellers

In this section, we explore why activists are attracted to firms with the presence of large short sellers. We first study whether large short sellers make it more likely that an activist's campaign will succeed, and then explore how the presence of these short sellers increases her bargaining power with the targeted firm's management. Additionally, we also investigate whether there is a cost channel through which activists benefit from the lower stock prices following the announcement of a large short position.

## 6.1 Short Positions and Activists' Campaign Success

Corporate managers clearly care about long-term share prices because of their fiduciary duties to shareholders and the desire to accumulate personal wealth. Edmans et al. (2017) show that the largest component of U.S. CEOs' compensation comes from performance-based stock grants, the value of which is positively related to future stock returns. Further, the probability of forced CEO termination is higher for firms with poorer performance (Jenter and Lewellen (2020)). Becht et al. (2008) show that activists generate abnormal returns through engagement rather than stock picking. Therefore, managers may be more open to accepting activists'

demands when facing pressure from large short sellers, leading to more successful activist campaigns.

The superior abnormal returns following activist campaigns in the presence of large short sellers might be attributable to activists being more likely to achieve their goals. We examine this possibility by replacing the dependent variable in Equation (1) with *D(Activist Success)*, defined as an indicator variable equal to one if an activist achieves at least one stated goal of her campaign and zero otherwise. The sample includes all activist interventions with available covariates in our sample. Column (1) of Table 8 shows that the presence of large short sellers is associated with a 15.7-percentage-point increase in activists' success probability, with the coefficient significant at the 5% level. This is economically large relative to the 62% unconditional probability of success.

TABLE 8 ABOUT HERE

We also expect that activists have more bargaining power and can generate more material changes to the firm with the support of institutional investors, as suggested by Brav et al. (2020) and He and Li (2022). Column (2) reports that an increase in blockholders' ownership—that is, those that own more than 5% of outstanding shares—makes it more likely that activists will achieve their stated goals in the presence of large short sellers. Similarly, column (3) shows that activist success is more sensitive to short sellers' involvement when the Herfindahl-Hirschman index of institutional ownership is higher. These results provide indirect evidence that when facing pressure from large short sellers, management is more likely to accept the demands of activists that have stronger support by large institutional shareholders.[13]

Overall, our results rationalize activists' targeting decisions: they are more likely to be successful in achieving their campaign objectives.[14]

[13] Appendix Table A5 reports similar results using a linear probability model.

[14] Due to the small number of observations, we cannot use our DiD estimation strategy to analyze the probability of activists' campaign success.

## 6.2 Bargaining Power of Activists

The previous subsection provides suggestive evidence that management is more likely to cooperate with activists when large short sellers are present. The presence of large short sellers, who are likely informed investors, leads to lower share prices in the long run (Jank and Smajlbegovic (2015)). In turn, lower prices reduce firms' ability to raise capital and performance-based compensation, which is a large component of CEOs' compensation (Edmans et al. (2017)). Furthermore, Kunzmann and Meier (2018) find that short selling increases the probability of CEO turnover, which can also make management more willing to engage with activists. Therefore, the pressure exerted on management by large short sellers can increase an activist's bargaining power and make managers more receptive to the activist's demands. In this subsection, we provide direct evidence of this bargaining power channel.

First, we examine whether activists employ less hostile tactics—which are also less costly and increase the returns to activism—in the presence of large short sellers. We focus on the sample of firms that were targeted by activists during our sample period. As shown in column (1) of Table 9, the likelihood of an activist seeking board seat(s) is 14.2 percentage points lower when large short sellers are present, controlling for aggregate short interest and firm-level covariates. The estimate is significant at the 5% level. The magnitude is substantial given that the unconditional probability of seeking board seats is 44%. Similarly, when large short sellers are present, activists are 9.7 percentage points less likely to launch a proxy contest, another costly and risky type of activist intervention (Gantchev (2013), Fos (2017), and Brav et al. (2020)).

Table 9 About Here

Next, we examine corporate policies after activist campaigns. Column (3) shows that the growth rate in CEO compensation in the three years after activism is 37.0 percentage points lower in the presence of large short sellers, consistent with the notion that activism becomes

more effective in improving governance when management faces pressure from short sellers.[15] However, while column (4) suggests that activism-induced CEO turnover marginally increases with aggregate short interest, it is unrelated to the presence of large short sellers. When large shorts are present, a firm targeted by an activist is 11.5 percentage points more likely to be acquired by another firm in the three-year period after activism. These results suggest that management becomes less resistant to acquisitions, which are often facilitated by activists (Boyson et al. (2017)). Activists are also better able to improve operating performance, as indicated by a higher return on assets three years after activists' disclosures, when large short sellers are involved.[16]

Finally, the longer an activist campaign lasts, the more costly it is for the activist, who shoulders all the costs associated with activism but shares with other equity holders the benefits of a successful campaign. To assess the extent of such costs, we link the duration of activist campaigns to the presence of large short sellers. Specifically, we use the Cox (1972) proportional hazards model to estimate the hazard rate on a daily frequency for activist campaign resolution.[17] The dependent variable is the number of days between an activist's disclosure and the campaign's resolution. As reported in column (1) of Table 10, the estimated hazard ratio associated with the indicator variable *D(Large short)* implies that, conditional on a campaign being in process, the probability of a campaign resolution on a given day is about 27% higher in the presence of large short sellers. The coefficient estimate is significant at the 5% level. This result is not simply due to aggregate short selling. We obtain slightly stronger results when aggregate short interest is controlled for, as reported in column (2). Overall, the involvement of large short sellers is associated (both economically and statistically) with a shorter duration of activist campaigns.

TABLE 10 ABOUT HERE

[15] We do not focus on stock-based CEO compensation because the majority of European firms, 81.4% of our sample firms, do not grant equity pay. For those that use stock-based pay, the equity portion is less than 15% on average.

[16] We obtain qualitatively similar results when using return on assets two years after activists' disclosures.

[17] In the Cox model, the hazard function at a given time $t$ (from activist disclosure), conditional on the failure to resolve a campaign, is given by $h_i(t) = h_0(t)e^{X_i\beta}$, where $h_0(t)$ is an unspecified (or non-parametric) function.

Overall, the evidence presented in this subsection indicates that, faced with pressure from significant short sellers, corporate managers are more receptive to activists' demands, resulting in less hostile tactics, a short duration of campaigns, and more favorable post-activism outcomes.

## 6.3 The Cost Channel

The announcement of a large short position leads to an immediate decrease in the stock price (Jank et al. (2021)), which can lower an activist's cost of accumulating a block of shares. This is an alternative potential channel through which activists can achieve superior returns. In this subsection, we examine the importance of this channel by examining abnormal returns during the period when activists are accumulating shares.

Collin-Dufresne and Fos (2015) show that U.S. activists that file 13D forms consistently purchase targeted stocks from at least 60 calendar days before the activism announcement to the day before the announcement. The activity peaks on day -10 when activists cross the regulatory reporting threshold. Although certain European countries have a grace period shorter than 10 days for reporting purposes (e.g., two and four business days for investors acquiring 3% of the outstanding stock in the United Kingdom and Germany, respectively), it is reasonable to believe that most activists would have acquired the bulk of their holdings in the 10-day period before their announcements.[18] Therefore, for stocks targeted by activists, we mainly compare cumulative abnormal returns (CARs) during the [-60, -10) window for stocks involving large shorts versus those without, where day 0 represents the date of activist announcement.

To motivate our tests, in Figure 3 we plot the four-factor adjusted CARs, which are cumulative daily excess returns after adjusting for the Fama-French plus momentum factors, using a window running from 60 days before an activist campaign announcement to 30 days after the announcement. The estimation window runs from 365 days to 80 days prior to the activist

[18] Gantchev and Jotikasthira (2018) find that the average activist purchases 2.65% of the target's outstanding shares from day -60 to day -10, representing 62.4% of her total acquisition in the 60-day period before filing.

announcement. Our factors (*MKT*, *SMB*, *HML*, and *UMD*) are obtained from AQR Capital Management's website, where *MKT* is the European market returns in excess of risk-free rates, and the other factors are calculated based on European market data, following Fama and French (1996) and Asness and Frazzini (2013).[19]

FIGURE 3 ABOUT HERE

Figure 3 shows that the average CAR during the [-60, -10) window is virtually zero when at least one large short seller is present, while the CAR [-60, -10) is 1.3% on average when large short sellers are not involved. More formally, we regress CAR [-60, -10) on the large short indicator, controlling for firm characteristics and time- and country-fixed effects. As reported in column (1) of Table 11, the coefficient on *D(Large short)* is close to zero and statistically insignificant, suggesting that the average activist's cost of accumulating a block of shares is *not* significantly lower in the presence of large short sellers, relative to cases without large shorts' involvement. As shown in column (2), CAR [-10, -1], which is the CAR during the 10-day period before activist disclosures, is 2.5 percentage points higher for stocks involving large short sellers. This suggests that if activists continue to accumulate shares during this 10-day window, their costs are likely to be higher when large shorts are present.[20]

TABLE 11 ABOUT HERE

Unlike in the U.S., where activists are required to submit 13D fillings at most 10 days after reaching the ownership threshold, many European countries (e.g., the United Kingdom and Germany) have shorter disclosure windows. To account for the possibility that activists in Europe would continue to accumulate shares after day $t$-10, in column (3) we use CAR [-60, -4)

[19] See https://www.aqr.com/Insights/Datasets/Betting-Against-Beta-Equity-Factors-Daily

[20] Cookson et al. (2021) show that disagreement among retail investors facilitates informed trading by activists as well as short sellers. In unreported tests, we do not find any statistical difference in the effects of large short sellers on pre-disclosure CARs between stocks with high and low levels of disagreement, proxied by the dispersion of analyst forecasts. We also find no differences based on campaigns sorted by illiquidity or the expected net benefits of activism measured by Gantchev and Jotikasthira (2018).

to test whether large short sellers affect stock returns before an activism campaign disclosure. The coefficient on *D(Large short)* is close to zero and insignificant. These results show that the cost channel is not an important one for the typical campaign in our sample.[21]

It is important to note that these results do not suggest that activists do not benefit from firms' expected share underperformance after short selling. Given that the average large short seller in our sample built her position 226.8 days before an activist's disclosure, by the time the activist begins to accumulate the bulk of shares, the share price is likely already underperforming.

# 7 Conclusion

This paper studies events in which two types of sophisticated investors—activist hedge funds and large short sellers—target the same stock, using data on European activist campaigns between January 2010 and December 2019 and EU-wide disclosures of short positions exceeding 0.5% of shares outstanding. We find that the presence of large short positions has a positive effect on the likelihood of activist targeting. In contrast, the presence of activist hedge funds is associated with a reduction in subsequent shorting activity by large short sellers, potentially attributable to heightened short-squeeze risk and higher costs of shorting due to a reduction in the lendable supply of shares.

We also use the pan-European harmonization of short selling disclosure requirements in November 2012 as a plausible exogenous shock to estimate how hedge fund activism is causally related to information about the presence of large short sellers. We find that in the period after November 2012, EU firms without prior disclosure requirements exhibit an increase in the likelihood of activist campaigns relative to firms in France, Spain, and the United Kingdom that already faced disclosure rules. This effect is more pronounced for stocks with larger aggregate short selling intensity.

[21] Given the price jump observed after an activist's disclosure in Figure 3, it might be less costly for large short sellers to enter the market as the downside risk is potentially higher. The fact that large short sellers do not increase their positions post-activism, as reported in Table 5, also suggests that the cost channel may not be of first-order importance.

A calendar-time portfolio approach shows that hedge fund activism generates higher abnormal returns in the presence of large short sellers, especially when activists achieve their stated goals. Our tests indicate that this result is consistent with activists having more bargaining power relative to managers when the latter face pressure from short sellers. These results rationalize activists' decisions to launch campaigns more frequently in stocks targeted by large short sellers.

Our conclusions are useful for investors and regulators considering the profitability of activist campaigns and the impact of sophisticated and large investors trading shares of the same firm. For regulators, our study provides an analysis of the effects of changes in disclosure requirements for large short sellers, which have been discussed in the context of the U.S. Securities and Exchange Commission's proposed short sale disclosure rule (Proposed Rule 13f-2). Knowledge about their presence can affect the behavior of other market participants, including an increase in the likelihood of investor activism that meaningfully affects corporate actions and outcomes.

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**Figure 1. Activist Campaigns and Their Success Rates Over Time**
This figure plots the annual number of activist campaigns in Europe from 2010 to 2019 (left axis) and the associated success rate (right axis). A campaign is deemed successful if the activist achieved at least one stated goal.

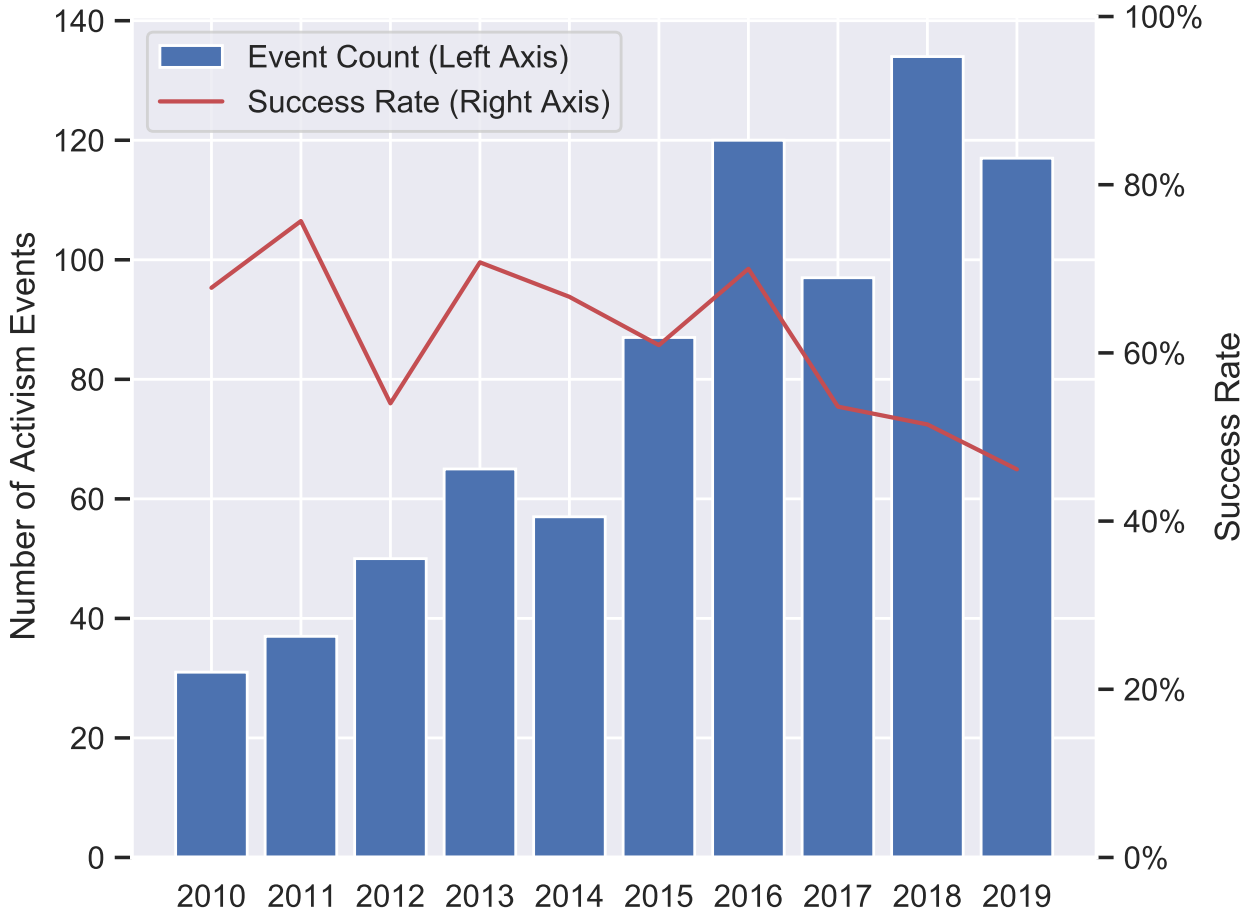

**Figure 2. Pre- and Post-Event Differences Between Short Sale Disclosure Regimes**
We regress *D(Activist Targeting)* on quarterly indicator variables, interacted with the *Treat* indicator, and controls, and then plot the coefficients along with their 95% confidence intervals in this figure. The sample period runs from Q2 2011 to Q2 2013, with Q2 2012 being the baseline period ($t = -1$). *D(Activist targeting)* is an indicator equal to one if a firm is targeted by an activist in quarter $t$ and zero otherwise. *Treat* equals zero for stocks that were subject to short sale disclosure rules prior to November 2012, which include all stocks traded in France and Spain, as well as financial stocks and stocks that underwent rights issues in the United Kingdom, and one otherwise.

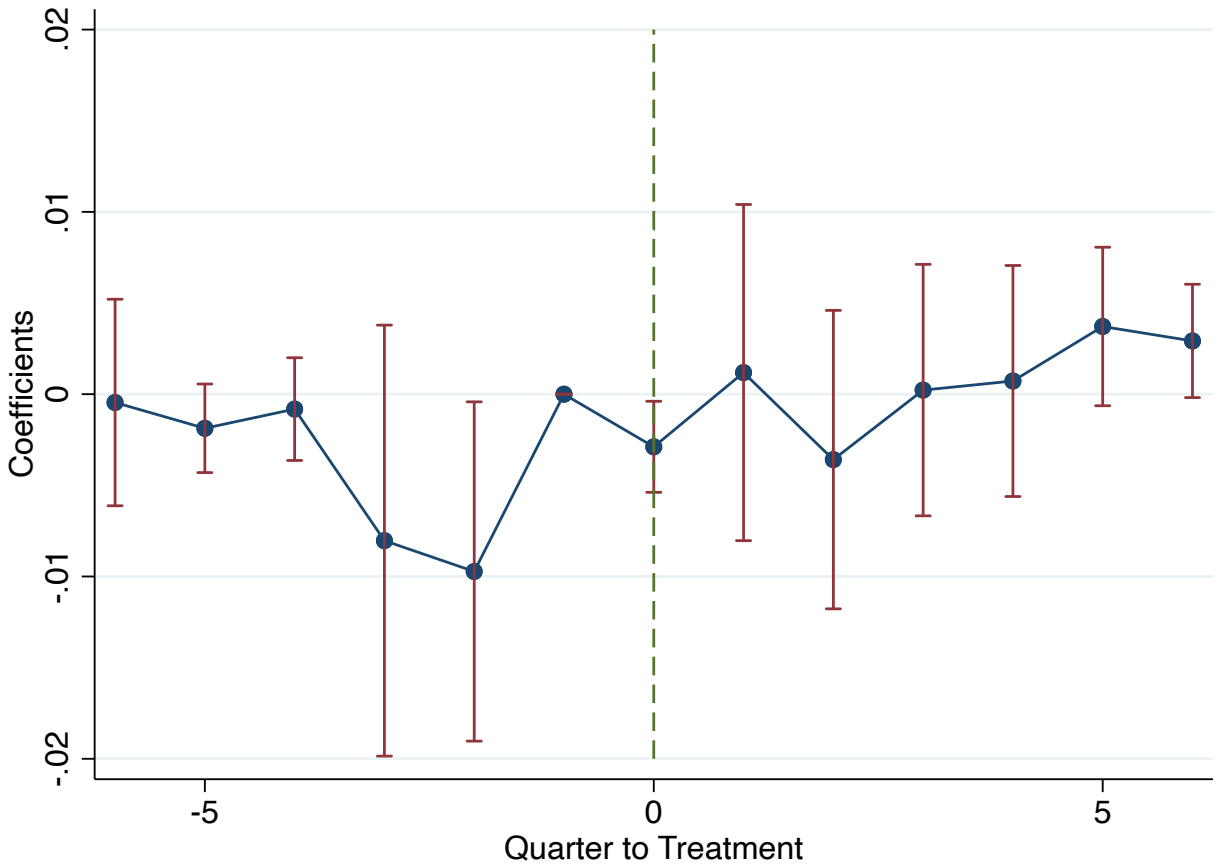

**Figure 3. Cumulative Abnormal Returns Around Activist Announcements**
This figure plots average cumulative abnormal returns (CARs) from 60 calendar days before to 30 calendar days after activist campaign announcements. CARs are sums of daily excess returns after adjusting for the Fama and French (1993) plus momentum factors, with an estimation window runs from 365 to 80 calendar days prior to activist announcements. Our factors (*MKT*, *SMB*, *HML*, and *UMD*) are obtained from AQR Capital Management's website, where *MKT* is the European market returns in excess of risk-free rates, and the other factors are calculated based on European market data, following Fama and French (1996) and Asness and Frazzini (2013). The yellow line represents the average cumulative return for firms with at least one large short position in the quarter before activist announcements. The blue line represents the average cumulative return for firms without any large short position.

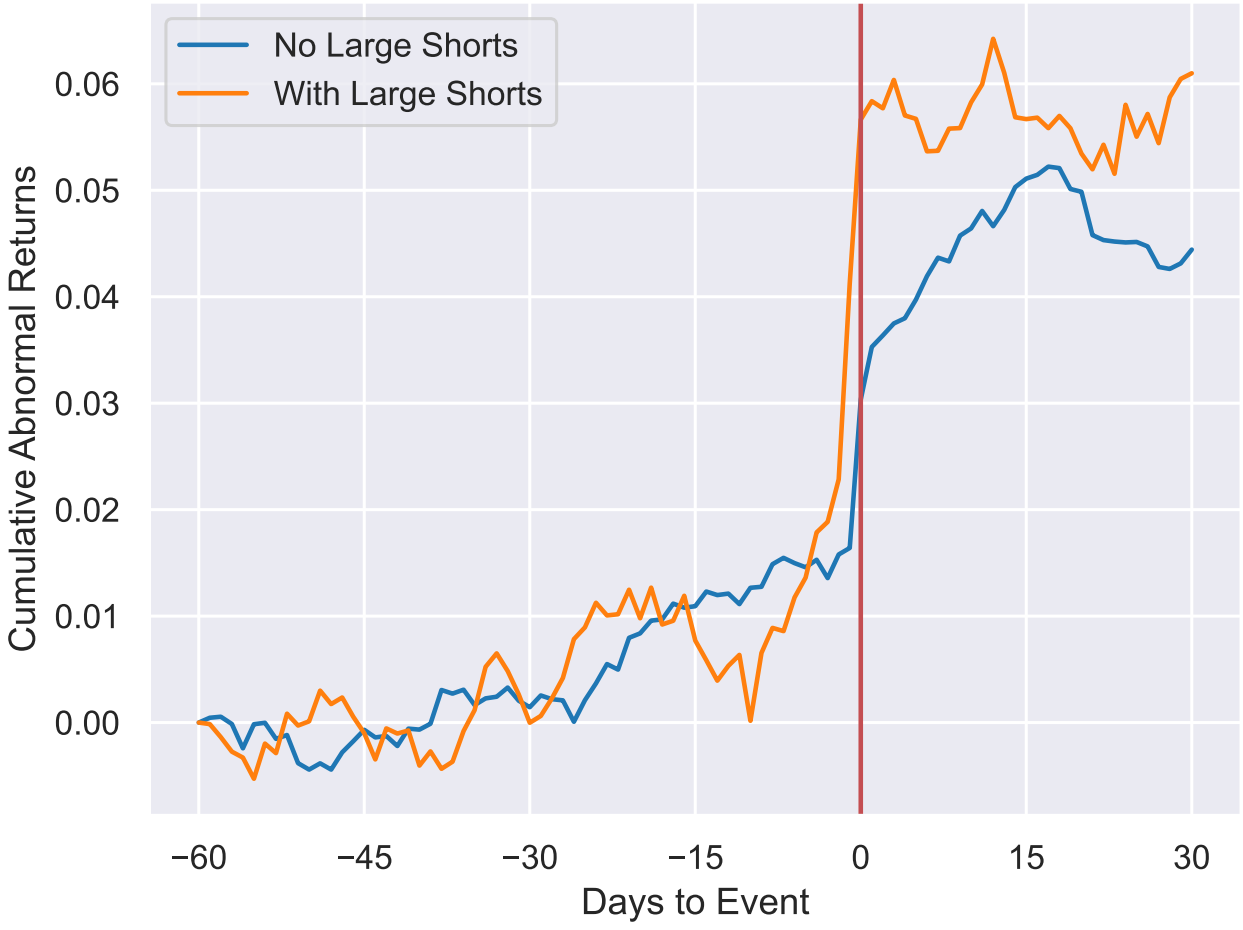

**Table 1**
**Hedge Fund Activism in Europe**
In this table, we report descriptive statistics on hedge fund activism campaigns in the European Union (EU) between January 2010 and December 2019. For each country, Panel A describes the number of events, the fraction of events that involve a foreign activist, the fraction of events that involve a U.S.-based activist, the average fraction of shares held by activists at announcement (*Activist ownership*), and the success rate. A campaign is deemed successful if the activist achieved at least one stated goal. *Rest of the EU* includes Bulgaria, Czech Republic, Iceland, Lithuania, Malta, and Slovenia. Panel B reports statistics on campaign outcomes grouped by activist demands. The demands, except general undervaluation, are not mutually exclusive as one activist campaign can target multiple issues.

Panel A: Hedge fund activism across the countries

| Country | N(Events) | Percent by foreign activists | Percent by U.S. activists | Activist ownership | Success rate |
|---|---|---|---|---|---|
| Austria | 18 | 88.9% | 0.0% | 11.6% | 61.1% |
| Belgium | 5 | 100.0% | 20.0% | 4.7% | 40.0% |
| Cyprus | 3 | 66.7% | 0.0% | 32.8% | 33.3% |
| Denmark | 7 | 71.4% | 28.6% | 8.7% | 71.4% |
| Finland | 16 | 75.0% | 6.2% | 10.5% | 93.8% |
| France | 51 | 70.6% | 35.3% | 4.6% | 29.4% |
| Germany | 106 | 67.0% | 27.4% | 10.9% | 52.8% |
| Greece | 2 | 50.0% | 0.0% | 37.6% | 50.0% |
| Ireland | 18 | 94.4% | 22.2% | 6.7% | 55.6% |
| Italy | 60 | 95.0% | 16.7% | 4.4% | 70.0% |
| Luxembourg | 6 | 100.0% | 16.7% | 10.7% | 50.0% |
| Netherlands | 25 | 92.0% | 64.0% | 5.3% | 60.0% |
| Norway | 16 | 81.2% | 31.2% | 8.9% | 68.8% |
| Poland | 51 | 45.1% | 9.8% | 10.1% | 80.4% |
| Portugal | 2 | 50.0% | 50.0% | 2.3% | 50.0% |
| Spain | 25 | 88.0% | 16.0% | 11.9% | 60.0% |
| Sweden | 28 | 64.3% | 35.7% | 13.8% | 71.4% |
| United Kingdom | 347 | 39.5% | 27.4% | 9.9% | 59.4% |
| Rest of the EU | 9 | 44.4% | 0.0% | 3.2% | 22.2% |
| The EU | 795 | 59.0% | 25.4% | 9.4% | 59.4% |

Panel B: Types of activist demands

| Type | N(Events) | % | Success rate |
|---|---|---|---|
| Business strategy | 85 | 10.7% | 61.2% |
| Capital structure | 98 | 12.3% | 58.2% |
| Corporate governance | 451 | 56.7% | 65.0% |
| Oppose merger | 113 | 14.2% | 51.3% |
| Sale of firm or assets | 167 | 21.0% | 60.5% |
| General undervaluation | 25 | 3.1% | 52.0% |

**Table 2**
**Short Selling in Europe**
In Panel A, we report country-level statistics on large short selling positions between January 2010 and December 2019. Short selling positions are collected from the websites of the National Competent Authorities and are expressed as a percentage of shares outstanding. If a stock is targeted by two or more short sellers on a given day, their positions are added together. In Panel B, we report country-level statistics on end-of-quarter aggregate short interest during the sample period. Aggregate short interest is measured by *On Loan*, which is the number of shares loaned out divided by shares outstanding. In both panels, we require that a stock exists in Compustat Global. *Rest of EU* includes Bulgaria, Czech Republic, Iceland, Lithuania, Malta, and Slovenia.

Panel A: Large short positions across countries

| Country | No. of positions | No. of sellers | No. of stocks | Mean | 25th pctile. | Median | 75th pctile. | Std. Dev. |
|---|---|---|---|---|---|---|---|---|
| Austria | 193 | 59 | 26 | 1.41% | 0.55% | 0.98% | 1.92% | 1.24% |
| Belgium | 347 | 109 | 42 | 1.73% | 0.60% | 1.09% | 2.07% | 1.74% |
| Cyprus | 5 | 4 | 2 | 0.71% | 0.51% | 0.55% | 0.84% | 0.28% |
| Denmark | 382 | 121 | 39 | 1.91% | 0.52% | 1.03% | 2.27% | 2.13% |
| Finland | 508 | 148 | 48 | 1.96% | 0.60% | 1.27% | 2.48% | 1.94% |
| France | 1,153 | 261 | 149 | 2.04% | 0.57% | 1.21% | 2.60% | 2.16% |
| Germany | 1,895 | 306 | 186 | 2.16% | 0.59% | 1.26% | 2.85% | 2.27% |
| Greece | 46 | 7 | 6 | 1.34% | 0.59% | 0.96% | 1.50% | 1.35% |
| Hungary | 24 | 18 | 5 | 1.80% | 0.95% | 1.55% | 2.63% | 1.12% |
| Ireland | 128 | 69 | 26 | 1.60% | 0.53% | 0.71% | 1.58% | 2.21% |
| Italy | 1,081 | 184 | 128 | 1.90% | 0.58% | 1.12% | 2.39% | 1.94% |
| Luxembourg | 131 | 69 | 17 | 2.39% | 0.55% | 1.12% | 2.65% | 2.75% |
| Netherlands | 624 | 194 | 77 | 2.27% | 0.59% | 1.16% | 2.71% | 2.63% |
| Norway | 269 | 108 | 46 | 2.55% | 0.79% | 1.28% | 2.95% | 2.89% |
| Poland | 189 | 47 | 33 | 1.08% | 0.57% | 0.80% | 1.36% | 0.73% |
| Portugal | 119 | 53 | 9 | 2.24% | 0.64% | 1.68% | 3.27% | 1.92% |
| Spain | 747 | 175 | 71 | 1.97% | 0.59% | 1.19% | 2.39% | 2.21% |
| Sweden | 1,198 | 343 | 151 | 2.04% | 0.54% | 1.10% | 2.32% | 2.45% |
| United Kingdom | 5,580 | 468 | 581 | 2.13% | 0.60% | 1.21% | 2.70% | 2.37% |
| Rest of the EU | 27 | 16 | 6 | 0.80% | 0.52% | 0.61% | 0.95% | 0.43% |
| The EU | 14,646 | 1,223 | 1,648 | 2.06% | 0.59% | 1.18% | 2.57% | 2.27% |

**Table 2 – Continued**

Panel B: Aggregate short interest across countries

| Country | No. of positions | No. of stocks | Mean | 25th pctile. | Median | 75th pctile. | Std. Dev. |
|---|---|---|---|---|---|---|---|
| Austria | 1,412 | 69 | 1.41% | 0.02% | 0.36% | 1.72% | 2.58% |
| Belgium | 2,519 | 123 | 0.93% | 0.01% | 0.12% | 0.79% | 2.31% |
| Cyprus | 190 | 15 | 0.05% | 0.00% | 0.00% | 0.04% | 0.16% |
| Denmark | 2,525 | 128 | 0.14% | 0.00% | 0.01% | 0.11% | 0.60% |
| Finland | 2,852 | 150 | 1.18% | 0.00% | 0.08% | 1.12% | 2.44% |
| France | 11,005 | 589 | 0.95% | 0.00% | 0.11% | 0.95% | 2.00% |
| Germany | 10,142 | 561 | 1.30% | 0.00% | 0.18% | 1.35% | 2.71% |
| Greece | 1,109 | 60 | 0.09% | 0.00% | 0.00% | 0.01% | 0.37% |
| Hungary | 213 | 16 | 0.00% | 0.00% | 0.00% | 0.00% | 0.02% |
| Ireland | 1,298 | 69 | 0.55% | 0.00% | 0.12% | 0.54% | 2.46% |
| Italy | 7,195 | 423 | 0.99% | 0.01% | 0.14% | 0.85% | 2.20% |
| Luxembourg | 747 | 51 | 1.01% | 0.01% | 0.20% | 0.94% | 2.04% |
| Netherlands | 2,802 | 153 | 1.75% | 0.03% | 0.50% | 1.78% | 4.17% |
| Norway | 3,872 | 243 | 0.12% | 0.00% | 0.01% | 0.07% | 0.32% |
| Poland | 2,505 | 177 | 0.08% | 0.00% | 0.01% | 0.07% | 0.18% |
| Portugal | 799 | 42 | 0.94% | 0.01% | 0.12% | 0.82% | 2.22% |
| Spain | 3,481 | 172 | 1.21% | 0.02% | 0.31% | 1.34% | 2.45% |
| Sweden | 9,272 | 705 | 0.10% | 0.00% | 0.01% | 0.08% | 0.24% |
| United Kingdom | 34,059 | 1,875 | 0.99% | 0.00% | 0.13% | 0.74% | 2.66% |
| Rest of the EU | 303 | 21 | 0.03% | 0.00% | 0.00% | 0.02% | 0.06% |
| The EU | 98,300 | 5,642 | 0.87% | 0.00% | 0.08% | 0.65% | 2.34% |

**Table 3**
**Summary Statistics**

This table provides descriptive statistics on firms targeted by activist hedge funds; the difference with firms in the same year and six-digit GICS Industry; and the difference with firms in the same year, with the same six-digit GICS Industry, and with the closest market capitalization. *Large short interest* is the number of shares shorted by all large short sellers divided by shares outstanding as of quarter end. *D(Large short)* equals one if at least one large short seller is present and zero otherwise. *On Loan* is the number of shares loaned out divided by shares outstanding. *Size* is market capitalization in billions of dollars. *M/B* is the market-to-book ratio, defined as (book value of equity)/(market value of equity). *q* is defined as (book value of debt + market value of equity)/(book value of debt + book value of equity). *ROA* is return on assets, defined as EBITDA/assets. *Leverage* is defined as the ratio of debt to the sum of debt and equity, all in book values. *Prior 12-month return* is the buy-and-hold stock return during the 12 months prior to an activist's disclosure. *Dividend yield* equals (common dividend + preferred dividend)/(market value of common stock + book value of preferred). *Institutional ownership* is the fraction of shares held by institutional investors, as reported by Thomson Eikon. *Amihud illiquidity* is defined as the yearly average (using daily data) of $1{,}000\sqrt{|\text{Stock return}|/(\text{Dollar Trading Volume})}$. We use the same-day exchange rate to convert local-currency trading volume to dollar trading volume. All of the variables above, except *Prior 12-month return* and *Amihud illiquidity*, are measured at the quarter end before the disclosure. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively.

| | Summary statistics | | | Difference with firms in same industry-year | | Difference with firms in same industry-year closest in MV | |
|---|---|---|---|---|---|---|---|
| Variable | Mean (1) | Median (2) | Std. Dev. (3) | Avg. diff. (4) | $t$-stat. (5) | Avg. diff. (6) | $t$-stat. (7) |
| Large short interest (%) | 0.610 | 0.000 | 1.631 | 0.500*** | 18.67 | 0.249*** | 3.04 |
| D(Large Short) | 0.259 | 0.000 | 0.438 | 0.206*** | 23.61 | 0.108*** | 4.92 |
| On loan | 0.019 | 0.006 | 0.028 | 0.011*** | 14.10 | 0.005*** | 3.30 |
| Size ($ billion) | 5.090 | 0.901 | 9.960 | 3.545*** | 17.32 | 0.428 | 0.84 |
| M/B | 1.974 | 1.125 | 3.579 | -0.304* | -1.73 | -0.737*** | -3.13 |
| $q$ | 1.454 | 1.119 | 1.405 | -0.292*** | -3.14 | -0.434*** | -3.72 |
| ROA | 0.053 | 0.086 | 0.239 | 0.034*** | 2.69 | -0.011 | -0.83 |
| Leverage | 0.396 | 0.360 | 0.324 | 0.079*** | 6.36 | 0.044** | 2.56 |
| Prior 12-month return | 0.037 | 0.008 | 0.447 | -0.052** | -2.54 | -0.082*** | -3.20 |
| Dividend yield (%) | 0.431 | 0.000 | 1.271 | -0.013 | -0.25 | -0.069 | -0.98 |
| Amihud illiquidity | 5.825 | 0.972 | 12.897 | -21.477*** | -9.38 | -4.076*** | -3.12 |
| Institutional ownership | 0.262 | 0.250 | 0.166 | 0.095*** | 12.97 | 0.047*** | 4.39 |

**Table 4**
**Activism following Short Selling Disclosures**
In this table, we report results on the effect of large short position disclosures on the occurrence of hedge fund activism. The sample period runs from November 2012 to December 2019. The dependent variable is an indicator equal to one if a firm is targeted by an activist in quarter $t$ and zero otherwise. All independent variables are as defined in Table 3 and are measured in quarter $t$-1. In each column we report coefficient estimates and their associated $t$-statistics and, when applicable, the corresponding marginal probability change (%) induced by a one-unit change in the value of a specific covariate from its sample average. Standard errors are clustered at the firm level. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively.

| Dependent variable: D(Activist targeting) | Probit Model | | | | | |
|---|---|---|---|---|---|---|
| | Coefficient (1a) | $t$-stat. (1b) | Marg. Pr. (%) (1c) | Coefficient (2a) | $t$-stat. (2b) | Marg. Pr. (%) (2c) |
| D(Large short) | 0.103** | 2.02 | 0.135 | | | |
| Large short interest (%) | | | | 0.103** | 2.26 | 0.134 |
| On loan | 2.659*** | 3.08 | 3.470 | 1.969* | 1.91 | 2.566 |
| Size (log $) | 0.053*** | 4.13 | 0.069 | 0.054*** | 4.22 | 0.070 |
| M/B | -0.023*** | -3.01 | -0.030 | -0.023*** | -3.01 | -0.030 |
| ROA | -0.121** | -2.49 | -0.158 | -0.122** | -2.51 | -0.159 |
| Leverage | 0.213*** | 3.13 | 0.278 | 0.214*** | 3.14 | 0.278 |
| Prior 12-month return | -0.160*** | -3.14 | -0.209 | -0.162*** | -3.19 | -0.211 |
| Dividend yield (%) | -0.052*** | -2.61 | -0.068 | -0.052*** | -2.61 | -0.068 |
| Illiquidity | 0.001 | 0.79 | 0.001 | 0.001 | 0.77 | 0.001 |
| Institutional ownership | 0.102 | 0.81 | 0.133 | 0.101 | 0.81 | 0.132 |
| Year-quarter FE | Y | | | Y | | |
| Country FE | Y | | | Y | | |
| Observations | 85,857 | | | 85,857 | | |
| Pseudo R-squared | 0.058 | | | 0.059 | | |
| % (Dep variable = 1) | 0.62 | | | 0.62 | | |

**Table 5**
**Changes in Short Positions following Activism**

In this table, we report probit regression results on the effect of hedge fund activism on the occurrence of new or increased large short positions, aggregate short interest, and lendable supply. The sample period runs from November 2012 to December 2019. In column (1), the dependent variable, *D(Δ(Large short)<0)*, is an indicator equal to one if the number of reported large short seller positions decreases in quarter $t$ relative to the previous quarter and zero otherwise. In column (2), the dependent variable is an indicator equal to one if *on loan* decreases from quarter $t$-1 to quarter $t$ and zero otherwise. In column (3), the dependent variable is an indicator equal to one if *lendable supply* as a percentage of outstanding shares decreases from quarter $t$-1 to quarter $t$ and zero otherwise. *D(Activist targeting)* is an indicator equal to one if the firm is targeted by an activist in quarter $t$-1 and zero otherwise. All other independent variables are as defined in Table 3 and are measured in quarter $t$-1. In each column, we report coefficient estimates and their associated $t$-statistics and, when applicable, the corresponding marginal probability change (%) induced by a one-unit change in the value of a specific covariate from its sample average. Standard errors are clustered at the firm level. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively.

| Dependent variable: | D(Δ(Large short) < 0) | | | D(Δ(On loan) < 0) | | | D(Δ(Lendable) < 0) | | |
|---|---|---|---|---|---|---|---|---|---|
| | Coefficient (1a) | $t$-stat. (1b) | Marg. Pr. (%) (1c) | Coefficient (2a) | $t$-stat. (2b) | Marg. Pr. (%) (2c) | Coefficient (3a) | $t$-stat. (3b) | Marg. Pr. (%) (3c) |
| D(Activist targeting) | 0.171** | 2.09 | 1.566 | 0.209*** | 3.28 | 8.185 | 0.176*** | 2.76 | 7.035 |
| On loan (%) | 0.276*** | 36.91 | 2.524 | | | | | | |
| Size (log $) | 0.142*** | 16.66 | 1.303 | 0.115*** | 30.12 | 4.500 | 0.012*** | 4.75 | 0.492 |
| M/B | 0.007** | 2.36 | 0.060 | 0.002* | 1.89 | 0.092 | 0.008*** | 7.48 | 0.324 |
| ROA | -0.140*** | -3.34 | -1.279 | 0.020 | 0.96 | 0.796 | 0.074*** | 4.26 | 2.931 |
| Leverage | 0.125** | 2.26 | 1.146 | 0.030 | 1.37 | 1.185 | -0.050*** | -2.94 | -1.994 |
| Prior 12-month return | -0.016 | -0.52 | -0.144 | -0.186*** | -14.35 | -7.271 | -0.544*** | -41.24 | -21.701 |
| Dividend yield (%) | -0.031*** | -4.49 | -0.288 | 0.066*** | 15.59 | 2.569 | 0.036*** | 9.93 | 1.443 |
| Institutional ownership | 1.410*** | 15.27 | 12.921 | 0.119*** | 2.99 | 4.673 | -0.048* | -1.81 | -1.920 |
| Year-quarter FE | Y | | | Y | | | Y | | |
| Country FE | Y | | | Y | | | Y | | |
| Observations | 88,782 | | | 87,943 | | | 87,978 | | |
| Pseudo R-squared | 0.343 | | | 0.046 | | | 0.071 | | |
| % (Dep variable = 1) | 9.63 | | | 42.81 | | | 48.51 | | |

**Table 6**
**Heterogeneous Short Selling Disclosure Requirements**
In this table, we report results from a linear probability model on the heterogeneous effects of short selling disclosure requirements in the EU. Our sample is based on data for the six quarters before and after November 2012. *Post* equals one for periods after November 2012, when the disclosure rule is in effect, and zero otherwise. *Treat* equals zero for stocks that were subject to short selling disclosure before November 2012, including all stocks traded in France and Spain, and financial stocks and stocks underwent right issues in the United Kingdom, and one otherwise. The firm controls are identical to those used in Table 4 and are measured in quarter $t$-1. In each column, we report coefficient estimates and their associated $t$-statistics (in parentheses). Standard errors are clustered at the firm level. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively.

| Dependent variable: D(Activist targeting) | Linear Probability Model | | | |
|---|---|---|---|---|
| | (1) | (2) | (3) | (4) |
| Post × Treat | 0.005*** | 0.003** | 0.005*** | 0.003** |
| | (3.58) | (2.52) | (3.61) | (2.29) |
| Post | -0.001 | -0.001 | | |
| | (-0.97) | (-0.59) | | |
| Treat | -0.001 | -0.001 | | |
| | (-0.59) | (-0.53) | | |
| Post × Treat × On loan | | 0.152* | | 0.173** |
| | | (1.80) | | (2.13) |
| On loan | | 0.035 | | |
| | | (0.55) | | |
| Post × On loan | | -0.034 | | -0.032 |
| | | (-0.62) | | (-0.76) |
| Treat × On loan | | -0.011 | | -0.053 |
| | | (-0.29) | | (-0.91) |
| Firm controls | Y | Y | Y | Y |
| Year-quarter FE | N | N | Y | Y |
| Firm FE | N | N | Y | Y |
| Observations | 30,053 | 30,053 | 29,903 | 28,740 |
| R-squared | 0.002 | 0.003 | 0.124 | 0.121 |
| % (Dep variable = 1) | 0.35 | 0.35 | 0.35 | 0.36 |

**Table 7**
**Short Positions and Activists' Profitability**

In this table, we report abnormal returns of activist campaigns between 2010 and 2019 using Carhart (1997)'s four-factor model. Our factors (*MKT*, *SMB*, *HML*, and *UMD*) are obtained from AQR Capital Management's website, where *MKT* is the European market returns in excess of risk-free rates, and the other factors are calculated based on European market data, following Fama and French (1996) and Asness and Frazzini (2013). The dependent variable is the daily return of a calendar-time portfolio that buys all stocks with an unresolved campaign on a given day. Panel A shows results based on univariate sorts for firms with *Large Short Positions (L)*, with *No Large Short Positions (N)*, for *Successful Campaigns (S)*, and for *Unsuccessful Campaigns (U)*. Panel B reports results for double-sorted portfolios based on whether a firm involves large short positions (*L* or *N*) and whether a campaign is successful or not (*S* or *U*). Portfolios are value-weighted. *Alphas (× 252)* are annualized by multiplying daily alphas by 252. *t*-statistics are calculated using the Newey-West standard errors with seven lags (Newey and West (1987)). *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively.

| Panel A: | Univariate Sorted Portfolios | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | Large Short Positions (L) | | No Large Short Positions (N) | | Successful Campaigns (S) | | Unsuccessful Campaigns (U) | |
| Variable | Coefficient (1a) | *t*-stat. (1b) | Coefficient (2a) | *t*-stat. (2b) | Coefficient (3a) | *t*-stat. (3b) | Coefficient (4a) | *t*-stat. (4b) |
| Alpha (× 252) | 0.129** | 2.01 | 0.047 | 0.71 | 0.125** | 2.39 | 0.027 | 0.39 |
| MKT | 0.340*** | 9.28 | 0.246*** | 5.54 | 0.318*** | 9.04 | 0.219*** | 4.90 |
| SMB | -1.065*** | -12.71 | -0.947*** | -10.22 | -1.172*** | -17.26 | -0.951*** | -9.36 |
| HML | -0.216** | -2.06 | -0.291** | -2.47 | -0.113 | -1.35 | -0.387*** | -3.27 |
| UMD | -0.025 | -0.27 | 0.176* | 1.86 | 0.039 | 0.46 | 0.046 | 0.50 |
| Days | 1,637 | | 1,637 | | 1,637 | | 1,637 | |
| R-Squared | 0.275 | | 0.179 | | 0.381 | | 0.157 | |

**Table 7 – Continued**

| Panel B: | Double Sorted Portfolios | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | L + S | | L + U | | N + S | | N + U | |
| Variable | Coefficient (1a) | *t*-stat. (1b) | Coefficient (2a) | *t*-stat. (2b) | Coefficient (3a) | *t*-stat. (3b) | Coefficient (4a) | *t*-stat. (4b) |
| Alpha (× 252) | 0.164** | 2.33 | 0.038 | 0.54 | 0.118** | 2.05 | 0.042 | 0.57 |
| MKT | 0.338*** | 8.80 | 0.257*** | 6.19 | 0.317*** | 8.08 | 0.220*** | 4.61 |
| SMB | -0.980*** | -10.88 | -0.767*** | -8.14 | -1.138*** | -14.50 | -0.948*** | -8.48 |
| HML | -0.159 | -1.45 | -0.369*** | -3.09 | -0.076 | -0.81 | -0.296** | -2.31 |
| UMD | 0.000 | 0.00 | -0.017 | -0.20 | 0.024 | 0.25 | 0.079 | 0.81 |
| Days | 1,637 | | 1,637 | | 1,637 | | 1,637 | |
| R-Squared | 0.210 | | 0.106 | | 0.326 | | 0.136 | |

**Table 8**
**Short Positions and Activist Success**

In this table, we report results on the effect of large short position disclosures on activist success for all activist interventions. The sample period runs from November 2012 to December 2019. The dependent variable is an indicator equal to one if an activist achieves at least one stated goal and zero otherwise. *5% Block Ownership* is the total ownership of institutional blockholders who own more than 5% of outstanding shares. *IO HHI* is the Herfindahl-Hirschman index of institutional ownership. The firm controls are identical to those used in Table 4 and are measured in quarter $t$-1. In each column, we report coefficient estimates and their associated $t$-statistics and, when applicable, the corresponding marginal probability change (%) induced by a one-unit change in the value of a specific covariate from its sample average. Standard errors are clustered at the year-quarter level. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively.

| Dependent variable: D(Activist success) | Probit Model | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | Coefficient | $t$-stat. | Marg. Pr. (%) | Coefficient | $t$-stat. | Marg. Pr. (%) | Coefficient | $t$-stat. | Marg. Pr. (%) |
| | (1a) | (1b) | (1c) | (2a) | (2b) | (2c) | (3a) | (3b) | (3c) |
| D(Large short) | 0.421** | 2.29 | 15.733 | 0.294 | 1.37 | 10.927 | -0.025 | -0.08 | -0.929 |
| D(Large short) × 5% blockholder ownership | | | | 4.305** | 2.18 | 160.066 | | | |
| 5% blockholder ownership | | | | -1.809 | -1.44 | -67.267 | | | |
| D(Large short) × IO HHI | | | | | | | 6.364** | 2.23 | 235.710 |
| IO HHI | | | | | | | -0.440 | -0.80 | -16.299 |
| On loan | 0.215 | 0.07 | 8.031 | -0.951 | -0.30 | -35.347 | -1.146 | -0.37 | -42.457 |
| Year-quarter FE | Y | | | Y | | | Y | | |
| Country FE | Y | | | Y | | | Y | | |
| Firm controls | Y | | | Y | | | Y | | |
| Observations | 458 | | | 427 | | | 427 | | |
| Pseudo R-squared | 0.138 | | | 0.159 | | | 0.163 | | |
| % (Dep variable = 1) | 62.01 | | | 61.83 | | | 61.83 | | |

**Table 9**
**Activist Demands and Post-Activism Outcomes**
In this table, we report results on the effect of large short position disclosures on activist demands and post-activism outcomes, controlling for firm characteristics. *Board Seats* equals one if an activist seeks at least one board seat when launching a campaign and zero otherwise. *Proxy Contest* equals one if a campaign proceeds to a proxy contest and zero otherwise. $\Delta$*CEO Pay* is the growth rate in a target CEO's total compensation from $t$ to $t+3$, where $t$ is the year the campaign is launched. *CEO Turnover* equals one if an incumbent CEO departs during the window [$t$, $t$+3] and zero otherwise. *M&A* equals one if a firm targeted by an activist is acquired during the window [$t$, $t$+3] and zero otherwise. *ROA* is return of assets in year $t$+3. In each column, we report coefficient estimates and their associated $t$-statistics. Standard errors are clustered at the year level. The firm controls are identical to those used in Table 4 and are measured in the quarter immediately before the campaign quarter. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively.

| | Linear Probablity Model | | | | | |
|---|---|---|---|---|---|---|
| Dependent variable: | Board Seats | Proxy Contest | ΔCEO Pay | CEO Turnover | M&A | ROA |
| | (1) | (2) | (3) | (4) | (5) | (6) |
| D(Large short) | -0.142** | -0.097** | -0.370*** | 0.012 | 0.115** | 0.024** |
| | (-2.53) | (-2.00) | (-2.88) | (0.25) | (2.25) | (2.36) |
| On loan | 0.181 | 0.077 | -0.327 | 1.684* | -0.352 | 0.115 |
| | (0.32) | (0.48) | (-0.31) | (1.91) | (-0.61) | (1.01) |
| Year FE | Y | Y | Y | Y | Y | Y |
| Country FE | Y | Y | Y | Y | Y | Y |
| Firm controls | Y | Y | Y | Y | Y | Y |
| Observations | 573 | 573 | 281 | 221 | 571 | 394 |
| R-squared | 0.13 | 0.07 | 0.07 | 0.11 | 0.12 | 0.51 |
| % (Dep variable = 1) | 44.0 | 14.7 | — | 49.8 | 18.2 | — |

**Table 10**
**Duration of Activist Campaigns**
In this table, we apply a Cox (1972) proportional hazards model to estimate the hazard rate on a daily frequency for activist campaign resolution. In each column, we report coefficient estimates, their heteroskedasticity-robust $t$-statistics, and their associted hazard ratios. All independent variables are as defined in Table 3 and are measured in the quarter immediately before the campaign quarter. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively.

| | Cox Model | | | | | |
|---|---|---|---|---|---|---|
| Variable | Coefficient (1a) | $t$-stat. (1b) | Hazard Ratio (1c) | Coefficient (2a) | $t$-stat. (2b) | Hazard Ratio (2c) |
| D(Large short) | 0.238** | 2.51 | 1.27 | 0.301*** | 2.77 | 1.35 |
| On loan | | | | -1.660 | -1.33 | 0.19 |
| Size (log $) | -0.071*** | -2.97 | 0.93 | -0.073*** | -2.79 | 0.93 |
| M/B | 0.004 | 0.56 | 1.00 | 0.005 | 0.66 | 1.01 |
| ROA | -0.262 | -0.84 | 0.77 | -0.257 | -0.83 | 0.77 |
| Leverage | 0.013 | 0.29 | 1.01 | 0.010 | 0.23 | 1.01 |
| Prior 12-month return | 0.189* | 1.76 | 1.21 | 0.151 | 1.36 | 1.16 |
| Dividend yield (%) | 0.037 | 1.48 | 1.04 | 0.032 | 1.23 | 1.03 |
| Illiquidity | 0.018 | 1.07 | 1.02 | -0.025 | -0.68 | 0.97 |
| Institutional ownership | 0.264 | 0.94 | 1.30 | 0.245 | 0.85 | 1.28 |
| Observations (Time at risk) | 106,320 | | | 105,555 | | |
| Wald Chi-squared | 20.91 | | | 17.88 | | |

**Table 11**
**Activists' Costs of Accumulating Target Shares**

In this table, we relate pre-disclosure cumulative abnormal returns (CARs) to whether large short sellers are involved in a stock. CARs are sums of daily excess returns after adjusting for the Fama-French (1993) plus momentum factors, with an estimation window running from 365 days to 80 days prior to activist announcement. Our factors (*MKT*, *SMB*, *HML*, and *UMD*) are obtained from AQR Capital Management's website, where *MKT* is the European market returns in excess of risk-free rates, and the other factors are calculated based on European market data, following Fama and French (1996) and Asness and Frazzini (2013). *D(Large short)* is an indicator equals to one if the firm is targeted by a large short seller in the previous quarter, and zero otherwise. In each column, we report coefficient estimates and their associated *t*-statistics. Standard errors are clustered at the year-quarter level. All independent variables are as defined in Table 3 and are measured in the quarter immediately before the campaign quarter. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively.

| Dependent variable: | CAR [-60, -10) (1) | CAR [-10, -1] (2) | CAR [-60, -4) (3) | CAR [-4, -1] (4) |
|---|---|---|---|---|
| D(Large short) | -0.013 | 0.025*** | 0.001 | 0.008 |
| | (-0.55) | (3.38) | (0.03) | (1.49) |
| On loan | -0.002 | -0.012 | -0.006 | -0.042 |
| | (-0.01) | (-0.14) | (-0.01) | (-0.42) |
| Size (log $) | -0.005 | -0.002 | -0.006 | -0.002 |
| | (-1.25) | (-0.80) | (-1.20) | (-1.00) |
| M/B | 0.004 | -0.00004 | 0.003 | 0.001** |
| | (1.21) | (-0.04) | (1.05) | (2.23) |
| ROA | 0.177** | 0.009 | 0.191** | 0.029 |
| | (1.99) | (0.34) | (2.16) | (0.92) |
| Leverage | -0.074*** | 0.004 | -0.072** | -0.008 |
| | (-3.49) | (0.31) | (-2.31) | (-1.18) |
| Prior 12-month return | -0.004 | 0.006 | 0.003 | -0.009* |
| | (-0.17) | (0.67) | (0.11) | (-1.90) |
| Dividend yield (%) | -0.355 | 0.114 | -0.365 | 0.054 |
| | (-0.77) | (0.56) | (-0.84) | (0.51) |
| Illiquidity | -0.005 | 0.004 | -0.004 | 0.001 |
| | (-0.49) | (1.60) | (-0.34) | (0.40) |
| Year-quarter FE | Y | Y | Y | Y |
| Country FE | Y | Y | Y | Y |
| Observations | 556 | 556 | 556 | 556 |
| R-Squared | 0.186 | 0.130 | 0.192 | 0.109 |

## Appendix I: Propensity Score Matching

One potential issue with the methodology used in Subsections 4.1 and 4.2 is that firms targeted by activists (i.e., the "treated" group) might be intrinsically different from non-targeted firms (i.e., the "control" group). If so, correct inference requires a properly balanced sample of firms with similar characteristics other than the presence of an activist hedge fund. Several studies on activism mitigate this concern by using propensity score matching (PSM) to control for observable differences between targeted and non-targeted firms (e.g., Cremers et al. (2018)).

First, we use PSM to randomize the likelihood of being targeted by an activist hedge fund, ensuring that the treated and control groups are comparable along observable covariates that explain the likelihood of being targeted in the first place (Cremers et al. (2018)).

We employ a 1:5 nearest-neighbor method without replacement and obtain 3,167 observations with different weights. Of all the observations in the final sample, 531 are targets and 2,636 ($\approx 5 \times 531$) are controls. In the regressions, all treated observations are given a weight of 1 and controls have a weight of 0.2.

In the first stage, we employ a logit regression to predict whether a firm is targeted, using observed firm characteristics as controls and heteroskedasticity-consistent standard errors proposed by Abadie and Imbens (2006). We use the same control variables used in Table 4 as well as the quadratic forms of firm size and institutional ownership. We also restrict matched observations to be in the same country and year-quarter.

In the full sample, the treated and control groups have very different characteristics. For example, firms targeted by activists tend to be larger, more leveraged, more liquid, and have lower returns in the previous year. After matching, we have a propensity score of 0.0097 for the treated and 0.0093 for the control firms. The $p$-value of the difference is equal to 0.19, rejecting the hypothesis that the joint distribution of covariates for the treated and the control groups is different. This suggests that the matching algorithm correctly identifies non-target firms that have a propensity to be targeted by activists similar to those that are actually targeted.

In Table A6, we compare the unmatched and matched samples randomized for the likelihood of being targeted by an activist, displaying the averages for the main variables used in the paper. All differences in the control variables are no longer statistically significant at the 10% level. We also perform the PSM algorithm to assess the likelihood of being targeted by a large short seller, showing the results in Table A7.

In Table A8, we use the matched sample to re-estimate the regressions discussed in Subsection 4.1. Our main findings remain unchanged. That is, firms shorted by large short sellers are more likely to be targeted by activist hedge funds. Like our finding in the unmatched sample (see Subsection 4.2), the presence of activists is not related to the likelihood that large investors will short sell the stock, as shown in Table A9.

# Appendix II

**Table A1**
**Non-Hedge Fund Activism following Short Selling Disclosures**
In this table, we report results on the effect of large short position disclosures on the occurrence of activism by non-hedge fund activists. The sample period runs from November 2012 to December 2019. The dependent variable is an indicator equal to one if a firm is targeted by an activist in quarter $t$ and zero otherwise. All independent variables are as defined in Table 3 and are measured in quarter $t$-1. In each column, we report coefficient estimates and their associated $t$-statistics and, when applicable, the corresponding marginal probability change (%) induced by a one-unit change in the value of a specific covariate from its sample average. Standard errors are clustered at the firm level. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively.

| Dependent variable: D(Activist targeting) | Probit Model | | | | | |
|---|---|---|---|---|---|---|
| | Coefficient (1a) | $t$-stat. (1b) | Marg. Pr. (%) (1c) | Coefficient (2a) | $t$-stat. (2b) | Marg. Pr. (%) (2c) |
| D(Large short) | 0.001 | 0.01 | 0.001 | | | |
| Large short interest (%) | | | | -0.014 | -0.23 | -0.010 |
| On loan | 1.536 | 1.15 | 1.050 | 1.767 | 1.22 | 1.207 |
| Size (log $) | 0.066*** | 3.47 | 0.045 | 0.067*** | 3.51 | 0.045 |
| M/B | -0.027** | -2.08 | -0.018 | -0.027** | -2.08 | -0.018 |
| ROA | -0.135* | -1.68 | -0.093 | -0.136* | -1.68 | -0.093 |
| Leverage | 0.104 | 1.23 | 0.071 | 0.104 | 1.24 | 0.071 |
| Prior 12-month return | -0.126 | -1.61 | -0.086 | -0.126 | -1.61 | -0.086 |
| Dividend yield (%) | -0.066** | -2.33 | -0.045 | -0.066** | -2.33 | -0.045 |
| Illiquidity | 0.001 | 0.54 | 0.000 | 0.001 | 0.54 | 0.000 |
| Institutional ownership | -0.094 | -0.64 | -0.064 | -0.088 | -0.61 | -0.060 |
| Year-quarter FE | Y | | | Y | | |
| Country FE | Y | | | Y | | |
| Observations | 85,478 | | | 85,478 | | |
| R-squared | 0.096 | | | 0.096 | | |
| % (Dep variable = 1) | 0.37 | | | 0.37 | | |

**Table A2**
**Changes in Short Positions following Non-Hedge Fund Activism**

In this table, we report probit regression results on the effect of non-hedge fund activism on the occurrence of new or increased large short positions, aggregate short interest, and lendable supply. The sample period runs from November 2012 to December 2019. In column (1), the dependent variable, D(Δ(Large short) < 0), is an indicator equal to one if the number of reported large short seller positions decreases in quarter $t$ relative to the previous quarter and zero otherwise. In column (2), the dependent variable is an indicator equal to one if on loan decreases from quarter $t$-1 to quarter $t$ and zero otherwise. In column (3), the dependent variable is an indicator equal to one if lendable supply as a percentage of outstanding shares decreases from quarter $t$-1 to quarter $t$ and zero otherwise. All independent variables are as defined in Table 3 and are measured in quarter $t$-1. In each column, we report coefficient estimates and their associated $t$-statistics and, when applicable, the corresponding marginal probability change (%) induced by a one-unit change in the value of a specific covariate from its sample average. Standard errors are clustered at the firm level. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively.

| Dependent variables: | D(Δ(Large short) < 0) | | | D(Δ(On loan) < 0) | | | D(Δ(Lendable) < 0) | | |
|---|---|---|---|---|---|---|---|---|---|
| | Coefficient (1a) | $t$-stat. (1b) | Marg. Pr. (%). (1c) | Coefficient (2a) | $t$-stat. (2b) | Marg. Pr. (%) (2c) | Coefficient (3a) | $t$-stat. (3b) | Marg. Pr. (%) (3c) |
| D(Activist targeting) | -0.002 | -0.01 | -0.014 | 0.042 | 0.48 | 1.637 | 0.014 | 0.16 | 0.573 |
| On loan (%) | 0.276*** | 36.93 | 2.526 | | | | | | |
| Size (log $) | 0.142*** | 16.70 | 1.306 | 0.115*** | 30.18 | 4.510 | 0.013*** | 4.82 | 0.501 |
| M/B | 0.006** | 2.34 | 0.059 | 0.002* | 1.86 | 0.090 | 0.008*** | 7.44 | 0.322 |
| ROA | -0.140*** | -3.36 | -1.284 | 0.020 | 0.94 | 0.779 | 0.073*** | 4.24 | 2.916 |
| Leverage | 0.126** | 2.28 | 1.156 | 0.031 | 1.42 | 1.223 | -0.049*** | -2.89 | -1.960 |
| Prior 12-month return | -0.016 | -0.52 | -0.144 | -0.186*** | -14.35 | -7.277 | -0.545*** | -41.25 | -21.705 |
| Dividend yield (%) | -0.032*** | -4.50 | -0.289 | 0.065*** | 15.55 | 2.563 | 0.036*** | 9.90 | 1.439 |
| Institutional ownership | 1.409*** | 15.26 | 12.915 | 0.120*** | 3.00 | 4.688 | -0.048* | -1.80 | -1.905 |
| Year-quarter FE | Y | | | Y | | | Y | | |
| Country FE | Y | | | Y | | | Y | | |
| Observations | 88,782 | | | 87,943 | | | 87,978 | | |
| Pseudo R-squared | 0.343 | | | 0.046 | | | 0.071 | | |
| % (Dep variable = 1) | 9.63 | | | 42.81 | | | 48.51 | | |

**Table A3**
**Changes in Aggregate Short Selling and Lendable Supply following Activism**
In this table, we report results on the effect of hedge fund activism on aggregate short selling and lendable supply of shares for shorting. The sample period runs from November 2012 to December 2019. In column (1), the dependent variable is the change in on loan from quarter *t-1* to quarter *t*. In column (2), the dependent variable is the change in lendable supply from quarter *t*-1 to quarter *t*. All independent variables are as defined in Table 3 and are measured in quarter *t*-1. In each column we report coefficient estimates and their associated *t*-statistics. Standard errors are clustered at the firm level. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively.

| Dependent variables: | Δ(On loan (%)) | | Δ(Lendable (%)) | |
|---|---|---|---|---|
| | Coefficient | *t*-stat. | Coefficient | *t*-stat. |
| D(Activist targeting) | -0.168*** | -3.23 | -0.276** | -2.30 |
| Size (log $) | -0.001 | -0.19 | -0.007** | -2.42 |
| M/B | -0.001*** | -3.04 | -0.010*** | -8.14 |
| ROA | 0.041*** | 2.80 | -0.165** | -2.34 |
| Leverage | -0.005 | -0.96 | 0.042** | 2.44 |
| Prior 12-month return | 0.036*** | 6.03 | 0.643*** | 32.48 |
| Dividend yield (%) | -0.046*** | -12.60 | -0.042*** | -7.32 |
| Institutional ownership | 0.070*** | 7.04 | 0.164*** | 5.37 |
| Year-quarter FE | Y | | Y | |
| Country FE | Y | | Y | |
| Observations | 85,785 | | 85,780 | |
| R-squared | 0.032 | | 0.089 | |

**Table A4**
**Placebo Test: Heterogeneous Short Selling Disclosure Requirements**
In this table, we replicate the results of the analysis associated with Table 6 by replacing the event time, November 2012, with a pseudo-event time. In columns (1) and (2), the sample period spans six quarters before and after November 2011, while in columns (3)-(4), the sample period spans six quarters before and after November 2013. *Post* equals one for periods after the pseudo-event time and zero otherwise. *Treat* equals zero for stocks that were subject to short selling disclosure before the pseudo-event time, including all stocks traded in France and Spain, and financial stocks and stocks underwent right issues in the United Kingdom, and one otherwise. The firm controls are identical to those used in Table 4 and are measured in quarter $t$-1. In each column, we report coefficient estimates and their associated $t$-statistics (in parentheses). Standard errors are clustered at the firm level. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively.

| Dependent variable: D(Activist targeting) | Linear Probability Model | | | |
|---|---|---|---|---|
| | (1) | (2) | (3) | (4) |
| Post × Treat | -0.001 | -0.002 | 0.003 | 0.002 |
| | (-0.36) | (-0.99) | (1.55) | (1.37) |
| Post × Treat × On Loan | | 0.163 | | 0.059 |
| | | (1.58) | | (0.43) |
| Post × On Loan | | -0.056 | | -0.009 |
| | | (-0.69) | | (-0.09) |
| Treat × On Loan | | 0.029 | | 0.125 |
| | | (0.32) | | (1.17) |
| Firm controls | Y | Y | Y | Y |
| Year-quarter FE | Y | Y | Y | Y |
| Firm FE | Y | Y | Y | Y |
| Observations | 32,938 | 32,400 | 33,986 | 33,766 |
| R-squared | 0.151 | 0.131 | 0.129 | 0.128 |
| % (Dep variable = 1) | 0.28 | 0.27 | 0.40 | 0.40 |

**Table A5**
**Short Positions and Activist Success**

This table replicates the results of the analysis associated with Table 8 using a linear probability model. The sample period runs from November 2012 to December 2019. The dependent variable is an indicator equal to one if an activist achieves at least one stated goal and zero otherwise. *5% Block Ownership* is the total ownership of institutional blockholders who own more than 5% of outstanding shares. *IO HHI* is the Herfindahl-Hirschman index of institutional ownership. All independent variables are as defined in Table 3 and are measured in quarter $t$-1. In each column, we report coefficient estimates and their associated $t$-statistics. Standard errors are clustered at the year-quarter level. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively.

| Dependent variable: D(Activist success) | Linear Probability Model | | |
|---|---|---|---|
| | (1) | (2) | (3) |
| D(Large short) | 0.138** | 0.095 | 0.039 |
| | (2.16) | (1.26) | (0.44) |
| D(Large short) × 5% blockholder ownership | | 1.213** | |
| | | (2.04) | |
| Blockholder ownership > 5% | | -0.505 | |
| | | (-1.17) | |
| D(Large short) × IO HHI | | | 1.200** |
| | | | (2.34) |
| IO HHI | | | -0.170 |
| | | | (-0.88) |
| On loan | 0.122 | -0.192 | -0.078 |
| | (0.11) | (-0.17) | (-0.07) |
| Year-quarter FE | Y | Y | Y |
| Country FE | Y | Y | Y |
| Firm controls | Y | Y | Y |
| Observations | 468 | 436 | 436 |
| R-squared | 0.176 | 0.196 | 0.197 |
| % (Dep variable = 1) | 62.82 | 62.61 | 62.61 |

**Table A6**
**Propensity Score Matching: Balancing Test**
In this table, we report balancing test outcomes comparing firms targeted by activists and firms involving no activists before applying the propensity score matching algorithm (*Unmatched Sample*) and after applying the algorithm (*Matched Sample*). The covariates used in the matching procedure are all defined in Table 3. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively.

| Variable | Sample | Treated | Control | %bias | *t*-stat. | *p*-value |
|---|---|---|---|---|---|---|
| On loan | Unmatched | 0.018 | 0.009 | 38.1 | 11.27 | 0.000 |
| | Matched | 0.018 | 0.018 | 2.0 | 0.28 | 0.783 |
| Size (log $) | Unmatched | 20.589 | 19.951 | 29.4 | 7.21 | 0.000 |
| | Matched | 20.589 | 20.543 | 2.1 | 0.3 | 0.745 |
| Size squared | Unmatched | 429.16 | 402.21 | 30.7 | 7.59 | 0.000 |
| | Matched | 429.16 | 427.20 | 2.2 | 0.34 | 0.731 |
| M/B | Unmatched | 1.903 | 2.776 | -23.3 | -4.56 | 0.000 |
| | Matched | 1.903 | 1.954 | -1.4 | -0.31 | 0.758 |
| ROA | Unmatched | 0.061 | 0.072 | -3.9 | -0.83 | 0.408 |
| | Matched | 0.061 | 0.050 | 3.9 | 0.60 | 0.550 |
| Leverage | Unmatched | 0.401 | 0.334 | 22.5 | 5.44 | 0.000 |
| | Matched | 0.401 | 0.386 | 4.9 | 0.77 | 0.441 |
| Prior 12-month return | Unmatched | 0.017 | 0.124 | -24.4 | -5.37 | 0.000 |
| | Matched | 0.017 | 0.012 | 1.2 | 0.22 | 0.828 |
| Dividend yield (%) | Unmatched | 0.432 | 0.566 | -10.4 | -2.34 | 0.019 |
| | Matched | 0.432 | 0.455 | -1.8 | -0.32 | 0.751 |
| Amihud illiquidity | Unmatched | 5.591 | 6.812 | -7.8 | -1.56 | 0.120 |
| | Matched | 5.591 | 5.522 | 0.4 | 0.07 | 0.945 |
| Institutional ownership (IO) | Unmatched | 0.238 | 0.190 | 26.2 | 6.06 | 0.000 |
| | Matched | 0.238 | 0.246 | -4.7 | -0.77 | 0.439 |
| IO squared | Unmatched | 0.089 | 0.067 | 19.0 | 4.49 | 0.000 |
| | Matched | 0.089 | 0.093 | -3.9 | -0.63 | 0.528 |

**Table A7**
**Propensity Score Matching: Balancing Test**
In this table, we report balancing test outcomes comparing firms with new or increased large short positions to those without large shorts. We report descriptive statistics before applying the propensity score matching algorithm (*Unmatched Sample*) and after applying the algorithm (*Matched Sample*). The covariates used in the matching procedure are all defined in Table 3. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively.

| Variable | Sample | Treated | Control | %bias | $t$-stat. | $p$-value |
|---|---|---|---|---|---|---|
| On loan | Unmatched | 0.012 | 0.009 | 19.3 | 7.88 | 0.000 |
| | Matched | 0.012 | 0.012 | 0.2 | 0.07 | 0.943 |
| Size (log $) | Unmatched | 21.172 | 19.905 | 67.7 | 28.48 | 0.000 |
| | Matched | 21.172 | 21.184 | -0.6 | -0.22 | 0.824 |
| Size squared | Unmatched | 451.06 | 400.41 | 66.3 | 28.37 | 0.000 |
| | Matched | 451.06 | 451.62 | -0.7 | -0.26 | 0.795 |
| M/B | Unmatched | 3.558 | 2.751 | 16.5 | 8.33 | 0.000 |
| | Matched | 3.558 | 3.491 | 1.4 | 0.42 | 0.678 |
| ROA | Unmatched | 0.097 | 0.068 | 9.9 | 4.16 | 0.000 |
| | Matched | 0.097 | 0.097 | -0.2 | -0.08 | 0.934 |
| Leverage | Unmatched | 0.374 | 0.334 | 14.2 | 6.44 | 0.000 |
| | Matched | 0.374 | 0.378 | -1.5 | -0.50 | 0.618 |
| Prior 12-month return | Unmatched | 0.174 | 0.121 | 10.6 | 5.24 | 0.000 |
| | Matched | 0.174 | 0.178 | -0.9 | -0.29 | 0.770 |
| Dividend yield (%) | Unmatched | 0.652 | 0.559 | 6.9 | 3.24 | 0.001 |
| | Matched | 0.652 | 0.646 | 0.5 | 0.15 | 0.881 |
| Institutional ownership (IO) | Unmatched | 0.291 | 0.187 | 57.4 | 26.15 | 0.000 |
| | Matched | 0.291 | 0.292 | -0.5 | -0.16 | 0.877 |
| IO squared | Unmatched | 0.116 | 0.068 | 43.5 | 20.71 | 0.000 |
| | Matched | 0.116 | 0.117 | -0.4 | -0.12 | 0.905 |

**Table A8**
**Propensity Score Matched Sample: Activism following Short Selling Disclosures**
In this table, we report results on the effect of large short position disclosures on the occurrence of hedge fund activism, using the propensity matched sample. The sample period runs from November 2012 to December 2019. The dependent variable is an indicator equal to one if a firm is targeted by an activist in quarter $t$ and zero otherwise. All independent variables are as defined in Table 3 and are measured in quarter $t$-1. In each column, we report coefficient estimates and their associated $t$-statistics and, when applicable, the corresponding marginal probability change (%) induced by a one-unit change in the value of a specific covariate from its sample average. Standard errors are clustered at the firm level. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively.

| Dependent variable: D(Activist targeting) | Probit Model | | | | | |
|---|---|---|---|---|---|---|
| | Coefficient (1a) | $t$-stat. (1b) | Marg. Pr. (%) (1c) | Coefficient (2a) | $t$-stat. (2b) | Marg. Pr. (%) (2c) |
| D(Large short) | 0.168* | 1.92 | 6.717 | | | |
| Large short interest (%) | | | | 0.161** | 2.11 | 6.411 |
| On loan | -0.337 | -0.22 | -13.457 | -1.347 | -0.75 | -53.739 |
| Size (log $) | -0.004 | -0.20 | -0.168 | -0.003 | -0.14 | -0.117 |
| M/B | -0.007 | -0.50 | -0.281 | -0.007 | -0.48 | -0.269 |
| ROA | 0.032 | 0.29 | 1.297 | 0.033 | 0.30 | 1.315 |
| Leverage | 0.139 | 1.14 | 5.552 | 0.141 | 1.16 | 5.615 |
| Prior 12-month return | 0.034 | 0.37 | 1.344 | 0.029 | 0.32 | 1.168 |
| Dividend yield (%) | -0.014 | -0.43 | -0.577 | -0.015 | -0.46 | -0.610 |
| Illiquidity | 0.000 | 0.13 | 0.011 | 0.000 | 0.11 | 0.009 |
| Institutional ownership | -0.255 | -1.02 | -10.170 | -0.250 | -1.00 | -9.960 |
| Year-quarter FE | Y | | | Y | | |
| Country FE | Y | | | Y | | |
| Observations | 3,167 | | | 3,167 | | |
| Pseudo R-squared | 0.004 | | | 0.004 | | |
| % (Dep variable = 1) | 50.00 | | | 50.00 | | |

**Table A9**
**Propensity Score Matched Sample: Changes in Short Positions following Activism**
In this table, we report results on the effect of hedge fund activism on the number of large short positions, using the propensity matched sample. The sample period runs from November 2012 to December 2019. The dependent variable, D(Δ(Large short) < 0), is an indicator equal to one if the number of reported large short seller positions decreases in quarter $t$ relative to the previous quarter and zero otherwise. All independent variables are as defined in Table 3 and are measured in quarter $t$-1. In each column, we report coefficient estimates and their associated $t$-statistics and, when applicable, the corresponding marginal probability change (%) induced by a one-unit change in the value of a specific covariate from its sample average. Standard errors are clustered at the firm level. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively.

| Dependent variable: D(Δ(Large short) < 0) | Probit Model | | |
|---|---|---|---|
| | Coefficient (1a) | $t$-stat. (1b) | Marg. Pr. (%) (1c) |
| D(Activist targeting) | 0.368* | 1.86 | 12.658 |
| On loan (%) | 0.200*** | 22.53 | 6.875 |
| Size (log $) | 0.018 | 1.55 | 0.630 |
| M/B | 0.007 | 1.64 | 0.258 |
| ROA | -0.175** | -2.13 | -6.025 |
| Leverage | -0.009 | -0.14 | -0.315 |
| Prior 12-month return | 0.051 | 1.03 | 1.736 |
| Dividend yield (%) | -0.013 | -0.92 | -0.448 |
| Institutional ownership | 0.167 | 1.35 | 5.749 |
| Year-quarter FE | Y | | |
| Country FE | Y | | |
| Observations | 12,509 | | |
| Pseudo R-squared | 0.071 | | |
| % (Dep variable = 1) | 30.19 | | |